WORKSHOP ON PERMAFROST DATA RESCUE AND ACCESS
An illustration of the diverse user requirements of the Global Geocryological Database (GGD).
GLACIOLOGICAL DATA

REPORT GD-28

WORKSHOP ON PERMAFROST DATA RESCUE AND ACCESS
3-5 November 1994, Oslo, Norway

by

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DESCRIPTION OF THE WORLD DATA CENTER SYSTEM

The World Data Centers (WDCs) were established in 1957 to provide archives for the observational data resulting from the International Geophysical Year (IGY). In 1958 the WDCs were invoked to deal with the data resulting from the International Geophysical Cooperation 1959, the one-year extension of the IGY. In 1960, the International Council of Scientific Unions (ICSU) Comité International de Geophysique (CIG) invited the scientific community to continue to send to the WDCs similar kinds of data from observations in 1960 and following years, and undertook to provide a revised Guide to International Data Exchange for that purpose. In parallel the CIG inquired of the IGY WDCs whether they were willing to treat the post-IGY data; with few exceptions, the WDCs agreed to do so. Thus the WDCs have been serving the scientific community continuously since the IGY, and many of them archive data for earlier periods.

In November 1987 the International Council of Scientific Unions (ICSU) Panel on World Data Centers prepared a new version of the Guide to International Data Exchange, originally published in 1957, and revised in 1963, 1973 and 1979. The new publication, Guide to the World Data Center System, Part 1, The World Data Centers (General Principles, Locations and Services), was issued by the Secretariat of the ICSU Panel on World Data Centers. This new version of the Guide contains descriptions of each of the twenty-seven currently operating disciplinary centers, with address, telephone, telex, and contact persons listed. The reader is referred to the new Guide for descriptions of the responsibilities of the WDCs, the exchange of data between them, contribution of data to WDCs, and the dissemination of data by them. The WDCs for Glaciology are listed below.

World Data Center A for Glaciology [Snow and Ice]

Address: WDC-A for Glaciology
         CIRES, Campus Box 449
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         Boulder, Colorado 80309-0449
         USA

Telephone: (303)492-5171
Fax: (303)492-2468
Network Address: nsidc@kryos.colorado.edu
Director: Dr. R. G. Barry

World Data Center B1

Address: World Data Center B1 for Glaciology
         Molodezhnaya 3
         Moscow 117296
         USSR

Telephone: 130-05-87
Telex: 411478 SGC SU
World Data Center C for Glaciology

Address: WDC-C for Glaciology
Scott Polar Research Institute
Lensfield Road
Cambridge CB2 1ER
UNITED KINGDOM

Telephone: (0223)336556
Telex: 81240 CAMSPL G
Network Address: ojm21@cus.cam.ac.uk
Manager: Oliver J. Merrington

World Data Center D for Glaciology [Snow and Ice] and Geocryology

Address: Lanzhou Institute of Glaciology and Geocryology
Chinese Academy of Sciences
Lanzhou 730000, China

Telephone: (86)0931-082-2815
Fax: (86) 931-888-5241
Director: Professor Cheng Guodong

The following organization provides international data services including data analyses and preparation of specialized data products. It merges the previous activity of the Permanent Service on the Fluctuations of Glaciers and the Temporary Technical Secretariat for World Glacier Inventory. These activities are not part of the WDC system but the center cooperates with WDCs in the discipline. Users wishing assistance in seeking data or services from this group may contact an appropriate WDC.

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FOREWORD

This issue of *Glaciological Data* highlights international efforts to improve the accessibility of data on permafrost, ground ice and seasonally frozen ground and to rescue data sets that may be at risk. A small workshop on the prioritization of permafrost data and on improved access to data in general was organized under the auspices of the International Permafrost Association, through its Executive Committee and the Working Group on Permafrost Data and Information. The meeting took place at the Norwegian Geotechnical Institute (NGI) in Oslo, Norway, 3-5 November 1994. We wish to thank Dr. Susan Lacasse, Director of the NGI, for hosting the meeting, and especially Dr. Odd Gregerson, NGI, and Dr. Kaare Flaate, Norwegian Directorate of Public Roads, for their generous assistance with the local arrangements.

The attendance of Russian and Chinese delegates at the meeting and partial assistance to some other non-government scientists was made possible by funds from NOAA's Earth System Data and Information (ESDIM) program for data rescue and the National Science Foundation Arctic System Science data management program support to NSIDC. The assistance of Claire Hanson, Paul Farley and Cindy Brekke, NSIDC, in the coordination of the travel arrangements was indispensable. Claire Hanson also prepared the Data Base Inventory format included as Appendix 1. Ann Brennan has assisted greatly with the editing and Lyn Ryder and Carol Pedigo with word processing.

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1. Background

The origins of this workshop and its purpose arose from several parallel and converging initiatives within the science and data programs of the International Permafrost Association, the National Oceanic and Atmospheric Administration's (NOAA) Earth System Data and Information Management (ESDIM) program and the National Science Foundation (NSF) Arctic System Science (ARCSS) program. These three strands are summarized below.

1.1. The International Permafrost Association

At the ninth council meeting of the International Permafrost Association (IPA) in Beijing, China, 8 July 1993, a resolution was adopted to "seek a more active role in International Geosphere-Biosphere Program (IGBP) core projects" and for "relevant IPA working groups [to] give particular attention to global climate change." The IPA Working Group on Data and Information seeks to improve and standardize the collection, archiving, documentation and dissemination of permafrost and ground ice data (Frozen Ground, No. 14, December 1993, p. 8 and p. 10).

The report of a workshop on permafrost data and information, held at the Fifth International Conference on Permafrost in Trondheim, Norway, on 7 August 1988 (Brennan and Barry, 1989) recommended that the IPA, through its working groups, should seek to ensure the security of key historical information and data records and to facilitate the development of user-friendly data systems, including data directories. Some preliminary steps were reported by Barry and Brennan (1993). As an outcome of those initiatives, during the winter of 1993-94, the IPA Working Group on Data and Information, in conjunction with the IPA Executive Committee, developed a draft prospectus for a Global Geocryological Database (GGD). This was circulated for comment and finalized at a two-day workshop held at the GeoData Institute, University of Southampton, UK, on 30 June-1 July 1994. The IPA Executive Committee, at its meeting on 2-3 July, endorsed the project and the proposed course of action. Accordingly, a workshop was organized in Oslo, Norway, by the Working Group on Data and Information to establish priorities for data rescue, to develop an implementation plan and procedures for data recovery, storage and dissemination, and to review the results of pilot projects underway in Russia and the UK.

1.2. NOAA Earth System Data and Information Management Program

The National Oceanic and Atmospheric Administration has instituted a program of Earth System Data and Information Management to coordinate data and information management activities on an agency-wide basis. The specific objectives of the program are to:

- Rescue critical NOAA environmental data currently at risk of being lost.
- Improve access to NOAA environmental data and information for scientists and administrators.
- Modernize and interconnect environmental data systems throughout NOAA to increase their capability and responsiveness.
- Assist in developing standards for data documentation, data quality, and network connectivity.
- Provide agency-wide-guidelines on developing policies related to environmental data management.
- Build a top-level consensus within NOAA on data management issues, and formulate a vision of the agency's data and information management strategy for the 1990s and beyond.
The final objective is addressed in the ESDIM plan and involves the construction of a strategic approach to data management and information that can be applied agency-wide. The early focus of the ESDIM implementation plan is on the rescue of critical NOAA environmental data, with the cryosphere being one of the first topics addressed. The first Workshop on Cryospheric Data Rescue and Access was held in May 1993 (Crane, 1993). The Permafrost Data Rescue and Access Workshop built on the approach developed at the earlier meeting; it addressed specific problems of data rescue and improved access to data. Data rescue in this context refers to saving data sets that are critical for scientific research. This may involve: copying data from existing magnetic tapes to new tapes or to other media; transcribing disintegrating or otherwise inaccessible historical paper records to digital, analog, or micro-form; or the compilation of new data sets from highly varied, original sources with different media types. The concept of data rescue, in the context of this workshop, focused on data records relating to permafrost, ground ice and seasonally frozen ground, and to the consideration of potential future data sources. Although the primary objective of the workshop was data rescue, the discussion included plans to make data readily accessible to the user community. Data access focuses on providing, or enhancing, the ability of researchers to access existing or rescued data sources.

1.3. Arctic System Science Program of the US National Science Foundation

Since September 1994 the National Snow and Ice Data Center (NSIDC), University of Colorado at Boulder, has been funded as the ARCSS Data Coordination Center for all components of the United States Arctic System Science (ARCSS) Program; ARCSS represents NSF's global change program for the Arctic. This unified data project follows separate grants for ARCSS data management pilot projects relating to the Ocean-Atmosphere-Ice Interactions (OAI1) and Land-Atmosphere-Ice Interactions (LAII), and the Greenland Ice Sheet Project Two (GISP2) components of ARCSS. Current NSIDC efforts focus on identifying ways to integrate the ARCSS component communities, and on providing access to existing, unarchived data of interest for ARCSS research. In parallel, the planning for archiving of ARCSS-funded data sets continues in concert with the OAI1, LAII, GISP2 and PALE (Paleoclimates of Arctic Lakes and Estuaries) Science Management Offices. Close contact is maintained with the emerging Human Dimensions component, the Surface Heat Budget of the Arctic Ocean (SHEBA) experiment planning process, and the developing Synthesis, Integration and Modeling component. The concept of "System Science", or integration, depends heavily on the accessibility and sharing of data and results among all those involved. NSIDC is seeking to develop the ways and means to ensure that accessibility.

As part of the LAII component and in keeping with the underlying ARCSS principles of integration and data accessibility, NSIDC is collaborating with the IPA Working Group on Data and Information in its efforts to identify and archive permafrost and other active-layer data for the IPA Global Geocryological Database. As an example, J. Brown and F. Nelson have provided active layer temperature and thickness, soil moisture, and snow depth data from the former US Army Cold Regions Research and Engineering Laboratory (CRREL) site and the new ARCSS site at Barrow for the first ARCSS/LAII CD-ROM product, "North Slope Alaska Data Sampler" (NSIDC, 1994). The CD-ROM also contains climate, soils, vegetation, and river runoff data. Such information is identified as vital for documenting the climate signal, for assessing changes in hydrological regimes, biologic processes and the Arctic ecosystem (McCaulay and Meier, 1991).

2. Permafrost Data and Applications

The cryosphere, representing the solid phase of the hydrosphere, occupies a unique place in the global water cycle. Ice in the atmosphere plays a vital role in the precipitation process and, at the surface of the oceans, it drastically modifies the ocean-atmospheric exchanges of heat and momentum. When ice occurs on land, it represents a major source of fresh water for societal use, and acts as a significant agent for geomorphic activity. The widespread distribution of permafrost in the Northern Hemisphere is shown in Figure 1. Past changes in climate have led to variations in the extent of the cryosphere, and the effects of this can still be seen in the geomorphic and isostatic history of large parts of the middle and high latitudes. Changes in the extent and distribution of the cryosphere itself
Figure 1. The distribution of permafrost in the Northern Hemisphere. (See Brown et al., in press; Heginbottom et al., 1993)
have a positive feedback on climate, and thus the magnitudes of past climatic changes are likely to be linked, in part, to the expansion and contraction of the snow and ice cover. Similarly, global climate model predictions of future global warming through enhanced greenhouse effects are strongly dependent on the effectiveness of the cryospheric response.

The cryosphere interacts with the earth system in a variety of ways, the most important of which is its interaction with climate. While climate controls on the cryosphere are readily apparent (in general outline, if not in detail), what may be less obvious is the way in which changes in the permafrost can feed back to influence the climate system. The presence of permafrost has a strong influence on soil water and runoff and therefore on the energy and moisture balance in cold regions. Thawing of thin permafrost, or a deepening of the active layer would greatly modify the runoff regimes, both water and sediments, as well as the soil moisture balance. Frozen organic materials also sequester substantial amounts of radiatively active trace gases (CO₂, CH₄, etc.) both within and beneath the permafrost body; their potential release to the atmosphere involves an important and little understood biogeochemical/climate link. Permafrost contains large quantities of ground ice and, once thawed, the ground becomes unstable, promoting dramatic increases in sediment yields.

Feedbacks between the cryosphere and the rest of the earth system have led to the suggestion that the permafrost is not only an important component of the system, possibly instrumental in mediating global change, but it may also be a sensitive indicator of such global change processes (see Koster et al., 1994, for an annotated bibliography). The attention focused on the cryosphere has been prompted by the important role that the snow and ice plays in General Circulation Models’ (GCM) climate change experiments, together with the recognition that the cryosphere has undergone large variations in the past that correspond to periods of extensive changes in global climate. It is important to note, however, that many processes involving perennially or seasonally frozen ground are not well understood and are very poorly simulated by current numerical climate models. Permafrost data are thus essential for validating Earth System Models and for improving model physics, as well as for monitoring environmental change and variability. These two (overlapping) requirements are central components of the IGBP and many national global change programs, and they contributed to themes for the data rescue discussions in the present workshop. Additionally engineering design and environmental impacts were also considered.

The cryosphere is an appropriate target for ESDIM’s early data rescue efforts not only because of the apparent importance of these data, but also because of the nature of the data themselves. Permafrost-related data encompass a wide range of parameters including, for example, depth and distribution of permafrost and seasonally frozen soils, as well as snow cover extent, depth, and mass balance, periglacial features, chemistry and temperature structure from boreholes in permafrost. In addition to their contribution to studies of snow cover-vegetation-ground ice interactions and trace gas fluxes, these data have operational applications in hydrology, engineering, shipping/fisheries, and off-shore development. Scientific applications, as noted above, tend to focus on cryosphere-climate interactions, but again this implies a wide range of possibilities that would include, in the case of permafrost, ground ice and seasonally-frozen ground, hydrological processes, and paleoclimatic reconstructions. The importance of these permafrost conditions is reported in the most recent impacts assessment of the Intergovernmental Panel on Climate Change, Working Group II; the report containing a chapter on the cryosphere is in preparation and final review.

Apart from the wide range of possible data sets and applications, several other factors complicate decision making with regard to cryospheric data management. For example, data sets are not application specific, and where time series of active-layer thickness and its physical and chemical properties may be of use to scientists interested in modeling frozen ground processes, they may also be of interest to engineers concerned with construction of pipelines and transportation facilities. The importance of any given data set will, therefore, vary according to the application concerned, which must obviously be reflected in the guidelines developed for prioritizing data sets, i.e., prioritizing of data sets must also involve some prioritizing of scientific objectives.
Permafrost data have been collected by both governmental and non-governmental agencies from many different countries. This raises problems of data acquisition and highlights the problem encountered when integrating data collected over varying temporal and spatial scales that exist on different media with a wide range of formats. Some further indication of the nature of the problem is shown in earlier data surveys/inventories conducted by the World Data Center-A for Glaciology (e.g. Barry, 1988; Crane, 1993).

3. Workshop Objectives

3.1. Prioritizing Data Sets

A first objective of the workshop was to derive a set of guidelines for data set selection that will facilitate the successful implementation of a rescue and access program. Given the limited resources initially available for the project, the volume of data involved, and the wide range of data sets/applications noted above, it was recognized that guidelines must be established early in the program.

3.2. Identification of Candidate Data Sets

A second objective was to identify high-priority data sets that satisfy the criteria recognized as a result of the first objective. The purpose was to begin the process of data set selection by identifying data sets with which to begin the data rescue activity.

3.3. The Global Geocryological Database (GGD) Concept

The specific objectives of the GGD project are to help identify, acquire and disseminate data on permafrost and frozen ground to serve several important purposes:

- To advance the scientific understanding of permafrost, with specific reference to relationships among climate, process, material and morphology; definition of palaeo-permafrost conditions; and specification of future long-term environmental monitoring programs.
- To improve the basis of engineering design in cold regions, for both contemporary and predictive purposes.
- To aid in understanding and predicting global and regional climatic change, and specifically to support the verification of general circulation models and trace gas cycles.
- To offer a basis for detecting environmental change at a range of temporal and spatial scales, particularly through establishing and managing long-term, wide-area monitoring programs.
- To enhance the basis for developing environmental scenarios and assessing socioeconomic implications of environmental change in cold regions, for planning and environmental protection.

The meeting endorsed the proposition of M.J. Clark (see Appendix 2) of "one database, many uses" and the proposed organization of the Russian National Geocryological Database (NGD), (see Appendix 3).

3.4. Data Base Structure

As currently proposed, the GGD will consist of an internationally distributed system of linked data centers or nodes. Information from regions of perennially and seasonally frozen ground will be assembled in National or Regional Geocryological Databases (NGDs, RGDs) and/or selected World Data Centers. The information will be made available to the scientific, engineering, environmental and policy communities.
The general issue of data structure was specifically addressed by M.J. Clark and J. Branson; their report is included in its entirety in Appendix 2. The group made no specific recommendations, however, as to a preferred structure.

3.5. The GGD Process

The GGD will operate by identifying existing data sets, current and historic; rescuing those that are at risk of being lost; managing the acquired data; and making data available to the scientific and engineering communities either in raw form or processed into specific usable forms of information. Standard data descriptions will be held in national and international directories, and users will gain access to the data through a variety of modes and media. The IPA is working with user communities to identify priorities for data rescue, acquisition and monitoring. Initially, the emphasis is being placed on retrieving data and time-series that are in danger of being lost.

Once identified and described, data sets will be organized into standard file structures and accessioned by an appropriate National Geocryological Database or regional node. Currently, the designated nodes are:

- Federal Center for Geocological Systems, Moscow, Russia
- GeoData Institute, Southampton, UK
- World Data Center A for Glaciology, Boulder, Colorado, USA
- World Data Center D for Glaciology and Geocryology, Lanzhou, China

The GGD nodes are using their existing in-house facilities, but are also developing additional funding to support NGD/GGD data rescue and management activities, as well as to promote information generation and dissemination through analysis and modeling.

Further working links have been established with other organizations pursuing similar goals for data rescue, monitoring, management and dissemination.

These include:

- Global Resources Information Database (UNEP/GRID), Arendal, Norway; Director: Svein Treitdal
- International Arctic Science Committee (IASC), Oslo, Norway (see IASC, 1994); President: Magnúss Magnússon
- Scientific Committee on Antarctic Research (SCAR); Chair: A.C. Clarke
- Council of Managers of National Antarctic Programs (COMNAP), Ad Hoc Planning Group on Antarctic Data Management, Cambridge, UK; Co-Chair: M.R. Thorley
- World Conservation Monitoring Centre (UNEP/WCMC), Cambridge, UK
- World Glacier Monitoring Service, Zurich, Switzerland; Director: W. Haeberli.

The topic of access to the GGD was raised by N.N. Romanovskii and M. Liebman (Appendix 3). A proposed protocol for use of the database was presented by J. Branson and is included as Appendix 4.

4. Priorities for Data Rescue

The results of the workshop discussions are presented under four headings:

- **Demands for permafrost data.** Priority should be given to data sets for which there is a high demand or that are important for a critical research goal. As resources are limited and as we cannot anticipate all future demands for data, priority is given to research areas considered to be important today, as well as to monitoring impact assessment and engineering needs. Three of these areas fall within the current US Global Change program:
data sets identified as being important for the validation of general circulation of global climate or earth system models, for system monitoring, and for process studies. Specific cryospheric parameters are assessed in the light of all these areas of application, and each is prioritized as discussed below.

- **Guidelines for prioritizing data sets.** A set of guidelines was presented for assessing the relative importance of prospective data sets and their priority in the data rescue effort.

- **High priority data sets.** Two groups of data sets are identified—one group having high priority and worthy of immediate attention, and one group that should be considered in the data rescue effort, but have a lower priority or require more information before priority can be fully assessed.

- **General recommendations.** A set of recommendations is presented for the near-term implementation of the permafrost data rescue effort.

### 4.1. Demands for Permafrost Data

As noted above, the workshop discussion focused on emphasizing data sets useful for parameterizing or validating large-scale GCMs or earth system models, data sets that could be used for monitoring climate change and variability, and data for developing or validating empirical or numerical models of system processes. It is also recognized that data are required to support specific international and national programs, e.g., Global Energy and Water Experiment (GEWEX), Arctic Climate System Study (ACSYS), Arctic System Science (ARCSS), International Tundra Experiment (ITEX), etc.

Although not considered specifically in this workshop, it should be noted that there are important linkages between the distribution and erosion of permafrost terrain and sea level (which is a concern over time scales of 100 years), and between the cryosphere and hydrology (important in terms of future water resources and the timing and quantity of runoff). Both of these are important research questions that may require data not discussed here.

#### 4.1.1. Validation of Earth System Models

The results from the present generation of climate models suggest that the model climate and its sensitivity to greenhouse gas-induced climate change are greatly affected by the cryosphere, particularly by the distribution of sea ice and snow cover. This is exemplified by the fact that most model results show their greatest greenhouse-induced warming at high latitudes, and at least one study has shown that about one third of the temperature feedback is due to albedo changes in high latitudes.

##### 4.1.1.1. Permafrost and Ground Ice

The primary importance of ground ice and permafrost is the way in which they modify the surface thermal and moisture regimes and how they respond to these surface modifications (thermokarst, etc.). In this regard, the most important parameters are ground ice extent, active layer depth and moisture content. Given this, we can establish that the highest priority data sets will be those that verify a model's ground ice extent and ground temperature above the depth of zero annual amplitude (DZAA). Most of the present generation of climate models include only a simple treatment of ground processes (Nelson et al., 1993). However, temperature and moisture are treated in newer models of surface processes. For example, a permafrost subcomponent has been developed by the UK Meteorological Office (UKMO) Hadley Centre and implemented in a single column model. For each of four soil layers, the variables of soil temperature, liquid and frozen water content are calculated based on the hydraulic and thermal properties of the soil. Dr. H. Cattle, of the UKMO (personal communication, 1994), confirms that the current data requirements include the seasonal variations in soil temperature and moisture profiles, together with information on the annual variations in thaw depth. Currently, research projects in several countries are obtaining soil moisture and temperature data, as reported at the 1994 Fall Meeting of the American Geophysical Union. Maps of these variables and of the current distribution of permafrost would be useful model validation data. In
addition, seasonal patterns of freeze-thaw may be important in the context of modelling and predicting trace gas fluxes.

For Earth System Models, highest priority will also go to those data sets that are global in coverage and have sufficient duration to derive climatological statistics (mean and variance). Although monthly data are adequate for most purposes, original data must be collected at sufficient temporal resolution to derive representative monthly averages. Several soil models utilize daily and monthly input data (see Waelbroeck, 1993). A possible future development could be a move towards the use of statistical methods to derive the spatial variability of the temperature-moisture ground-ice parameters within a grid cell. This would require the collection of data at a higher spatial resolution than the surface grid of the model (i.e., 2 degrees or better) in order to derive the spatial relationship for use in the model.

4.1.1.2. Snow Cover

Snow cover was not specifically discussed at the workshop. However, there is a consensus among permafrost scientists and engineers that snow cover is a key control in mediating ground temperature and must be considered in all models. It is worth noting that state-of-the-art Earth System Models predict the fractional snow cover, snow depth and water equivalent, and layer temperature. Little work has been done on the sensitivity of climate models to snow cover, the importance of which appears to be due to its albedo (and the related masking effect on the vegetation canopy), and to its effect on the surface hydrology and active layer temperature and moisture regimes. The required data sets for model validation are snow cover extent, snow water equivalent, and snow depth (for land surface models that allow vegetation masking by snow accumulation). Again the data should be global and of sufficient duration (> 10 years) to derive climatological statistics. Both conventional and remotely sensed snow data are required. Recent work by Holze (1994) in the upper Engadine Valley, Switzerland, shows that the bottom temperature of winter snow cover is a good indicator of permafrost distribution if combined with digital elevation model data. This would potentially be an additional parameter for inclusion in the list shown in Table 1, for change detection.

Table 1. Results of priority setting for key permafrost variables.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Process understanding</th>
<th>Engineering design</th>
<th>Model validation</th>
<th>Change detection</th>
<th>Impact evaluation</th>
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<td>M</td>
<td>M</td>
<td>H</td>
<td>L</td>
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<tr>
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<td>H</td>
<td>M</td>
<td>L</td>
<td>L</td>
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<tr>
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<td>M</td>
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<td>Chemical composition</td>
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<td>Soil</td>
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<td>Water or ice</td>
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<tr>
<td>Trace gases</td>
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<td>L</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

H, M, L = High, Moderate, and Low priority.
† Depth of zero annual amplitude.
4.1.2. System Monitoring and Change Detection

Permafrost data can be used for Earth System monitoring and change detection in several ways: the data may be used alone (e.g., measuring the areal extent of permafrost and ground ice content, or development of thermokarst features); they may be used as an integrator of various climate parameters (e.g., active layer thickness); and they may be used to support trends noted in the data sets (e.g., changes in shallow ground temperatures may be used to support trends noted in regional meteorological data).

For monitoring purposes the most important consideration is the length of record of the data set and its internal consistency. As with any meteorological data set these require a length of record sufficient to extract long-term trends from the short-term variability, and they require sufficient metadata to assess the data set history and to separate natural changes from artifacts introduced by the data collection process. While global data are less critical for change detection than they are for model validation, data sets have to be available from enough regions to demonstrate that observed changes are globally significant.

Interactions and feedbacks between permafrost and climate (mainly via greenhouse reinforcing as a consequence of thawing of frozen organic matter) involve very long time scales, but alterations due to continued or even accelerated warming could be dramatic over vast areas (affecting land subsidence, coastal erosion, drainage patterns, slope stability, etc.). Borehole temperatures in ice-supersaturated and, hence, impermeable permafrost provide extremely clear signals of secular warming trends (Lachenbruch et al., 1988) and recently accelerated temperature increases. Commercial boreholes have been drilled in connection with Arctic oil exploration, but these boreholes are not always available for long-term temperature measurements. A few research boreholes of limited depth have recently been drilled at high altitude/low latitude sites in Canada, China, and the European Alps, and their records should become part of the proposed GGD.

4.1.3. Process Studies/Process Model Development and Verification

Data priorities for process studies and models are less easily defined than they are for the Earth System Models or for climate monitoring. Virtually any data at any temporal or spatial resolution are potentially useful for empirical analysis, as inputs for process models, for model parameterization, or for model validation. In this case, the greatest priority would go to those data sets that comprise a suite of co-located measurements of several related parameters.

4.2. Guidelines for Prioritizing Data Sets

The guidelines reported by Crane (1993) have been modified slightly, but essentially adopted for the present purpose.

1) The five areas of application – process understanding, engineering design, model validation, change detection, and impact evaluation – have equal priority. Other applications should not be excluded but they would receive a lower priority level.

2) Only data sets with a certain minimum level of accompanying metadata should be considered. Metadata do not have to be complete, but enough information is needed to determine the exact nature of the data collected, the location and period of coverage, and to evaluate the data reliability. It should be recognized, however, that the reliability may not be immediately obvious. The evaluation of reliability often comes from the research process and through comparison with other data sets. What defines a minimum level of metadata will vary from application to application.

3) Data in danger of being lost should get a higher priority for data rescue. Priority is determined by length of time before the data set is likely to be lost. Higher priority should also go to data that, while in no danger of being lost, are presently inaccessible to the user community.
4) Data quality is an important consideration, but it is difficult to quantify. Requirements for data accuracy and reliability will vary from application to application. A lower quality may be more acceptable for unique data sets compared to those for which other alternatives are available. The decision on an acceptable data quality (as with the decision on what constitutes sufficient metadata) will rest with the Data Center manager.

5) Having satisfied the previous criteria, data sets may be prioritized according to data set attributes such as coverage, duration, frequency, and cost.

The results of the prioritization exercise conducted at the workshop for five key applications are summarized in Table 1 (p. 8). As the table illustrates, the requirements in these categories vary for each application. Comments on these rankings are welcomed as we anticipate that the priorities will be reassessed as the GGD process develops.

It was noted that data would be especially useful for model validation if they coincided with the 10-year (1979 to 1988) Atmospheric Model Intercomparison Project (AMIP) period used for GCM intercomparisons. High priority would also go to data sets having a spatial coverage and duration that match other extensive data collection/analysis programs such as GEWEX, ACSYS, ITEX, etc.

Further discussion following this priority-setting exercise led to the conclusion that permafrost thickness should also have been divided into shallow and deep (or thin and thick), perhaps using the same depth division as used for temperature. Greater emphasis might also have been given to trace gas composition, especially methane. Site descriptions (location, geology, vegetation, ownership), and metadata (sampling techniques, equipment used, precision, post-processing) are included in the data description and were not prioritized separately.

Ultimately, decisions about which data sets to rescue will depend on the cost of the rescue operation as well as scientific importance. A cost-benefit analysis should be part of any decision making process – where costs are high and the importance of the data set relatively low, the data set would automatically receive a low priority. Low costs, on the other hand, should not automatically raise the priority of the data set. It is likely that decisions regarding costs can only be made by considering the data rescue in terms of opportunity cost (i.e., the loss of other data sets that might alternatively have been rescued). Again, this is a decision that would appear to rest with the data center. Recognizing the limited resources available for data retrieval tasks, the workshop also developed a number of recommendations for guiding data rescue, archiving, and information management. Other, more technical and procedural results of the workshop included the discussion of formats for data set information and the preparation of drafts of a statement of protocol for data management, acquisition, and dissemination (see Appendix 4).

4.3. High Priority Data Sets

The meeting participants discussed several candidate data sets that should receive priority treatment, following the presentations by the Russian specialists (see Appendix 3) and brief status reports by other national representatives. It was decided that the following data should be targeted for early attention in the Global Geocryological Database:

- digital point values of permafrost thickness, ground temperature and ground ice content that were used in preparing the 1:10 million Circumarctic Map of Permafrost and Ground Ice Conditions (Heginbottom et al., 1993; Brown et al., in press); data from some 100 boreholes in Russia also incorporated in the same map;
- data on temperatures and moisture content in soil layers at standard depths at selected stations in Russia (Table 2);
- metadata on national and regional maps of permafrost published in Russia (see Appendix 5);
- a directory of institutions and individuals in the Former Soviet Union holding major collections of permafrost data (See Appendix 6).
### Table 2. SELECTED RUSSIAN METEOROLOGICAL STATIONS.  
SOIL TEMPERATURE DATA (PILOT PROJECT).  
STATIONS WITH OBSERVATIONS AT DEPTHS > 2.4 m

<table>
<thead>
<tr>
<th>STATIONS</th>
<th>LOCATION</th>
<th>PERIOD OF RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aleisk</td>
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<td>1947 - 1965</td>
</tr>
<tr>
<td>Eleckay</td>
<td>Not Available</td>
<td>1955 - 1965</td>
</tr>
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<td>61°16' N - 108°01'E</td>
<td>1953 - 1970</td>
</tr>
<tr>
<td>Irkutsk</td>
<td>52°16' N - 104°21'E</td>
<td>1958 - 1970</td>
</tr>
<tr>
<td>Ishim</td>
<td>56°06' N - 69°26'E</td>
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<td>1952 - 1965</td>
</tr>
<tr>
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<td>61°00' N - 69°10'E</td>
<td>1961 - 1965</td>
</tr>
<tr>
<td>Komsomolskiy</td>
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<td>1963 - 1965</td>
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<td>Markovo</td>
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<td>1948 - 1965</td>
</tr>
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<td>1948 - 1965</td>
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<tr>
<td>Oimykon</td>
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<td>1949 - 1965</td>
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<td>Ostrovnov</td>
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<tr>
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<tr>
<td>Srednekolymsk</td>
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<td>1931 - 1965</td>
</tr>
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<td>1949 - 1965</td>
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<td>1949 - 1965</td>
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4.4. General Recommendations

Given limited resources we recommend that:

1) Immediate efforts should be made to begin, or to assist with, the rescue of data sets pertaining to the high priority variables listed in Table 1.

2) The IPA should consider a follow-up meeting in mid-1995 that would review the data rescue procedures and focus on identifying other high priority data sets for the next stage of the rescue effort.

3) This workshop focused almost entirely on the recent time period. We should not lose sight of the fact that the best verification of an Earth System Model’s ability to predict climate change is to run the model for past climate states. Paleoclimatic data are vital for this approach, and a focused effort should address the question of permafrost data rescue for paleoclimate applications in this context. This can be done in cooperation with other programs such as the International Geosphere-Biosphere Program’s Past Global Changes Project (PAGES), the UNESCO-International Union of Geological Sciences CLIMEX (Climatic Extremes of the Past), mapping project, and the ARCSS PALE program (PALE Steering Committee, 1993).

4) The order of processing for rescuing data sets should not automatically start with the oldest records and work forward (unless the oldest records are deteriorating at a rate that makes this approach necessary), nor should it start at the present and work backwards. As was noted in the criteria for data set prioritization, the most useful data, such as those that coincide temporally with other large-scale experiments or overlap with the introduction of new satellite systems, should receive early attention.

5) The question of data rescue, in general, and permafrost data rescue in particular, should be included on the agenda of the meetings of the IPA Executive Committee and Council and special sessions at the five-yearly international conferences.

6) Data rescue should also be placed on the agenda of the International Commission of Snow and Ice, and other international organizations with common interests.

5. Next Steps

Several useful data sets have been compiled and released on CD-ROM; an example is the Alaska North Slope Data Sampler containing soil and permafrost data distributed by NSIDC (1994). It would be useful if a general cryospheric data set that included permafrost data could be made available in this form. This could include gridded data contained in the permafrost map of the northern hemisphere, selected borehole temperature data from Russia and Canada, and measurements of active layer characteristics for circum-Arctic sites.

The Data and Information Working Group anticipates that the IPA, through the Council and other Working Groups, will encourage the implementation of the GGD in the following ways:

- Develop an inventory of relevant national data sets (see Appendix 5).
- Compile approved data set descriptions into master directories, accessible to users. The International Arctic Environmental Data Directory (ADD) project is a possible means of facilitating user access to GGD (Appendix 7).
- Retrieve priority data sets, and archive them in standard formats at National Database Centers or GGD nodes.
- Make the databases available to users through appropriate distribution media (diskettes, CD-ROM, hard copy) or on-line via FTP.
- Promote user-oriented analytical, modeling and mapping information products, based on NGD or GGD data sets.
- Concurrently develop funding proposals to national and international, governmental and non-governmental funding sources.
The Data and Information WG invites all IPA member countries, working groups and interested individuals, wherever they are, to participate in and contribute to the GGD project. As a first step this requires completion of a data set description on the form being distributed with the December 1994 issue of Frozen Ground to over 2,000 readers (see Appendix 1). Readers of Frozen Ground, are encouraged to complete and return the form to the WDC-A for Glaciology or their National Representative at their earliest convenience. The WG plans to convene a three-day meeting and workshop in Potsdam, Germany, before the XIV International Congress of the International Union for Quaternary Research, in Berlin. It will report on the status and results of GGD activities to the IPA Council at its 4-5 August, 1995 meeting.

The participants recommended the following strategic targets and time table for GGD implementation.

A. RESEARCH AND DEVELOPMENT

A1 Review and refine the GGD Parameter Priorities List (through Frozen Ground) (6 months)

A2 Refine the GGD Data Structure (coordinate through the groups in Southampton and Moscow) (6 months)

A3 Converge on agreed GGD DIF (in consultation with USGS) (9 months)

A4 Combine A1-A3 into a first Draft of IPA "Guidelines for Geocryological Data Management" with metadata guidance (12 months)

B. DATA SETS

B1 Compile first version of Inventory of Candidate Data Sets (6 months)

B2 Using refined List A1, develop from B1 a List of Rescue Priorities for IPA (9 months)

B3 Define technology. (Scan v. Automated digitization v. Manual digitization) (6 months)

C. INFORMATION SYSTEM

C1 Continue work on IPA GGD database pilot, initially using Barrow and CPM data (6 to 12 months)

C2 Develop proposals for pilot GGD Dissemination System (media and management) (6 to 12 months)

C3 Develop proposals for high level derivative products (9 to 15 months)
  • Derivative data
  • Analysis and monitoring
  • GGM input data
  • Permafrost bulletin
  • Inputs to the Intergovernmental Panel on Climate Change
  • Flagship data sets
6. References


7. **AGENDA**

**Objectives**

1. Establish priorities for the recovery of permafrost and frozen ground data
2. Develop the implementation plan and procedures for the data recovery, storage and dissemination
3. Review results of pilot projects and approaches to database structure and utilization

**Agenda – Day 1, Thursday, 3 November 1994**

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Welcome and Introductions</td>
<td>(Flaate, Barry)</td>
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<tr>
<td>09:15</td>
<td>Review Purpose and Program of Meeting, Accept Agenda</td>
<td>(Barry, Heginbottom)</td>
</tr>
<tr>
<td>09:30</td>
<td>GGD project – Status Report, Summary of Southampton Meeting</td>
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<td>10:00</td>
<td>Break</td>
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<tr>
<td>10:15</td>
<td>Criteria for data prioritization (See Crane, 1993)</td>
<td>(Barry, Brown)</td>
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<td>13:00</td>
<td>Lunch</td>
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<tr>
<td>14:00</td>
<td>Data set identification and description, Data availability</td>
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<tr>
<td></td>
<td>(existing Directory Interchange Format [DIF] and Master Directory activities)</td>
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<tr>
<td>16:00</td>
<td>Break</td>
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<tr>
<td>16:15</td>
<td>Presentations of on-going GGD-NGD activities</td>
<td>(Participants)</td>
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<td></td>
<td>(Russia, US, Canada, China, Fennoscandia, Alpine Europe, Japan, etc.)</td>
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<td>17:30</td>
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**Day 2, Friday, 4 November 1994**

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<td>08:30</td>
<td>Models and structures: GeoData results of pilot projects including GLOCOPH</td>
<td>(Clark, Branson)</td>
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<tr>
<td>10:15</td>
<td>Working sessions: Priorities and options</td>
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<tr>
<td>13:30</td>
<td>Working session: Data distribution and archives</td>
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<tr>
<td>15:00</td>
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</table>
15:15 Working session: Activities, options, schedules, funding, responsibilities  

17:30 Adjourn

Day 3, Saturday, 5 November 1994

08:30 Working session: Report preparation
10:00 Break
10:15 Plenary session: Review progress, Next meeting
12:00 Closure
12:30 Lunch
13:30 IPA Data Working Group Business Meeting
16:30 Closure
8. PARTICIPANTS

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**APPENDIX 1**

**IPA GLOBAL GEOCRYOLOGICAL DATABASE INVENTORY**

The International Permafrost Association is conducting a survey of available data on past and current investigations of permafrost, seasonally frozen ground and periglacial conditions and related laboratory studies. An electronic mail form is also available. You may submit more than one form if data types differ substantially. Results of this survey will be reported in *Frozen Ground* and other relevant publications. Please complete this form and return it to your IPA national representative with a copy to the World Data Center-A for Glaciology, Attn: Claire Hanson, Campus Box 449, University of Colorado, Boulder, Colorado 80309-0449, U.S.A. *Forms and instructions are also available electronically from: hanson@kryos.colorado.edu.*

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<tbody>
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<tr>
<td>Data compiler/author</td>
</tr>
<tr>
<td>Name</td>
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<tr>
<td>Latitude (south to north)</td>
</tr>
<tr>
<td>Longitude (east to west)</td>
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<tr>
<td>Period of investigation</td>
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</tbody>
</table>

**Summary:** Give brief details of site, collection technique, measurement frequency, and quality. Indicate what ancillary data on site, climate, data processing and metadata are available or can be reliably obtained (with sources).

(Attach additional sheets if necessary)

Current storage medium: CD-ROM / Spreadsheet / Word processor / Database / Data centre (give name) / Paper

Are your data at risk of being lost? YES / NO

Bibliography (Published and unpublished reports about this data set; attach additional sheets if necessary)

**Key Words:** (Maximum of 10 such as Active layer, Permafrost thickness, Temperature, Moisture content, Ice content, Chemistry, etc.)
APPENDIX 2

GLOBAL GECRYSOLOGICAL DATABASE: SUGGESTION FOR DATA STRUCTURE

Julia Branson and Mike Clark
GeoData Institute
University of Southampton
Southampton, United Kingdom

Database Prototype

A prototype database has been prepared to illustrate how the development of the GGD database could be approached. The development of the prototype has assumed that the end product should be a tool to facilitate data manipulation and analysis (see figure 1) rather than simply a method of data storage. The prototype as presented is a developers’ version and has no user front end and only limited functionality compared to a full production system. Two different types of data set have been entered into the database: 1) the Barrow data set comprising soil moisture, temperature, etc., taken at multiple points and plots over a number of years and 2) the data used to compile the Canadian permafrost map (See Heginbottom et al., 1993).

This report outlines issues that should be addressed during the development of the production database, describes the software used and discusses three different possible forms of data structure.

Software

For the prototype the data have been stored in a relational database system. A relational database is one in which the data are kept in several related tables. Each table contains data from a particular aspect of the data set. Tables are linked to each other using unique keys; for example, in a library data set the borrowers and book detail tables could be linked by a unique book number.

Advantages of relational structure over storing data in individual flat files include:

1) data can be queried to obtain items in the database which select data fulfilling a requirement either from many data sets or just particular items from one data set. Data can be output from queries as a text report or as an ASCII file that could be transferred into a spreadsheet or other package;

2) data redundancy (duplication) is reduced and thus storage requirements are reduced.

A disadvantage, however, is that some data manipulation may be required to input the data and fit it into the table format, particularly if it is presently held in a digital format.

The system used for the prototype is Paradox by the Borland Corporation. This package has been used by many other international projects, such as the North American and European pollen databases and the global palseoflood database, and is relatively inexpensive (not more than about $200). The advantage of this system over ones such as ORACLE is that graphical images can be easily incorporated into the product and there are also facilities for producing simple graphs within the database interface. A disadvantage, however, is that Paradox does not support structured query language (generally regarded as the industry standard language for relational databases), although this may not affect the end-user. For the production database it may be appropriate to hold the data on a central robust large database system and to transfer it to a more user-friendly system for distribution.
GLOBAL GEOCRYOLOGICAL DATABASE DATA APPLICATIONS

ONE DATABASE — MANY USES

USER REQUIREMENTS

<table>
<thead>
<tr>
<th>RESEARCH</th>
<th>OPERATIONAL</th>
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<tbody>
<tr>
<td>PROCESS UNDERSTANDING</td>
<td></td>
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<tr>
<td>HIGH RESOLUTION</td>
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<td>LARGE AND SMALL SCALE</td>
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<tr>
<td>ENGINEERING DESIGN</td>
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<tr>
<td>HIGH RESOLUTION</td>
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<td>LARGE SCALE</td>
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<td>GGM VALIDATION</td>
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<tr>
<td>LOW RESOLUTION</td>
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<td>DETECTION OF CHANGE</td>
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<tr>
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<td>VARYING SCALE</td>
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<td>IMPACT ASSESSMENT</td>
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<td>←--</td>
</tr>
<tr>
<td>MULTIPLE SCENARIOS</td>
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</tbody>
</table>

ENVIRONMENTAL PROTECTION

Figure 1. An illustration of the diverse user requirements of the Global Geocryological Database (GGD): research versus operational and science versus engineering design. The requirements range from access to archived 'raw' data to standardized/transformed data.
Access to the database

It is envisaged that access to the database could be either on-line (via INTERNET), thus allowing the user to perform interactive queries on the main database, or distributed on a CD-ROM that contains simple querying and visualization software. (The disadvantage of the latter is that the data that the user accesses will not necessarily be the most up-to-date version as available from the main database.) Either distribution method would allow users to download data to their own software.

The majority of database systems have the facility to allow restricted access to the database. Thus users may be requested to register to use their data on-line. Database security will restrict the users to only viewing and downloading the data and they will be unable to change the data. A sample of a database protocol is attached as Appendix 4.

Data structure

A possible data structure for the GGD is shown in Figure 2. This structure is most suitable for the representation of point data. For the storage of non-point data (either linear or area) it may be appropriate to link the database to a Geographical Information System.

The tables relate to the following:

The data in the database have been initially classified by data set and further details are given in the Data set table. This table contains similar information to other Directory Interchange Format (DIF) flat files and should be designed when the DIF for the GGD has been finalized and would include details of spatial and temporal coverage, keywords and a brief description. This is linked by publication number to the Bibliography table that contains references to the reports/papers from which the data were taken or which refer to the data and other relevant articles. It is not suggested that a complete permafrost bibliography should be maintained as this is available elsewhere.

The data set table also connects to the Researchers table which gives the name, address, e-mail, etc. of the person/people who submitted the data to the database and who should be contacted regarding the data.

The data are held in a hierarchical structure. Initially they have been split into sites (in the case of the Barrow data set a site is an individual plot). The Site table gives details of the site name and a unique site key. Locational information (latitude, longitude, elevation) is described in the Location table (if data are referenced to a smaller scale then they can be recorded at the Record level (see below)), and a longer text description of the site is in the Site comments table.

The data are then classified by what has been termed a Record, in the case of the Barrow data a record is an individual core (or point). The Record table gives the name and type of each record.

Representation of data

For ease of use of the database, to ensure that different data sets can be easily compared, and to avoid misrepresentation, it may be appropriate to translate all data to a common mensuration (probably the International Standard). It is important that a copy of the raw data is also held in the database, however, although it is recommended that this should only be available to privileged users.

Storage of spatially and temporally variable data at the record level

Storage of data that have been collected at different spatial and temporal intervals is a complex matter and three different alternatives have been explored here (see Figures 2, 3, and 4). The following tables are common to the three types of structure above: Data Set, Site, and Record tables.
Figure 2. Candidate data structure for GGD: Alternative 1. This is especially suitable for point data.

Figure 3. Candidate data structure for the GGD: Alternative 2.
Alternative 1) The data are held in just one main table; within this the different depths within a core have unique sequence numbers. The table contains the following:

- Type of data (e.g., soil moisture content, snow depth, permafrost extent)
- Value — this can be either numerical (e.g., 50%) or text (e.g. continuous)
- Depth at which the sample is taken
- Date — this is stored in a year field, a day/month field and an AD/BP date field.

The disadvantage behind this method is that there is a considerable amount of data redundancy, as the depth, dates, etc., have to be repeated for each sequence in each record. The advantage, however, is that queries of the data are relatively simple and quick to construct and, also, only a limited amount of manipulation is usually required to transfer the data from an original digital flat file to the database table.

The other two alternatives are more fully relational, and thus reduce the amount of data redundancy (and the amount of storage required). A considerable amount of data manipulation would be required, however, to transfer the digital data into the table structure. Queries are also complex to construct.

Alternative 2) The location and the date values are kept in individual tables so that many sequence numbers can refer to them, and the tables linked with key numbers (Figure 3).

Alternative 3) Each data type is stored in an individual table (Figure 4). This solution is not recommended as a large number of tables would be required to cover the wide range of possible data. Querying would also be very complex.
Other database tables

If the date has been determined by a dating method (e.g., radiocarbon) or has been inferred by stratigraphic inference then further details are given in the Date information table. This gives the errors, sample and laboratory numbers, dating method, etc., associated with the date.

If various statistics have been collected for a particular item of data (e.g. maximum, minimum temperature) then the details are given in the Statistics table which is linked to the Data table.
APPENDIX 3

RUSSIAN CONTRIBUTION TO THE GLOBAL GECRYOLOGICAL DATABASE

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Moscow State University
Moscow, Russia

According to the goals and objectives announced in the letter distributed by the IPA Data Working
Group on September 26, 1994, Russian participants in the meeting suggest that the approaches
developed for the Russian National Geocryological Database (NGD) be applied to the Global
Geocryological Database (GGD). Geocryological databases represent one component of the much
broader cryospheric database and should be compatible with the latter. At the same time, permafrost
and geocryological conditions differ fundamentally from other components of the cryosphere, such as
snow and ice. As a geological feature, permafrost is much more inert to external influences. That is
why it is more sensitive to medium (10s of years) and long-term (100s-1000s of years) climate
fluctuations than to short-term (interannual years) and seasonal ones.

The main manifestations of permafrost changes are concentrated at and just below the earth's
surface where external climatic and human-induced factors are interacting with permafrost features.
This interaction results in specific cryogenic (periglacial) processes and phenomena. Nevertheless
permafrost is not only a geological but a climatic feature as well, and hence several processes having
a seasonally variable character are inherent in the geocryological conditions of the
permafrost/atmosphere/hydrosphere interfaces.

Another specific feature of permafrost in comparison with surficial features is that some methods
of observation are not applicable to the study of the permafrost temperature regime, such as repeated
aerial and satellite photography. This method gives little information on the upper layers of
permafrost and virtually none for the deep layers of permafrost. Only those features that have a
geological origin but surficial expression, such as icings, can be studied like glacial features. Data
obtained when studying permafrost thus differ from that obtained for snow and ice, and the data
processing and generalization depend upon the existence of stability in the medium. The main method
of collecting data and of mapping permafrost in Russia is linked to the landscape type. This involves
two main procedures for acquiring data, depending on the degree of generalization. The first is
archiving maps with generalized information on each category (the maximal degree of generalization).
The second is archiving of the coordinates of the points (boreholes, etc.) with complete information
layer by layer on lithology, cryogenic features, and laboratory tests (the minimal degree
of generalization, but still varying according to the depth and goals of drilling, or description).

The problem of choosing the degree of generalization also concerns data collection about the
permafrost regime. At meteorological and agricultural stations, climatic and active layer records are
averaged for daily, weekly, monthly, annual and multi-year intervals. Different subjects need
different degrees of generalization. Some cryogenic processes and active layer studies need daily
information. Such processes as thermoerosion and thermoabrasion need seasonal information, frost
heave and thermokarst need long-term information. There are several hundred weather and
agricultural stations in the Russian permafrost zone and in the zone of the deep seasonal freezing (for
example, a seasonally frozen layer of about 3-5 m deep is characteristic of the southern part of West
Siberia). At least one hundred of them measure the depth of thawing or freezing and the temperature
of active layer at 8 levels in the profile (0, 20, 40, 80, 120, 160, 240, and 320 cm). There is a 60-year
long period of observations at one of the stations. In this case we have 35,000 readings just for the
temperature of the active layer; moisture content is also measured there. Should all these records be
digitized or should we choose a selection based on some criteria?

The data obtained at the meteorological stations, agricultural stations, and steady-state
permafrost stations during investigations for construction have different content, different techniques
of monitoring, laboratory testing and generalization. This makes it difficult to work out unique criteria for data selection.

To summarize:

- Permafrost as a geological feature has parameters that are stable or changing very slowly with time. They are important to the fundamental understanding of permafrost and its relationships with “... climate, process, material and morphology ...”

- At the same time permafrost as a climatic feature is characterized by short-term fluctuations reflecting the changes in climate and environments and in its turn influencing them.

- This duality results in heterogeneity of the database structure. We suggest that GGD should consist of several blocks with different internal structures depending on their subject. Neither present geological nor geographical database structures are acceptable. The structure of the geocryological database combines several blocks of features and parameters on one side and regime observations on the other side. Four main criteria and several specific criteria are proposed.

We suggest the following main criteria for data prioritization:

1. **Relevance** — the use of relations between the geocryological data and important problems such as global climatic change, environmental protection, and development of useful mineral deposits in the Arctic.

2. **Availability** — the possibility of obtaining data with minimal time and use of funds.

3. **Completeness** — the maximal set of information at one point.

4. **Spatial distribution** — the acquisition of a uniform distribution of the points throughout the territory.

The last two points are, to some extent, contradictory, so an optimal combination should be found.

Specific criteria should be attached to specific data sets. Some permafrost elements, such as icings, have features of a stochastic character (analogous to glaciers) and icing data can be generalized only for situations with adequate local data. Hence, the fourth criterion cannot be used in cases where statistical analyses are to be performed.

Most permafrost data are concentrated in regions of active economic development where they are often not accompanied by the collection of weather data. In this case, high quality analyses of permafrost data are impossible. In this situation weather records play a more important role than the number of permafrost parameters monitored and the third criterion is not considered.

The most numerous data on the active layer are concentrated at agricultural stations but they are situated mostly to the south of the southern limit of the permafrost zone. Here the main criterion should be the existence of paired data (on hills and in valleys) and at an intermediate latitude; the latter refers to a location on some transect from the southernmost to the northernmost stations within different geographical regions.

Most data on ground temperature refer to the depth of zero annual amplitude. Often there are single measurements in each borehole, but sometimes there are repeated measurements although not necessarily on the permafrost regime. Those cases are most important in considering the stability of the permafrost thermal regime. Here the criterion of the time of recording is less important. The main criteria for monitoring borehole temperature are data extending below the base of permafrost, or at
least exceeding of the depth of zero annual amplitude, measuring the temperature gradient in permafrost, and monitoring processes in the same location (again data at paired elevations).

In order to unravel the problem of dividing the criteria, we suggest a list of informational blocks. Each block in the list would have a different structure and criteria for data acquisition.

**Block I** — Geocryological maps.
**Block II** — Geocryological conditions existing in boreholes, excavations, and description points.
**Block III** — Cryogenic (periglacial) processes.
**Block IV** — Observations on permafrost regime.
**Block V** — Inventory of metadata sets.

The inventory of metadata sets includes:

*Set 1* — A list of permanent weather stations, agricultural stations and permafrost stations.
*Set 2* — A list of investigations, design institutions and construction companies involved in Arctic and subarctic development.
*Set 3* — A list of published and unpublished sources of information.
*Set 4* — A list of existing digital or hard copy local databases (with a specific standard description of each database).
*Set 5* — A list of important unpublished geocryological maps.

We have started to develop a Russian National Geocryological Database (NGD) taking account of the following:

- the NGD should be compatible with the GGD, and
- the NGD should be compatible with existing local databases. This is why we started by planning the NGD structure. An initial version was reported at the summer meeting 1994 in Southampton. Now we are presenting the version that has been accepted for the NGD use for the GGD.

The NGD is based on a GIS-program and other compatible programs of data archiving. Four separate data blocks, referred to above, have been prepared for this meeting containing different type of information:

**I** — Bibliographical description of geocryological maps both published and unpublished, including maps of permafrost conditions, cryohydrogeological maps, terrain engineering maps, ecological maps, and maps of cryogenic (periglacial) processes and phenomena.
**II** — Numerical and text information on geocryological conditions obtained in boreholes, excavations, and at description points,
**III** — Numerical and text information on cryogenic (periglacial) processes,
**IV** — Numerical information on observations of permafrost regime.

The structure of the first block is rather obvious — it is a list including information on the authors, publisher, date and place of publication, scale and legend of the map. As a completed example we present a database of published maps of the FSU, Russia and regions of Russia (Appendix 5).

The second block includes practically all the information obtained in the boreholes and other points having coordinates on digitized maps. All the information is accumulated in several subblocks and can be retrieved layer by layer, or in a combination of layers according to the given legend.

The third block provides information on the extent, characteristics and rates of cryogenic (periglacial) processes and the morphometry of the phenomena referred to the category or to the area.
The fourth block is a collection of tables including measurement data and readings at the observation points of permanent research stations. Regime information can be obtained also from the published data of meteorological and agricultural stations (up to 1978) and unpublished, but available at a reimbursable cost, after 1978.

The fifth block gives information on the existence and content of geocryological data at the regional and local levels, format, archive address, owners' names and contact telephones. The structure of the block is not yet worked out but the contacts with the owners have begun.

The main sources of the data are held at:

- Permafrost institutions and research stations of the Russian Academy of Sciences (Yakutsk, Chersky, Tiksi, Syktyvkar),
- Research stations of other institutions (All-Russian Geological Institutes – Yamal, Gydan)
- Geological Survey of Russia (throughout Russia),
- Design companies (Hydroproject – Transbaikal region, Kolyma region; Mosgiprotrans, Lengiprotrans, Sibgiprotrans – Transbaikal region, West Siberia including Yamal, South Yakutia, Fundamentproekt – West Siberia, and many others).

It is a long-term task to complete the entire database, but a start should be made so that it can be of use in the future when the main emphases may change.

Conclusions

1. We support the goals and objectives of the GGD Project of IPA. We especially appreciate reference to permafrost conditions as a basis for environmental scenario development, impact assessment, and engineering design, together with the reference to global climatic change.

2. We agree that the status of GGD should be as a non-commercial, internationally accessible database. The only reason to encourage the owners of the data to make their data accessible to the general public should be that of free access to the database. Nevertheless, we suggest including a list of owners (block V, set 4) who are ready to release their data only on a commercial basis. That will at least help to provide a list of data available from the companies who are making temperature measurements in course of extensive drilling in Russia.

3. We would like to know how the existing system will work, what will be the ways of using the international database. In what way is its public character achieved?

4. We consider it important that the placing of data in the GGD is recognized as a publication. If we can gain such an acceptance, it would help in submitting proposals to different science foundations.

We would like to stress the additional problem of translation from Russian into English while developing the Russian part of GGD. This takes extra time and funds.

The system of GGD development is currently at the starting point. To make it work we need equipment, software, and funds. The minimal amount required for equipment and software is detailed in a separate report.
APPENDIX 4

DRAFT PROTOCOLS: A POSSIBLE MODEL FOR THE GGD

The participants discussed the issue of protocols for data management and dissemination. Draft protocols prepared for the ARCSS PALE program (PALE Steering Committee, 1993) and for the Global Continental Paleohydrology Project (GLOCOPH) database were discussed. GLOCOPH is organized by a commission of the International Union for Quaternary Research (INQUA).

The GLOCOPH draft protocol, presented by J. Branson, is summarized below.

Data

1) Data should include both original field measurements (raw data) and the paleoenvironmental reconstructions.

2) Only data that are available for unrestricted use will be accepted for the database.

3) GLOCOPH is not liable for ensuring the accuracy of the data - this is the responsibility of the data contributor.

4) Data must include a time-frame, even if it is very approximate.

Data contributors

1) Data should be made available to the database free of charge.

2) A printout of the data can be sent to the data contributor, if requested, so that the entry of the data may be verified.

3) Contributors can request to be informed if their data are being used, for what purpose and by whom.

4) Data can be removed from the database at any time at the request of the contributor.

Data users

1) Users must be registered to use the database.

2) The database can be used free of charge.

3) The database should be referenced when referring to data obtained from it and publications by the data contributor which discuss the original data should be cited.

4) Users should acknowledge the contributor if unpublished data are used.

5) Users should send contributors reprints of publications which use their data.

6) Data from the database should not be passed onto a third party; all data should be taken directly from the central database.

7) The data can be used by non-profit-making organizations for research purposes only. Profit-making organizations may use the data only if written consent has been given by the originator of the data and the database production group.

APPENDIX 5

RUSSIAN PERMAFROST MAP INVENTORY

The list of published maps includes both maps printed as separate items and those found in papers and monographs as illustrations. In the latter, references are given to the publication and page where the map is found. There are 375 maps listed; this is less than 20% of those published. Only the period 1950 to 1980s is covered by the list. The compilation is being continued and will include later publications. Irina D. Streletskaya, Ph.D. (Industrial and Research Institute for Investigations of Construction, Moscow) and Marina O. Leibman, Ph.D., Federal Center for Geocryological Systems, Moscow) are the editors. The listing is alphabetical by first author and the entries are numbered consecutively. The map scale index which follows p. 114, refers to that number.

| AUTHOR NAME: | Afanasenko, V.E., Goncharov, S.V., Zaitsev, V.N. |
| PUB: | Moscow, Moscow University Publishers, 1981 |
| SCALE: | 1:3 500 000 |
| SOURCE: | "Natural conditions Transbaikal railway industrialization zone", p.18. In the article by Afanasenko, V.E., Goncharov, S.V., Zaitsev, V.N. p.4-20 |
| REGION: | Transbaikal |
| LEGEND | Cryohydrogeological massif of deep discontinuous freezing, cryoartesian basins of continuous and discontinuous shallow freezing |
| LAT/LONG: | 54°00-57°00/120°00-127°00 |
| INSTITUTE: | Moscow State University |
| NUMBER | 00001 |

| AUTHOR NAME: | Are, F.E. |
| PUB: | Moscow, Nauka, 1983 |
| SCALE: | 1:37 500 000 |
| SOURCE: | "Geocryology problems"/edited by P.I. Mel'nikov, p.197. In the article by Are, F.E., p.195-201 |
| REGION: | North of the USSR |
| LEGEND | 5 areas (characteristic in article) |
| LAT/LONG: | 68°00-82°00/20°00-170°00 |
| INSTITUTE: | Permafrost Institute |
| NUMBER | 00002 |

| AUTHOR NAME: | Arkhipov, S.A., Astakhov, V.I., Volkov, I.A. |
| PUB: | Novosibirsk: Nauka, 1980 |
| SCALE: | 1:15 000 000 |
| SOURCE: | Inset-map in monograph "Paleogeography of West Siberian plain at the maximum of Late Zyriansk Glaciation" |
| REGION: | West Siberia |
| LEGEND | Northern limit of permafrost deep thawing |
| LAT/LONG: | 48°00-80°00/70°00-96°00 |
| NUMBER | 00003 |

| AUTHOR NAME: | Badu, Iu.B., Vasilchuk, Iu.K., Kashperiuk, P.I., Trofimov, V.T. |
| PUB: | Moscow, Moscow University Publishers, 1986 |
| SCALE: | 1:20 000 000 |

33
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, p.104
REGION: West Siberia
LEGEND: Old and contemporary developing and static syngenetic and epigenetic wedge ice in different soils on different topography, soil wedges spread, degradation ice places
LAT/LONG: 50°00'-72°00'/60°00'-95°00'
INSTITUTE: Moscow State University
NUMBER: 00004

AUTHOR: Badu, Iu.B., Trofimov, V.T.
NAME: Extent of wedge ice and injective ice in Yamal Peninsula
PUB: Moscow, Moscow University Publishers, 1974
SCALE: 1:2 500 000
REGION: West Siberia, Yamal Peninsula
LEGEND: Epigenetic and syngenetic wedge ice of active, nonactive and ice melting stages in ground and organic soils, volumetric macro ice content, polygonal-wedge relict two-floor ice, injective ice
LAT/LONG: 68°00'-74°00'/66°00'-74°00'
INSTITUTE: Moscow State University
NUMBER: 00005

AUTHOR: Badu, Iu.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Kazan period
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.14
REGION: West Siberia, Gydan Peninsula
LEGEND: Regions of formation of syngenetic and epigenetic wedge ice, permafrost of Salekhard strata, permafrost near surface with epigenetic wedge ice
LAT/LONG: 67°30'-74°00'/73°00'-84°00'
INSTITUTE: Moscow State University
NUMBER: 00006

AUTHOR: Badu, Iu.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Zyryan period
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.17
REGION: West Siberia, Gydan Peninsula
LEGEND: Divided plain (salekhrdskaya) with permafrost in upper part of section, coastal plain (kazanksevskaya) with permafrost in upper part of section, epigenetic and syngenetic wedge ice
LAT/LONG: 67°30'-74°00'/73°00'-84°00'
INSTITUTE: Moscow State University
NUMBER: 00007

AUTHOR: Badu, Iu.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Late-Middle Quaternary maximum (Yamal transgression)
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.9
REGION: West Siberia, Gydan Peninsula
LEGEND: Lowlands with sporadic permafrost, places of shelf with syngenetic wedge ice, freezing in the end of Middle Pleistocene, areas of formation of syngenetic and epigenetic wedge
Map of ground ice genetic types and macro-ice content in 10m upper of deposit section in West-Siberian platform

Moscow, Moscow University Publishers, 1980

1:7 500 000

Trofimov, V.T., Badu, I.U.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.84-85

West Siberia

Syngenetic and epigenetic polygonal wedge ice in different evolution states, volumetric macro ice content, injected ice, sheet ice, injected-segregated ice in different genetic complexes of deposits, buried ice

Map of the potential thaw settlement for the upper 10 m of permafrost section in West-Siberia platform

Moscow, Moscow University Publishers, 1980

1:7 500 000

Trofimov, V.T., Badu IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.216-217

West Siberia

Summary of potential settlement in the different genesis sediments, composition and ice content ground, catastrophic settlement in areas with injected ice

Primary features of paleogeography of Gydan Peninsula in Sartan epoch

Moscow, Moscow University Publishers, 1986

1:3 000 000

"Engineering-geological conditions of Gydan Peninsula", p.21

West Siberia, Gydan Peninsula

Permafrost extent on terrace plains, deep lakes and lake depression on thawing sheet ice places, polygonal-wedge ice erosion

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

67°30'-74°00' / 73°00'-74°00'

Moscow State University

00008

Badu, I.U.B.

Map of ground ice genetic types and macro- ice content in 10m upper of deposit section in West-Siberian platform

Moscow, Moscow University Publishers, 1980

1:7 500 000

Trofimov, V.T., Badu, I.U.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.84-85

West Siberia

Syngenetic and epigenetic polygonal wedge ice in different evolution states, volumetric macro ice content, injected ice, sheet ice, injected-segregated ice in different genetic complexes of deposits, buried ice

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Summary of potential settlement in the different genesis sediments, composition and ice content ground, catastrophic settlement in areas with injected ice

67°30'-74°00' / 73°00'-74°00'

Moscow State University

00009

Badu, I.U.B.

Primary features of paleogeography of Gydan Peninsula in Sartan epoch

Moscow, Moscow University Publishers, 1986

1:3 000 000

"Engineering-geological conditions of Gydan Peninsula", p.21

West Siberia, Gydan Peninsula

Permafrost extent on terrace plains, deep lakes and lake depression on thawing sheet ice places, polygonal-wedge ice erosion

67°30'-74°00' / 73°00'-74°00'

Moscow State University

00010

Badu, I.U.B., Trofimov, V.T.

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

68°00'-74°00' / 66°00'-74°00'

Moscow State University

00011

Badu, I.U.B., Trofimov, V.T.

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

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Moscow State University

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Badu, I.U.B., Trofimov, V.T.

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

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Moscow State University

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Badu, I.U.B., Trofimov, V.T.

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

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Moscow State University

00011

Badu, I.U.B., Trofimov, V.T.

Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula

Moscow, Moscow University Publishers, 1974

1:2 500 000

"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126

West Siberia, Yamal Peninsula

Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock

68°00'-74°00' / 66°00'-74°00'

Moscow State University

00011
Moscow State University

INSTITUTE: Moscow State University
NUMBER: 00012

AUTHOR: Badu, IU.B., Kudryashov V.G., Lurie I.S., Trofimov, V.T., Firsov N.G.
NAME: Scheme of permafrost average annual temperature in Yamal peninsula
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:2 500 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.67
REGION: West Siberia
LEGEND: Prevailing temperature
LAT/LONG: 73°00-67°00/66°00-74°00
INSTITUTE: Moscow State University
NUMBER: 00013

AUTHOR: Badu, IU.B., Gruzdov, A.V., Gusev, A.B.
NAME: Scheme of territories having different forecast erosional ground resistance
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:5 000 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, p. 230-231
REGION: West Siberia
LEGEND: Forecast resistance types depending on macro ice content and wedge ice in the different lithological composition places
LAT/LONG: 56°00-72°00/60°00-85°00
INSTITUTE: Moscow State University
NUMBER: 00014

AUTHOR: Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I., Trofimov, V.T.
NAME: Sketch map of massive ice extent in the Northern part of West-Siberian platform
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:10 000 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.131
REGION: West-North Siberia
LEGEND: Injected-segregated, injected, buried ice in different genesis and age sediments
LAT/LONG: 65°00-85°00/68°00-72°00
INSTITUTE: Moscow State University
NUMBER: 00015

AUTHOR: Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I.
NAME: Types of seasonal freezing referring to lithological composition and soil moisture content
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, P., 76
REGION: West Siberia
LEGEND: Main seasonal freezing and thawing types and their expansion boundaries
LAT/LONG: 50°00-72°00/60°00-95°00
INSTITUTE: Moscow State University
NUMBER: 00016

AUTHOR: Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I.
NAME: Types of seasonal freezing and thawing referring to ground average annual temperature and temperature amplitudes on surface ground massif
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.75
REGION: West Siberia
LEGEND: Types of seasonal freezing, boundaries of seasonal freezing and thawing types
LAT/LONG: 50°00'-72°00'/60°00'-95°00'
INSTITUTE: Moscow State University
NUMBER 00017

AUTHOR: Badu, I.U.D., Trofimov, V.T.
NAME: Map of genetic types and ice content in upper permafrost (10 m) of section of West-Siberia platform
 PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T., Badu, I.U.B., Dubikov G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.60-61
REGION: West Siberia
LEGEND: Genetic types, ice content
LAT/LONG: 64°00'-74°00'/65°00'-85°00'
INSTITUTE: Moscow State University
NUMBER 00018

AUTHOR: Baranov, I.J.
NAME: Geocryology map of the USSR
 PUB: Moscow, GUGK, 1977
SCALE: 1:5 000 000
REGION: USSR
LEGEND: Genetic type of permafrost, expansion, thickness, temperature, depth of seasonal freezing and thawing, frozen ground features and hilly terrain conditions
LAT/LONG: 38°00'-82°00'/30°00'-170°00'
INSTITUTE: PNIIS, Gosstroiii USSR, Glavpromstroiproect, Permafrost Institute, Academy of Science USSR
NUMBER 00019

AUTHOR: Baranov, I.J.
NAME: Map of permafrost regions of the Earth
 PUB: Moscow, Moscow University Publishers, 1978
SCALE: 1:50 000 000
SOURCE: General permafrost (geocryology)/ edited by V.A. Kudriavtsev, p.16-17
REGION: The Globe
LEGEND: Permafrost regions and glacial caps, regular and irregular repetition freezing of soil zones
INSTITUTE: Obruchev Permafrost Institute
NUMBER 00020

AUTHOR: Baranov, I.J.
NAME: Geocryological map of USSR
 PUB: Moscow, 1956
SCALE: 1:10 000 000
REGION: USSR
LEGEND: Expansion, temperature, thickness, cryogenic processes and relief
LAT/LONG: 38°00'-80°00'/20°00'-170°00'
INSTITUTE: Obruchev Permafrost Institute
NUMBER 00021

AUTHOR: Baranova, I.U.P.
NAME: General view and interpretation"lunar landscape"
PUB: Magadan, Knizh. izd-vo, 1972
SCALE: Large
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization of mountain countries and lowlands, the Magadan area and Yakutia", p.61
REGION: North-East
LEGEND: Alas depressions, thermodenudational terraces, baydzherakhs, thermokarst depression, places of original surface
LAT/LONG: 63°00-69°00/158°00-170°00
NUMBER: 00022

AUTHOR: Baulin, V.V.
NAME: Average annual temperature of the ground for districts with different conditions (3 maps)
PUB: Moscow, Nedra, 1985
SCALE: 1:30 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.24-25
REGION: West Siberia
LEGEND: Average annual temperature of ground in the places with the maximum and minimum snow cover, various lithological composition and thickness of the seasonal thaw layer
LAT/LONG: 55°00-74°00/60°00-86°00
INSTITUTE: PNIiIS, Gosstroi, USSR
NUMBER: 00023

AUTHOR: Baulin, V.V.
NAME: General geocryological areas of the Siberian platform
PUB: Moscow, Nedra, 1985
SCALE: 1:40 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.92
REGION: North-East
LEGEND: Geocryological areas, zones, boundaries of zones, subzones and areas
LAT/LONG: 53°00-75°00/90°00-130°00
INSTITUTE: PNIiIS, Gosstroi, USSR
NUMBER: 00024

AUTHOR: Baulin, V.V., Chekhovskii A.L., Gruzdov, A.V.
NAME: Map of permafrost thickness in west Siberian plain
PUB: Moscow, Stroiizdat, 1976
SCALE: 1:8 000 000
SOURCE: Inset-map in monograph "Transactions of Industrial and Research Institute for Engineering Investigations of Construction", issue 49
REGION: West Siberia
LEGEND: Bedding near surface permafrost thickness, the depth of relict permafrost table, southern limit of relict permafrost, places of intensive contemporary freezing of ground, places of deeply bedding permafrost table
LAT/LONG: 60°00-71°00/60°00-87°00
INSTITUTE: PNIiIS, Gosstroi, USSR
NUMBER: 00025

AUTHOR: Baulin, V.V., Danilova, N.S., Kondratieva, K.A.
NAME: Map of permafrost expansion in Holocene climatic optimum
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.90
REGION: USSR
LEGEND: Permafrost expansion
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: PNIiIS, Gosstroi USSR, Moscow State University
00026

Baulin, V.V., Chekhovskii, A.L.
Map of permafrost thickness in West Siberia plain
Novosibirsk, Nauka, 1990
1:3 000 000
Inset-map in monograph "Geocryological investigations history in West Siberia"/ edited by Nekrasov
West Siberia
Thickness, depth of relict permafrost table, isolines of depth of permafrost base, areas of intense contemporary freezing, areas of deep permafrost table
62°00-74°00/60°00-90°00
PNIIIS, Gostroi USSR

00027

Baulin, V.V.
Map of taliks under lakes with different depth
Moscow, Nedra, 1985
1:25 000 000
Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.49
West Siberia
Southern limit of lake taliks (with snow cover and without snow cover, different depth of lakes)
62°00-74°00/60°00-86°00
PNIIIS, Gosstroi, USSR

00028

Baulin, V.V.
Permafrost base in Urengoi gas field
Moscow, Nedra, 1985
Large
Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.121
West Siberia
Isolines (m) of permafrost base
66°30/77°00
PNIIIS, Gosstroi, USSR

00029

Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A.
Permafrost map of the Holocene climatic optimum
Moscow, Nauka, 1981
1:40 000 000
"History of permafrost development in Eurasia", p.28. In the article by Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A. p.24-40
USSR
Zone of deep layer permafrost; seasonal frost thickness, m; thermokarst, permafrost spread, average annual temperature geoisotherms
30°00-180°00/48°00-80°00
PNIIIS, Gosstroi, USSR

00030

Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A.
Permafrost map of Late Pleistocene
Moscow, Nauka, 1981
1:40 000 000
"History of permafrost development in Eurasia", p.26. In the article by Baulin, V.V.,
REGION: USSR
LEGEND: Permafrost spread, depth of permafrost base, average annual temperature geoisotherms, southern limit of permafrost, frost cracking, cryogenic weathering, frost heaving
LAT/LONG: 30°00-180°00/48°00-80°00
INSTITUTE: PNIIS, Gosstroi, USSR
NUMBER 00031

AUTHOR: Baulin, V.V.
NAME: Permafrost zoning map of West Siberian plain (upper part of permafrost)
PUB: GUGK, Moscow, 1985
SCALE: 1:1 500 000
REGION: West Siberia
LEGEND: Expansion, temperature, ice content, ground, peat, geomorphological levels
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Gosstroi USSR, Geological Ministry, Moscow State University
NUMBER 00032

AUTHOR: Baulin, V.V., Chekhovskii, A.L.
NAME: Permafrost zoning of West Siberian plain referring to thickness of permafrost and cryogenic structure
PUB: Moscow, Gosstroi of the USSR, 1985
SCALE: 1:2 500 000
REGION: West Siberia
LEGEND: Geomorphology, thickness, structure and condition of permafrost, depth of relict permafrost table
LAT/LONG: 50°00-70°00/60°00-90°00
INSTITUTE: PNIIS, Gosstroi USSR
NUMBER 00033

AUTHOR: Baulin, V.V.
NAME: Regionalization scheme of West Siberian plain (for the permafrost thickness map)
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.66
REGION: West Siberia
LEGEND: Permafrost regionalization, boundaries: permafrost zones, provinces and areas
LAT/LONG: 55°00-74°00/60°00-86°00
INSTITUTE: PNIIS, Gosstroi USSR
NUMBER 00034

AUTHOR: Baulin, V.V.
NAME: Scheme of contemporary thermokarst extent in West Siberia platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.210
REGION: West Siberia
LEGEND: Dynamic thermokarst zones, thermokarst on peatlands, boundaries of thermokarst on polygonal wedge ice, segregated and sheet ice
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: PNIIS, Gosstroi USSR
NUMBER 00035

AUTHOR: Baulin, V.V.
NAME: Scheme of long standing ground heave phenomena extent range in West Siberian
platform

PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.206
REGION: West Siberia
LEGEND: Hillocky peatlands expansion range zones, areas of hydrolaccoliths and frost mounds
LAT/LONG: 62°00-72°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroy USSR
NUMBER 00036

AUTHOR: Baulin, V.V.
NAME: Scheme of permafrost extent in Holocene Climatic Optimum. The third formation stage
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.147
REGION: West Siberia
LEGEND: Zones of continuous, discontinuous and deep seated permafrost, the depth of relict permafrost base and table, isotherms of average annual temperature, southern limit of permafrost
LAT/LONG: 55°00-75°00/50°00-90°00
INSTITUTE: PNIIIS, Gosstroy USSR
NUMBER 00037

AUTHOR: Baulin, V.V.
NAME: Scheme of permafrost extent in Demyanskoe Glacial epoch (Eopleistocene)
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.133
REGION: West Siberia
LEGEND: Subareal, subsea permafrost, permafrost under retaining basins, ice caps, southern limit of permafrost
LAT/LONG: 55°00-75°00/50°00-90°00
INSTITUTE: PNIIIS, Gosstroy USSR
NUMBER 00038

AUTHOR: Baulin, V.V., Bykov, I. IU., Sadchikov, P.B.
NAME: Scheme of permafrost expansion in the north-east of European part of the USSR
PUB: Moscow, Stroiizdat, 1984
SCALE: 1:20 000 000
SOURCE: Geocryological conditions and their change forecast in the primary development regions of the North, p.187
REGION: North European part of the USSR and West Siberia
LEGEND: Permafrost expansion, vertical structure, southern limit of relict permafrost
LAT/LONG: 60°00-70°00/50°00-80°00
INSTITUTE: PNIIIS, Gosstroy USSR
NUMBER 00039

AUTHOR: Baulin, V.V., Danilova, N.S., Pavlova, O.P.
NAME: Scheme of permafrost extent for Medvezhie gas field region
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development regions of the North, p.4
REGION: West Siberia
LEGEND: Expansion, depth of permafrost base, depth of taliks
65°00-68°00/72°00-78°00
PNIIS, Gosstroii USSR
00040
Baulin, V.V.
Scheme of permafrost extent in Sartan Glaciation epoch (the second half of Neopleistocene). The second formation stage
Moscow, Nedra, 1985
1:25 000 000
Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.146
West Siberia
Off shore permafrost, permafrost under ice caps, permafrost in areas of Kazan sea, average annual ground temperature
55°00-75°00/50°00-90°00
PNIIS, Gosstroii, USSR
00041
Baulin, V.V.
Scheme of permafrost extent in Yamal transgressive epoch (the second part of Mesopleistocene). The first formation stage
Moscow, Nedra, 1985
1:25 000 000
Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.143
West Siberia
Subsea permafrost, permafrost in regions with change glacial and sea conditions, permafrost under ice caps and subaerial, southern limit of permafrost (54-55° of n.l.)
55°00-75°00/50°00-90°00
PNIIS, Gosstroii, USSR
00042
Baulin, V.V.
Scheme of permafrost extent in Tobolskoe Interglacial epoch (the first part of Mesopleistocene)
Moscow, Nedra, 1985
1:25 000 000
Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.142
West Siberia
Subareal permafrost, places of subsea degradation permafrost, zone of subareal degradation permafrost, zone of permafrost, unfrozen ground
55°00-75°00/50°00-90°00
PNIIS, Gosstroii, USSR
00043
Baulin, V.V., Trofimov, V.T.
Scheme of seasonal frozen ground and permafrost spreading
Moscow, Moscow University Publishers, 1977
1:10 000 000
Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.64
West Siberia
Seasonal frozen ground and permafrost expansion zones
62°00-74°00/60°00-90°00
Moscow State University, PNIIS, Gosstroii USSR
00044
Baulin, V.V.
NAME: Sketch-map of permafrost spreading, thickness and structure in West Siberian plain
PUB: Moscow, Nedra, 1985
SCALE: 1:15 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.69
REGION: West Siberia
LEGEND Permafrost spreading, thickness, genetic complexes and lithological composition
LAT/LONG: 60°00-73°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00045

AUTHOR Baulin, V.V.
NAME: Sketch-map of ice content in West-Siberia plain
PUB: Moscow, Nedra, 1985
SCALE: 1:15 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.41
REGION: West Siberia
LEGEND Ice content (3 ranges), boundaries: southern limit of before Holocene and Holocene
synigenous permafrost, epigenetic wedge ice, permafrost spreading, sheet ice
LAT/LONG: 55°00-72°00/60°00-80°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00046

AUTHOR Baulin, V.V.
NAME: Sketch-map of relict permafrost
PUB: Moscow, Nedra, 1985
SCALE: 1:3 500 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.73
REGION: West Siberia
LEGEND Large blocks of relict permafrost, small islands of relict permafrost, geomorphological
levels
LAT/LONG: 58°00-63°00/69°00-78°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00047

AUTHOR Baulin, V.V., Efimova I.V., Timofeev V.G.
NAME: Sketch-map of relict permafrost
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:2 000 000
SOURCE: Permafrost Studies, XII, p.144
REGION: West Siberia
LEGEND Relict permafrost in large massifs and islands, geomorphological level
LAT/LONG: 59°00-63°00/69°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00048

AUTHOR Baulin, V.V., Belopukhova, E.B., Dubikov, G.I.
NAME: West Siberian Geocryological Map
PUB: Moscow, Academy of Science Publisher, 1968
SCALE: 1:5 000 000
SOURCE: Inset-map in paper by Baulin, V.V., Belopukhova, E.B., Dubikov, G.I. "Permafrost
geographical features in West Siberia". Proceedings of Academy of Science USSR,
Geography, p.64-70
REGION: West Siberia
LEGEND Type of freezing, spreading, temperature, active layer depth, ice wedges and massive ice,
recent and fossil thermokarst, perennial frost-heave mounds, southern permafrost limit
LAT/LONG: 60°00-74°00/64°00-87°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00049

AUTHOR Baulin, V.V.
NAME: West Siberian regionalization scheme for expansion and average annual temperature permafrost study
PUB: Moscow, Nedra, 1985
SCALE: 1:30 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.22
REGION: West Siberia
LEGEND Southern limit of permafrost, potential expansion permafrost zones
LAT/LONG: 55°00-75°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00050

AUTHOR Belopukhova, E.B., Tikhomirova, N.A., Sukhov A.G.
NAME: Permafrost expansion in Yagenetta river head (Nadym-Pur interfluve)
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development regions of the North, p.167
REGION: West Siberia
LEGEND Expansion, geomorphological levels
LAT/LONG: 64°00-68°00/72°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00051

AUTHOR Belopukhova, E.B., Tikhomirova, N.A., Sukhov, A.G.
NAME: Permafrost extent in Yamsovey down-stream (left shore Pur valley)
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development regions of the North, p.166
REGION: West Siberia
LEGEND Expansion, geomorphological levels
LAT/LONG: 64°00-68°00/72°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00052

AUTHOR Belopukhova, E.B.
NAME: Permafrost extent map of central part of West Siberia
PUB: Moscow, TSINIS, 1972
SCALE: 1:5 000 000
SOURCE: "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol. XVIII), p.95
REGION: West Siberia
LEGEND Permafrost spreading
LAT/LONG: 60°00-68°00/60°00-87°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00053

AUTHOR Belopukhova, E.B.
NAME: Scheme of permafrost temperature zoning of Yamburg tectonic structure
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development of the North,
| REGION: | West Siberia |
| LEGEND | 4 types of places with different ground temperature ranges |
| LAT/LONG: | 68°00'-69°00'/74°00'-77°00' |
| INSTITUTE: | PNIIS, Gosstroi USSR |
| NUMBER | 00054 |

**AUTHOR** Belopukhova, E.B.

**NAME:** Scheme of polygonal ground extent range in West Siberian platform

**PUB:** Moscow, Moscow University Publishers, 1977

**SCALE:** 1:10 000 000

**SOURCE:** Trofimov, V.T. "Regularities of spatial variability of engineering and geological conditions of the West Siberian platform

**REGION:** West Siberia

**LEGEND** Polygonal ground growth and dormant stages of hillocky terrain on poor and well drained places, young hillocky terrain relief

**LAT/LONG:** 62°00'-74°00'/60°00'-90°00'

**INSTITUTE:** PNIIS, Gosstroi USSR

**NUMBER:** 00055

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**AUTHOR** Belopukhova, E.B.

**NAME:** Sketch-map of polygonal relief

**PUB:** Yakutsk, Yakutskoe knizh. izd., 1966

**SCALE:** 1:20 000 000

**SOURCE:** "Scientific report of VIII All-Union Conference on geocryology", no.6. Geomorphological section, p.124. In the report by Belopukhova, E.B. p.117-125

**REGION:** West Siberia

**LEGEND** Area polygonal relief in stage of growth and dormant, hillocky terrain on bad and good drained places, on peatland and on soil, southern limit of continuous permafrost at present time

**LAT/LONG:** 60°00'-73°00'/63°00'-87°00'

**INSTITUTE:** PNIIS, Gosstroi, USSR

**NUMBER:** 00056

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**AUTHOR** Belopukhova, E.B., Dubikov, G.I.

**NAME:** West Siberia regionalization sketch-map referring to permafrost ice content

**PUB:** Moscow, TSINIS, 1972

**SCALE:** 1:10 000 000

**SOURCE:** "Geocryological research for engineering investigations for construction"(Transactions of PNIIS, vol.XVIII), p.33

**REGION:** West Siberia

**LEGEND** Boundaries of zones, subzones, districts

**LAT/LONG:** 60°00'-74°00'/60°00'-90°00'

**INSTITUTE:** PNIIS, Gosstroi, USSR

**NUMBER:** 00057

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**AUTHOR** Bobov, N.G., Novoselskaiia, N.B.

**NAME:** Kamchatka geocryological scheme

**PUB:** Novosibirsk, Nauka, 1975

**SCALE:** 1:10 000 000

**SOURCE:** "Regional and special geocryological investigations", p.37

**REGION:** Kamchatka

**LEGEND** Expansion (real and estimated), temperature, thermokarst lakes and depressions, frost mounds

**LAT/LONG:** 53°00'-61°00'/155°00'-165°00'

**NUMBER:** 00058
AUTHOR : Bobov, N.G., Molodykh, I.I.
NAME: Zoning of European part of the USSR referring to cryogenic processes and expansion
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.252
REGION: European part of the USSR
LEGEND: Contemporary and late Valdai epoch permafrost expansion, processes
LAT/LONG: 40°00-70°00/20°00-70°00
INSTITUTE: VSEGINGEO
NUMBER 00059

AUTHOR: Boyarskii, O.G., Mitt, K.L.
NAME: Regionalization sketch-map of Anabar-Olenek North referring to thermokarst topography development
PUB: Moscow, Moscow University Publishers, 1964
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, IV, p.152
REGION: North-East of the USSR
LEGEND: Thermokarst development regions in different age and genesis deposits, polygonal ground expansion, classes, remanent lakes
LAT/LONG: 71°00-73°00/120°00-124°00
NUMBER 00060

AUTHOR: Boyarskii, O.G., Maksimova L.N., Romanovskii N.N
NAME: Scheme of Patomski upland permafrost temperature
PUB: Moscow, Moscow University Publishers, 1968
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, VIII, p.207
REGION: Baikal
LEGEND: Number of area and region (the table lists the permafrost expansion, ground temperature, snow cover thickness, ground content and age, geomorphological levels)
LAT/LONG: 57°00-60°00/112°00-119°00
INSTITUTE: Moscow State University
NUMBER 00061

AUTHOR: Boyarskii, O.G., Mitt, K.L.
NAME: Sketch-map of mounds of different genesis extent in Anabar-Olenekskoi lowland
PUB: Moscow, Nauka, 1974
SCALE: 1:2 500 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p. 46
REGION: Central Siberia
LEGEND: Pingos, thermokarst topography, remanents of original rocks
LAT/LONG: 70°00-76°00/114°00-120°00
NUMBER 00062

AUTHOR: Bubnov, V.M., Pokrovskii, N.S.
NAME: Permafrost thickness and tectonic structure in the Nizh. Tunguska drainage basin
PUB: Moscow, Nedra, 1986
SCALE: 1:9 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.122
REGION: Central Siberia
LEGEND: Permafrost thickness, zone of geothermal anomaly near deep-seated domes of tectonic structures
LAT/LONG: 64°00-77°00/95°00-110°00
NUMBER 00063
Buldovich, S.N., Melentiev, V.S., Naumov, M.S.  
**Scheme of permafrost-hydrogeological conditions and fractured tectonics in Neryungi place**  
**PUB:** Moscow, Moscow University Publishers, 1976  
**SCALE:** Large  
**SOURCE:** Permafrost Studies, XV, p. 122  
**REGION:** Central Siberia  
**LEGEND:** Permafrost expansion, wells with underground water level, alluvial deposits  
**LAT/LONG:** 57°00'00"-00'125°00'-00°00"  
**INSTITUTE:** Moscow State University  
**NUMBER** 00064

Chekhovskii, A.L., Shamanova I.I.  
**Map of lake depths (lakes, below which are possible taliks)**  
**PUB:** Moscow, Stroiizdat, 1974  
**SCALE:** 1:10 000 000  
**SOURCE:** "Transactions of Industrial and Research Institute for Engineering Investigations of Construction", no.49, p.74  
**REGION:** West Siberia  
**LEGEND:** Depths of lake (7 ranges)  
**LAT/LONG:** 60°00'-74°00'/60°00'-90°00"  
**INSTITUTE:** PNIIIS, Gosstroi, U.S.S.R.  
**NUMBER** 00065

Chekhovskii, A.L.  
**Regionalization scheme of Kara Sea referring to benthic water layer temperature**  
**PUB:** Moscow, TSINIS, 1972  
**SCALE:** 1:12 000 000  
**SOURCE:** "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol. XVIII), p.106  
**REGION:** Kara Sea  
**LEGEND:** Benthic water layer average annual temperature (5 ranges), oceanic, suboceanic and subcontinental areas  
**LAT/LONG:** 70°00'-90°00'/54°00'-114°00"  
**INSTITUTE:** PNIIIS, Gosstroi, USSR  
**NUMBER** 00066

Cherniadev, B.P.  
**The changes of the position of southern limit of permafrost in West Siberia under disturbed natural conditions**  
**PUB:** Moscow, TSINIS, 1971  
**SCALE:** 1:15 000 000  
**SOURCE:** "Geocryological and hygrogeological research for engineering investigations", Transactions of PNIIIS, vol. 8, p.192  
**REGION:** West Siberia  
**LEGEND:** Southern limit: possible neogenesis of permafrost under cooling to maximum temperature; thawing potential of permafrost by moving of moss-lichen cover  
**LAT/LONG:** 52°00'-72°00'/60°00'-90°00"  
**INSTITUTE:** PNIIIS, Gosstroi, USSR  
**NUMBER** 00067

Cherniadev, V.P.  
**Map-scheme of upper limiting conditions and natural zones of West Siberia**  
**PUB:** Moscow, Stroiizdat, 1987  
**SCALE:** 1:10 000 000  
**SOURCE:** "Recommendations to estimate change of permafrost conditions in industrialization"
territories of West Siberia/ PNIIS, Gosstroy USSR", p.9

REGION: West Siberia
LEGEND Summary of mean monthly air temperature in warm and cold periods, summary mean monthly temperature of exposed soil surface, average snow cover, duration of summer period, natural zones
LAT/LONG: 60°00′-72°00′/60°00′-85°00′
INSTITUTE: PNIIS, Gosstroy, USSR
NUMBER 00068

AUTHOR Cherniadev, V.P.
NAME: Sketch-map of limiting conditions of perennial freezing
PUB: Moscow, TSINIS, 1971
SCALE: 1:20 000 000
SOURCE: "Geocryological and hydrogeological research for engineering investigations", Transactions of PNIIS, vol. 8, p.191
REGION: West Siberia
LEGEND Summary of degree months in maximum cold period, summary of degree months in minimum and maximum warming-up periods
LAT/LONG: 52°00′-72°00′/60°00′-90°00′
INSTITUTE: PNIIS, Gosstroy, USSR
NUMBER 00069

AUTHOR Chizhova, N.I.
NAME: Map of Aldan-Timpton interfluve relative formation of an icing(%)
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.309
REGION: Central Siberia
LEGEND Relative formation of an icing (6 ranges), icings on the ground surface
LAT/LONG: 55°00′-60°00′/122°00′-130°00′
INSTITUTE: Moscow State University
NUMBER 00070

AUTHOR Chizhova, N.I.
NAME: Map of icings of Aldano-Timptonski interfluve
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:2 500 000
SOURCE: Ospennikov, E.N., Trush, N.I., Chizhov, A.B., Chizhova, N.I. Exogenetic geological processes and phenomena (South Yakutia), p.188
REGION: South Yakutia
LEGEND Icing coefficient, icing on the ground surface
LAT/LONG: 57°00′-69°00′/123°00′-128°00′
INSTITUTE: Moscow State University
NUMBER 00071

AUTHOR Churinov, M.V., Tsipina, I.M., Lazareva, V.P.
NAME: Stratigraphic and genetic complexes and engineering-geological groups of sedimentary rocks
PUB: Moscow, GUGK, 1983
SCALE: 1:7 500 000
SOURCE: Atlas of hydrogeological and engineering-geological maps of the USSR
REGION: USSR
LEGEND Expansion frozen and unfrozen Quaternary ground
LAT/LONG: 38°00′-80°00′/20°00′-170°00′
INSTITUTE: VSEGINGEO
NUMBER 00072

48
AUTHOR Danilova, N.S., Kondratieva, K.A.
NAME: Central Siberia permafrost regionalization referring to cryogenic processes and frozen ground features development
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia/ edited by E.D. Ershov, p.125
REGION: Central Siberia
LEGEND Latitudinal thermal zones, thermal and regional subzones, regions of prevalent Quaternary deposits
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00073

AUTHOR Danilova, N.S.
NAME: Sketch-map of the structure of perennial frozen ground in Central Siberia
PUB: Moscow, TSINIS, 1972
SCALE: 1:10 000 000
SOURCE: "Geocryological research for engineering investigations for construction" (Transactions of PNIIIS vol. XVIII), p.166
REGION: Central Siberia
LEGEND Types of freezing, permafrost thickness, ice content and cryogenic structure, genesis and composition of deposits, time of freezing, wedge ice (old and contemporary), cave and sheet ice
LAT/LONG: 52°00-80°00/84°00-140°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00074

AUTHOR Danilova, N.S.
NAME: Sketch-map of polygonal ice wedges of Central Siberia
PUB: Moscow, Nedra, 1975
SCALE: 1:20 000 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.128
REGION: Central Siberia
LEGEND Zone of occurrence of relict and contemporary permafrost
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00075

AUTHOR Demidiuk, L.M.
NAME: Geocryological scheme of Charanorskoi lowland
PUB: Moscow, Nedra, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.118
REGION: Transbaikal
LEGEND Expansion, temperature, thickness, cryogenic processes and frozen ground features
LAT/LONG: 50°00-52°00/114°00-119°00
INSTITUTE: Moscow State University
NUMBER 00076

AUTHOR Demidiuk, L.M., Shaumian, L.V.
NAME: Sketch-map of jointing and permafrost extent of Talnakh field
PUB: Moscow, Moscow University Publishers, 1969
SCALE: Large
SOURCE: Permafrost Studies, IX, P.35
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<td>NAME</td>
<td>Districts with ice wedges and ground wedges in alluvial terraces</td>
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<td>PUB</td>
<td>Moscow, Academy of Sciences, 1962</td>
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<td>&quot;Academy of Sciences Information, Geographical Serie&quot;s, no. 6, p.81</td>
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| AUTHOR          | Dubikov, G.I.                           |
| NAME            | Geological sketch-map with massive ice outcropping |
| PUB             | Moscow, Stroiizdat, 1983                |
| SCALE           | Large                                   |
| SOURCE          | Dubikov, G.I. Problems of Regional Engineering Geocryology, p.53 |
| REGION          | West Siberia, Yamal Peninsula           |
| LEGEND          | Sites of massive ice outcrops; bore-holes with massive ice; deposits: genesis and age |
| LAT/LONG        | 70°00′/70°00                            |
| INSTITUTE       | PNIIS, Gosstroi USSR                    |
| NUMBER          | 00079                                   |

| AUTHOR          | Dubikov, G.I., Ivanova, N.V.            |
| NAME            | Map of saline permafrost in West Siberia |
| PUB             | Moscow, Scientific Council of the Earth Cryology, 1990 |
| SCALE           | 1:12 000 000                            |
| SOURCE          | "Saline permafrost as a foundation for construction. Collected scientific articles"/ Edited by Vyalov S.S., p.6 |
| REGION          | West Siberia                            |
| LEGEND          | Saline ground, ionic-saline content, general genetic complexes, permafrost extent with different saline content, districts with bedding table of saline Paleogene ground to 50 m depth |
| LAT/LONG        | 65°00′-73°00′/60°00′-90°00               |
| INSTITUTE       | PNIIS, Gosstroi USSR                    |
| NUMBER          | 00080                                   |

| AUTHOR          | Dubikov, G.I., Ivanov, N.V.             |
| NAME            | Scheme of marine saline and non-saline permafrost in West Siberia |
| PUB             | Moscow, Nauka, 1986                     |
| SCALE           | 1:7 500 000                             |
| REGION          | West Siberia                            |
| LEGEND          | Boundaries: Holocene freezing in upper layer permafrost, maximum advance of the sea in Pleistocene (by Lazukov), saline and non-saline ground, quantity of test |
| LAT/LONG        | 46°00′-73°00′/64°00′-84°00′             |
| INSTITUTE       | PNIIS, Gosstroi USSR                    |
| NUMBER          | 00081                                   |

| AUTHOR          | Dubikov, G.I., Ivanova, N.V.            |
| NAME            | Scheme of saline permafrost extent in the USSR |

50
Moscow, Scientific Council of the Earth Cryology, 1990

"Saline permafrost as a foundation for constructions. Collected scientific articles”/ Edited by S.S. Vyalov, p.4

The USSR

Type of saltings, saline permafrost table, saline and non-saline permafrost spreading, boundary of saline permafrost, southern limit of permafrost

40°00-80°00/40°00-170°00

PNIIIS, Gosstroy, USSR

00082

Dubikov, G.I., Belopukhova, E.B., Stremiakov, A.I., Sukhov, A.G.

Sketch-map of Byngapur tectonic structure permafrost regionalization

Moscow, Stroiizdat, 1984

Large

Geocryological conditions and their changes forecast in the primary development of the North, p.122

West Siberia

Zoning referring to permafrost expansion, lithological composition, genesis and age of deposits

64°00-68°00/72°00-78°00

PNIIIS, Gosstroy USSR

00083

Dubikov, G.I., Shmelev, L.M.

Sketch-map of southern limit of mineral and organic perennial ground between the Urals and the Ob

Moscow, Stroiizdat, 1976

1:5 000 000

"Transactions of Industrial and Research Institute for Engineering Investigations of Construction", issue 49, p.87

West Siberia

Boundaries by Kunitsin L.F., Belopukhova, E.B., Popov, A.I., Shpolianskaia, N.A., authors

60°00-64°00/60°00-66°00

PNIIIS, Gosstroy USSR

00084

Dubikov, G.I.

Sketch-map of lithological composition and permafrost ice content to the depth 10 m in Yamburg structural high area

Moscow, Stroiizdat, 1984

Large

Geocryological conditions and their change forecast in the primary development regions of the North, p.108

West Siberia

Types of freezing, lithological composition, genetic and ground ice content

68°00-69°00/74°00-77°00

PNIIIS, Gosstroy USSR

00085

Dunaeva, E.N., Koreisha, M.M.

Geocryological sketch-map of the Caucasus

Moscow, Nedra, 1989

1:10 000 000

Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.E. Ershov, p.335
REGION: Caucasus
LEGEND: Expansion, thickness, temperature, types of seasonal freezing of soils
LAT/LONG: 38°00-45°00/40°00-50°00
INSTITUTE: Moscow State University, PNIIS Gosstroi USSR
NUMBER: 00086

AUTHOR: Ershov, E.D., Danilov, I.D.
NAME: Map of permafrost expansion types and large concentration of surface and ground ice
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.111
REGION: USSR
LEGEND: Cryogenic ground types, injected ice, sheet ice, polyzonal wedge ice, buried ice, glaciers, permafrost expansion
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER: 00087

AUTHOR: Ershov, E.D., Dunaeva, E.N., Parmuzin, S.IU.
NAME: Sketch-map of seasonal freezing and thawing of soil types in the USSR
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.141
REGION: USSR
LEGEND: Thawing of soil types referring to average annual ground temperature and temperature fluctuations amplitude on surface
LAT/LONG: 35°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER: 00088

AUTHOR: Ershov, E.D.
NAME: Sketch-map of contemporary permafrost expansion on the Earth
PUB: Moscow, Nauka, 1988
SCALE: 1:100 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.15
REGION: The Globe
LEGEND: Seasonal frozen ground and permafrost expansion
INSTITUTE: Moscow State University
NUMBER: 00089

AUTHOR: Evseev, V.P.
NAME: Scheme of palsas and flat-topped polygonal peatlands contemporary spreading
PUB: Moscow, Moscow University Publishers, 1976
SCALE: 1:10 000 000
REGION: European North and West Siberia
LEGEND: Southern limit of palsas (southern limit of permafrost), northern limit of palsas, northern and southern limit of flat-topped polygonal peatlands
LAT/LONG: 55°00-72°00/30°00-90°00
INSTITUTE: Moscow State University
NUMBER: 00090

AUTHOR: Fedorov, A.N.
NAME: Sketch-map of physiographical districts in Leno-Amginsk interfluve northern part
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:20 000 000

52
Geographical research in Yakutia, p.130

AUTHOR: Fedorovich, D.I., Zhukov, V., Vialov, S.S.
NAME: Geocryological sketch-map
PUB: Moscow, Stroiizdat, 1980
SCALE: 1:25,000,000
SOURCE: "Textbook for engineering of bases and foundations on permafrost/Gersevanov Institute of Foundation and Underground Construction, Gosstroi, USSR, p.8-9
REGION: USSR
LEGEND: Permafrost spread, thickness, temperature of the ground to the depth 10m, southern limit of permafrost
LAT/LONG: 38°00-85°00/20°00-170°00
INSTITUTE: NIIOSP
NUMBER: 00092

AUTHOR: Feldman, G.M.
NAME: Atlas of forecast permafrost map of North-West Siberia
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:200,000,000
SOURCE: Feldman, G.M. Methodology book of permafrost temperature dynamic forecast (e.g., north West Siberia ), p.7-40, 64 maps
REGION: West Siberia
LEGEND: Isotherms of average annual frozen ground temperature on active layer base and isolines of active layer base thickness (for 63 combinations)
LAT/LONG: 60°00-74°00/60°00-84°00
INSTITUTE: Permafrost Institute
NUMBER: 00093

AUTHOR: Fotiev, S.M.
NAME: Map of permafrost dynamics in Pleistocene and Holocene
PUB: Moscow, Moscow University Publishers, 1978
SCALE: 1:35,000,000
SOURCE: General permafrost (geocryology)/ edited by V.A. Kudriavtsev, p.386
REGION: USSR
LEGEND: Relict permafrost zone under Polar basin, partial and complete thawing of Pleistocene permafrost, Holocene frozen and thawing ground, thickness of late Holocene frozen and thawing ground
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER: 00094

AUTHOR: Fotiev, S.M.
NAME: Regionalization scheme of West Siberia referring to discontinuus and permafrost spread
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:100,000,000
SOURCE: "Questions of geocryological mapping", p.44. In the article by Fotiev, S.M. p.38-52
REGION: West Siberia
LEGEND: Permafrost spread, unfrozen ground, taliks, areas of types of cryolithogenesis
LAT/LONG: 59°30-74°00/69°00-84°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER: 00095
Fotiev, S.M.

**Regionalization scheme of West Siberia region referring to conditions of open-water absorption for talik formation**

**PUB:** Moscow, Nauka, 1991

**SCALE:** 1:12 000 000

**SOURCE:** "Permafrost and cryogenic processes: Collection of scientific articles"/ Edited by G.I. Dubikov, p.74

**REGION:** West Siberia

**LEGEND**
Calculated boundary of the region where possible of open water absorption taliks were formed by favourable geological-geomorphological conditions, natural zones boundary

**LAT/LONG:** 58°00-74°00/66°00-84°00

**INSTITUTE:** PNIIIS, Gosstroi, USSR

**NUMBER** 00096

Fotiev, S.M.

**Scheme of different types of permafrost extent in West Siberia**

**PUB:** Moscow, TSINIS, 1972

**SCALE:** 1:12 000 000

**SOURCE:** "Geocryological research for engineering investigations for construction" (Transactions of PNIIIS, vol.XVIII), p.118

**REGION:** West Siberia

**LEGEND**
Permafrost stages, permafrost types and subtypes

**LAT/LONG:** 60°00-72°00/60°00-86°00

**INSTITUTE:** PNIIIS, Gosstroi, U.S.S.R.

**NUMBER** 00097

Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.

**Sketch geocryological map of Central Siberia**

**PUB:** Moscow, Nauka, 1974

**SCALE:** 1:7 500 000

**SOURCE:** Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.135

**REGION:** Central Siberia

**LEGEND**
Thickness, expansion, ground temperature, cryogenic processes, composition and genesis Quaternary deposits

**LAT/LONG:** 52°00-80°00/78°00-138°00

**INSTITUTE:** PNIIIS, Gosstroi USSR

**NUMBER** 00098

Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.

**Sketch-map of Quaternary deposits with their cryogenic structure and ice content characteristics (Northern Siberian lowland)**
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<td>REGION:</td>
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<td>LEGEND:</td>
<td>Type of freezing, cryogenic structure, sheet ice, ice content, possible thaw settlements, age and genesis type of deposits</td>
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<td>Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.113</td>
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<td>REGION:</td>
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<td>LEGEND:</td>
<td>Cryogenic structure (one and two stade), factual data about permafrost thickness</td>
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<td>NUMBER:</td>
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<tr>
<td>AUTHOR:</td>
<td>Garagulia, L.S., Ershov, E.D., Kondratieva, K.A.</td>
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<td>NAME:</td>
<td>Engineering-geological zoning map of the USSR</td>
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<td>Inset-map in monograph &quot;Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, E.D. &quot;</td>
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<td>LEGEND:</td>
<td>Areas with technical changes of geocryological conditions and with activity and origin of cryogenic processes and frozen ground features, types of geocryological conditions technical changes, permafrost zones (expansion and temperature)</td>
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<td>LAT/LONG:</td>
<td>38°00-82°00/30°00-170°00</td>
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<td>AUTHOR:</td>
<td>Garagulia, L.S., Trush, N.I., Bogoliubov, A.N.</td>
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<td>NAME:</td>
<td>Permafrost map of Eruda valley</td>
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<td>SOURCE:</td>
<td>Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.291</td>
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<td>REGION:</td>
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<tr>
<td>AUTHOR</td>
<td>Gasanov, Sh.Sh.</td>
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<td>NAME</td>
<td>Interaction of atmosphere/cryosphere with the earth surface</td>
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<tr>
<td>PUB</td>
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<td>SOURCE</td>
<td>&quot;Regional and special geocryological investigations&quot;, p.101</td>
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<td>The Globe</td>
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<td>Area of atmosphere/cryosphere interaction</td>
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<td>LAT/LONG</td>
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| AUTHOR        | Gavrilov, A.V.                                                                                       |
| NAME         | Geocryology-engineering map of Aldan area                                                            |
| PUB          | Moscow, Moscow University Publishers, 1975                                                          |
| SCALE        | 1:1 000 000                                                                                           |
| SOURCE       | Inset-map in monograph "South Yakutia"/ edited by Kudriavtsev                                       |
| REGION       | South Yakutia                                                                                        |
| LEGEND       | Expansion, temperature, thickness, seasonal freezing and thawing, geological and permafrost phenomena, taliks, genesis complexes of ground, water-bearing complexes, types of relief |
| LAT/LONG     | 56°00-80°00/30°00-170°00                                                                            |
| INSTITUTE    | Moscow State University                                                                            |
| NUMBER       | 00107                                                                                               |
| NUMBER       | 00108                                                                                               |
| INSTITUTE    | Moscow State University                                                                            |

| AUTHOR        | Gavrilova, M.K.                                                                                       |
| NAME         | Reconnaissance map of permafrost zones of the world                                                   |
| PUB          | Novosibirsk, Nauka, 1981                                                                           |
| SCALE        | 1:50 000 000                                                                                         |
| SOURCE       | Inset-map in monograph "Contemporary climate and permafrost in continents"                         |
| REGION       | The Globe                                                                                            |
| LEGEND       | Expansion of permafrost (island, continuous and discontinuous permafrost )                          |
| INSTITUTE    | Permafrost Institute                                                                                |
| NUMBER       | 00107                                                                                               |
| NUMBER       | 00108                                                                                               |
| INSTITUTE    | Permafrost Institute                                                                                |

| AUTHOR        | Gilichinski, D.A.                                                                                    |
| NAME         | Depths of seasonal freezing for the southern part of West-Siberian plain (sketch-map)             |
| PUB          | Moscow, Nauka, 1986                                                                                 |
| SCALE        | 1:7 500 000                                                                                         |
| SOURCE       | Inset-map in monograph "Seasonal frozen ground zone in West Siberia" by Gilichinski, D.A.          |
| REGION       | West Siberia                                                                                        |
| LEGEND       | Count and natural depths of thaw                                                                   |
| LAT/LONG     | 66°00-62°00/89°00-96°00                                                                            |
| NUMBER       | 00104                                                                                               |

| AUTHOR        | Gasanov, Sh.Sh.                                                                                       |
| NAME         | Interaction of atmosphere/cryosphere with the earth surface                                        |
| PUB          | Novosibirsk, Nauka, 1975                                                                           |
| SCALE        | 1:400 000 000                                                                                      |
| SOURCE       | "Regional and special geocryological investigations", p.101                                        |
| REGION       | The Globe                                                                                            |
| LEGEND       | Area of atmosphere/cryosphere interaction                                                           |
| LAT/LONG     | 56°00-62°00/89°00-96°00                                                                            |
| NUMBER       | 00104                                                                                               |
| NUMBER       | 00106                                                                                               |
| NUMBER       | 00107                                                                                               |
| INSTITUTE    | Moscow State University                                                                            |

| AUTHOR        | Gilichinski, D.A.                                                                                    |
| NAME         | Depths of seasonal freezing for the southern part of West-Siberian plain (sketch-map)             |
| PUB          | Moscow, Nauka, 1986                                                                                 |
| SCALE        | 1:7 500 000                                                                                         |
| SOURCE       | Inset-map in monograph "Seasonal frozen ground zone in West Siberia" by Gilichinski, D.A.          |
| REGION       | West Siberia                                                                                        |
| LEGEND       | Count and natural depths of thaw                                                                   |

56
Gilichinski, D.A.

**Sketch-map (fragment) of ground water depth and mineralization (referring to their influence on seasonal freezing and ground temperature regime)**

**PUB:** Moscow, Nauka, 1986

**SCALE:** 1:7 500 000

**SOURCE:** Gilichinski, D.A. Seasonal frozen ground in West Siberia, p.42

**REGION:** West Siberia

**LEGEND** Bedding in layer of seasonal freezing ground water, which provide inflow moisture to freezing

**LAT/LONG:** 50°00-61°00/62°00-94°00

**INSTITUTE:** Institute of Soil Science and Photosynthesis

**NUMBER** 00109

Gilichinski, D.A.

**Sketch-map fragment of the phase change of the quantity of heat in seasonal frozen layer**

**PUB:** Moscow, Nauka, 1986

**SCALE:** 1:7 500 000

**SOURCE:** Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.

**REGION:** West Siberia

**LEGEND** Quantity heat (13 ranges)

**LAT/LONG:** 50°00-61°00/62°00-94°00

**INSTITUTE:** Institute of Soil Science and Photosynthesis

**NUMBER** 00110

Gilichinski, D.A.

**Sketch-map of expenditure of energy on permafrost conditions influencing compensation**

**PUB:** Moscow, Nauka, 1986

**SCALE:** 1:7 500 000

**SOURCE:** Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.

**REGION:** West Siberia

**LEGEND** Expenditure of energy on compensation of influence of permafrost conditions

**LAT/LONG:** 50°00-61°00/62°00-94°00

**INSTITUTE:** Institute of Soil Science and Photosynthesis

**NUMBER** 00111

Gilichinski, D.A.

**Sketch-map of annual ground heat storage layer thickness, m**

**PUB:** Moscow, Nauka, 1986

**SCALE:** 1:7 500 000

**SOURCE:** Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.

**REGION:** West Siberia

**LEGEND** Annual ground heat storage layer thickness

**LAT/LONG:** 50°00-61°00/62°00-94°00

**INSTITUTE:** Institute of Soil Science and Photosynthesis

**NUMBER** 00112

Gilichinski, D.A.

**Sketch-map of types of seasonal freezing of soil referring to the average annual ground temperature**

**PUB:** Moscow, Nauka, 1986

**SCALE:** 1:7 500 000

**SOURCE:** Inset-map in monograph D.C. Gilichinski, "Seasonal frozen ground zone in West Siberia"
REGION: West Siberia
LEGEND Type of seasonal freezing of soils
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00114

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of snow cover influence on ground temperature
PUB: Moscow, Nauka, 1989
SCALE: 1:7 500 000
SOURCE: Inset map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Heat/snow cover influence
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00115

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of the depths of potential seasonal thawing
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph "Seasonal frozen ground zone in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Seasonal thawing (11 ranges)
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00116

AUTHOR Gilichinski, D.A.
NAME: Zoning referring to the development of frost heaving (fragment)
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Gilichinski, D.A. Seasonal frozen ground in West Siberia, p.68
REGION: West Siberia
LEGEND Regions with the intensive and weak development of heave processes or absence of them, areas with few frost mounds
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00117

AUTHOR Glushkova, O.IU., Degtiarenko, I.U.P., Prokhorova, T.P.
NAME: Aerophotogeomorphological map of eastern Verkhne-Khatyrskoi depression surrounding
PUB: Magadan, SVKNII DVO, 1987
SCALE: 1:1 000 000
REGION: Kamchatka
LEGEND Gentle slopes of solifluction removal and accumulation; relief, working by cryogenic processes
LAT/LONG: 61°00-64°00/172°00-178°00
NUMBER 00118

AUTHOR Gogichishvili, V.V.
NAME: Sketch-map of cryological landscape indicator near settlement Azei (Irkutsk area)
PUB: Novosibirsk, Nauka, 1983
Gorbunov, A.P., Geocryological map of Dzhungarsk Alatau, Moscow, Nauka, 1989, 1:1 500 000, Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.297, Southern Siberia (Kazakhstan), Expansion, temperature, thickness, types of seasonal freezing of soils, 40°00-47°00/75°00-83°00, NUMBER 00120.

Gorbunov, A.P., Geocryological map of Saur-Tarbagai, Moscow, Nauka, 1989, 1:1 500 000, Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.327, Southern Siberia (Kazakhstan), Expansion, temperature, thickness, types of seasonal freezing of soils, 47°00/83°00-85°00, NUMBER 00121.

Gorbunov, A.P., Permafrost under Fedchenko Glacier, Moscow, Nauka, 1989, Large, Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.E. Ershov, p.327, South-East Central Asia (Pamirs), Expansion, temperature, thickness, types of seasonal freezing of soils, 37°00-40°00/66°00-75°00, NUMBER 00122.

Gorbunov, A.P., Sketch-map of altitudinal geocryological zonality, Moscow, Nauka, 1976, 1:200 000 000, "Questions of global cryology", p.44, Global, Types of altitudinal zonality (8 ranges), tops with permafrost, absolute height of boundaries, permafrost belts, southern limit of permafrost in lowlands, Permafrost Institute, NUMBER 00123.

Gorbunov, A.P., Spreading, thickness and average annual temperature of permafrost in Pamiro-Altai, Moscow, Nauka, 1989, 1:4 000 000, Geocryology of the USSR. Mountain countries of the southern USSR / edited by...
E.E. Ershov, p.308
REGION: South-East Central Asia, Tien Shan
LEGEND: Expansion, temperature, thickness
LAT/LONG: 40°00'-43°00'/69°00'-80°00'
NUMBER: 00124

AUTHOR: Gorbunov, A.P.
NAME: Spreading, thickness and average annual temperature of permafrost in Pamir-Alai
PUB: Moscow, Nauka, 1989
SCALE: 1:2 500 000
SOURCE: Geocryology of the USSR, Mountain countries of the southern USSR / edited by E.E. Ershov, p.325
REGION: South-East Central Asia (Pamirs)
LEGEND: Expansion, temperature, thickness
LAT/LONG: 37°00'-40°00'/66°00'-75°00'
NUMBER: 00125

AUTHOR: Gotovtsev, S.P.
NAME: Sketch-map of cryogenic processes zoning in Charo-Tokinsky interfluve
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: Large
SOURCE: Geographical research in Yakutia, p.91
REGION: Southern Yakutia
LEGEND: Area of cryogenic processes expansion and topography formation
LAT/LONG: 58°00'-60°00'/118°00'-120°00'
INSTITUTE: Permafrost Institute
NUMBER: 00126

AUTHOR: Gravis, G.F., Drozdov, D.S., Stashenko, A.I.
NAME: Fragment of engineering-geological map
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: Large
REGION: Central Yakutia
LEGEND: Thermokarst, rock stream
LAT/LONG: 61°30'/127°00'
INSTITUTE: VSEGINGEO
NUMBER: 00127

AUTHOR: Grigorev, N.F.
NAME: Climatic regionalization of cryolithozone
PUB: Moscow, Nauka, 1981
SCALE: 1:50 000 000
SOURCE: Gasanov, Sh.Sh. "Cryolithological analysis", p.23
REGION: The USSR
LEGEND: Permafrost boundary
LAT/LONG: 50°00'-80°00'/30°00'-70°00'
NUMBER: 00128

AUTHOR: Gruzdov, A.V., Badu, Iu.B., Lobov, A.P.
NAME: Map of permafrost average annual temperature distribution
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T., Badu Iu.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.34-35

60
West Siberia

**Legend:** Prevailing temperatures in 8 ranges, places of untouched permafrost

**Lat/Long:** 64°00-74°00/65°00-85°00

**Institute:** Moscow State University

**Number:** 00129

**Author:** Gruzdov, A.V., Badu, IU.B., Varenyshev, V.B. et.al.

**Name:** Map of permafrost thickness in West Siberia platform

**Pub:** Moscow, Moscow University Publishers, 1980

**Scale:** 1:7 500 000

**Source:** Trofimov, V.T., Badu, IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.46-47

**Region:** West Siberia

**Legend:** Prevailing permafrost thickness (5 ranges) and their expansion, boundary of territory where wide extent cooling grounds are found or assumed, untouched permafrost places

**Lat/Long:** 64°00-74°00/65°00-85°00

**Institute:** Moscow State University

**Number:** 00130

**Author:** Gruzdov, A.V., Badu, IU.B., Varenyshev, V.B., Trofimov, V.T., Firsov, N.G.

**Name:** Map of permafrost thickness in West Siberia platform

**Pub:** Novosibirsk, Nauka, 1990

**Scale:** 1:3 000 000

**Source:** Inset-map in monograph "Geocryological investigation history in West Siberia"/ edited by Nekrasov

**Region:** West Siberia

**Legend:** Thickness, areas of discontinuous permafrost, boundaries of areas with cooling ground with cryopegs

**Lat/Long:** 62°00-74°00/60°00-90°00

**Institute:** Moscow State University

**Number:**

**Author:** Gruzdov, A.V., Trofimov, V.T., Filkin, N.A.

**Name:** Scheme of distribution of permafrost thickness in Nadym, Taz, Pur river-systems and Tazovski peninsula

**Pub:** Moscow, Moscow University Publishers, 1977

**Scale:** 1:5 000 000

**Source:** Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.77

**Region:** West Siberia

**Legend:** Expansion, thickness

**Lat/Long:** 64°00-69°00/68°00-88°00

**Institute:** Moscow State University

**Number:** 00132

**Author:** Gruzdov, A.V.

**Name:** Scheme of permafrost extent at the Kola Peninsula

**Pub:** Moscow, Nauka, 1988

**Scale:** 1:7 500 000

**Source:** Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.272

**Region:** Kola Peninsula

**Legend:** Southern limit of permafrost

**Lat/Long:** 66°00-70°00/32°00-42°00

**Institute:** Moscow State University

**Number:** 00133
Scheme of Vozei tectonic structure disposition  
Moscow, Stroiizdat, 1984  
1:10 000 000  
Geocryological conditions and their change forecast in primary development regions in the North, p.135  
REGION: European North of the USSR  
LEGEND: Expansion  
LAT/LONG: 64°00-70°00/55°00-65°00  
INSTITUTE: PNIIIS, Gosstroj USSR  
NUMBER: 00134

Kachiurin, S.P.  
Map of thermokarst extent in the USSR  
Moscow, Academy of Sciences Publishers, 1961  
1:15 000 000  
Inset-map in monograph by Kachiurin, S.P. "Thermokarst in the USSR"  
REGION: USSR  
LEGEND: Thermokarst on: wedge and segregation ice (contemporary and relict), hillocky terrain (contemporary and relict), thermokarst terraces, thermoabrasion, palsas, frost mounds  
LAT/LONG: 38°00-82°00/20°00-170°00  
INSTITUTE: Permafrost Institute  
NUMBER: 00135

Kaplina, T.N., Leibman, N.O.  
Sketch - map of ice content in permafrost  
Moscow, Stroyizdat, 1990  
1:20 000 000  
Climate for construction, reference book SNIP, p.51  
REGION: USSR  
LEGEND: Lithological types of ground, ice content, macro-ice content, expansion types of ground ice  
LAT/LONG: 38°00-80°00/20°00-170°00  
INSTITUTE: Gosstroj USSR  
NUMBER: 00136

Kaplina, T.N.  
Occurrence and age of syngenesis and epigenesis permafrost in northern Yakutia lowland  
Moscow, Nauka, 1986  
Large  
"Permafrost formation and cryogenic processes forecast", p.10. In article by Kaplina, T.N.  
REGION: Northern Yakutia  
LEGEND: Syngenesis permafrost deposits (thick to 40m of Middle Pleistocene age, thick to 5m Holocene), syngenesis and epigenesis permafrost strata  
LAT/LONG: 68°00-73°00/110°00-160°00  
INSTITUTE: PNIIIS, Gosstroj USSR  
NUMBER: 00137

Kaplina, T.N., Kostolyndina, N.K., Leibman, M.O.  
Ruggedness of edoma relief by alasas in Cukochya-Konkovskii bar region  
Moscow, Nauka, 1986  
Large  
"Permafrost formation and cryogenic processes forecast", p.52. In the article Kaplina, T.N., Kostolyndina N.K., Leibman, M.O.  
REGION: Northern Yakutia  
LEGEND: Alas depths (3 ranges), dome-shaped edoma of different altitude (3 ranges)
LAT/LONG: 68°00-69°30/156°00-157°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00138

AUTHOR Kaplina, T.N., Kostalyndina N.K., Leibman, M.O.
NAME: Ruggedness of edoma relief by alas in Duvannyi dome region
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic processes forecast", p.54. In the article by Kaplina, T.N., Kostalyndina N.K., Leibman, M.O. p.51-60
REGION: Northern Yakutia
LEGEND Alas depths (3 ranges), dome-shaped edoma of different altitude (3 ranges)
LAT/LONG: 168°00-169°00/158°00-160°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00139

AUTHOR Kaplina, T.N., Kostalyndina N.K., Leibman, M.O.
NAME: Ruggedness of terrace edoma relief by alas of Chukochya and Bolshoi Konkovoi interfluve
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic processes forecast", p.56. In the article by Kaplina, T.N., Kostalyndina H.K., Leibman, M.O. p.51-60
REGION: Northern Yakutia
LEGEND Alas depths (3 ranges), altitude of terrace edoma
LAT/LONG: 69°00-71°00/156°00-161°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00140

AUTHOR Kaplina, T.N., Znamenskii, E.N.
NAME: Schematic map of cryogenic processes and frozen features
PUB: Moscow, Stroiizdat, 1990
SCALE: 1:20 000 000
SOURCE: Climate for construction, reference book SNIP p.50
REGION: USSR
LEGEND Cryogenic processes and frozen ground features
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: Gosstroi USSR
NUMBER 00141

AUTHOR Kaplina, T.N., Kostalyndina N.K., Leibman M.O.
NAME: Sketch-map of relief levels in Kolyma lower course
PUB: Moscow, Nauka, 1986
SCALE: 1:5 000 000
SOURCE: "Permafrost formation and cryogenic processes forecast, p.52. In the article by Kaplina, T.N., Kostalyndina N.K., Leibman M.O. p.51-60
REGION: Northern Yakutia
LEGEND Terrace and dome-shaped edoma of different altitudes, bar and dome names
LAT/LONG: 68°00-71°00/155°00-162°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00142

AUTHOR Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Depths of seasonal ground freezing and thawing
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.82
REGION: West Siberia
LEGEND: Maximum natural depths of seasonal freezing and thawing
LAT/LONG: 50°00'-70°30'/60°00'-90°30'
INSTITUTE: Moscow State University
NUMBER: 00143

AUTHOR: Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Seasonal freezing and thawing of ground types referring to lithological and moisture content
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.79
REGION: West Siberia
LEGEND: Lithological composition, types of depth of thawing and their boundaries
LAT/LONG: 50°00'-70°30'/60°00'-90°30'
INSTITUTE: Moscow State University
NUMBER: 00144

AUTHOR: Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Seasonal freezing and thawing of ground types referring to average annual temperature and amplitudes on surface groundmass
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.77
REGION: West Siberia
LEGEND: Average annual temperature ground types and temperature amplitudes
LAT/LONG: 50°00'-70°30'/60°00'-90°30'
INSTITUTE: Moscow State University
NUMBER: 00145

AUTHOR: Katasonov, E.M.
NAME: Geomorphological map of Timara drainage basin
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:300 000 000
REGION: Central Yakutia
LEGEND: Surface with thermokarst lakes and depression
LAT/LONG: 63°45'-64°30'/129°00'-130°00'
INSTITUTE: Geocryological Institute
NUMBER: 00146

AUTHOR: Kaznacheeva, I.A.
NAME: Scheme of exogenesis processes and phenomena in Malo-Bolshezemel region
PUB: Moscow, Nauka, 1988
SCALE: 1:7 500 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.295
REGION: European North
LEGEND: Cryogenic processes and phenomena (hillocky peatland, thermokarst, thermal erosion, polygonal wedge ice, neogenesis, syngenesis and epigenesis permafrost)
LAT/LONG: 65°00'-69°00'/52°00'-64°00'
INSTITUTE: SO NIIOSP
NUMBER: 00147

AUTHOR: Kaznacheeva, I.A.
NAME: Scheme of polygonal ground types extent associated with their relief forms in Malo-Boshezemesky region
PUB: Moscow, Nedra, 1988
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.297
REGION: European North
LEGEND Contemporary syngenesis and epigenesis wedge ice, buried wedge ice, pseudomorphs, microrelief in growth and stabilization phases
LAT/LONG: 66°00-69°00/48°00-64°00
INSTITUTE: SO NIIOSP
NUMBER 00148

AUTHOR Kaznacheeva, I.A., Sukhodolskii, S.E.
NAME: Zoning scheme of Malo-Bolshezemel'sky region referring to discontinuous permafrost
PUB: Moscow, Nauka, 1988
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.278
REGION: European North
LEGEND Permafrost zone referring to expansion
LAT/LONG: 48°00-66°00/64°00-72°00
INSTITUTE: SO NIIOSP
NUMBER 00149

AUTHOR Khrustalev, L.H., Novikov, F.IA., Nadessdin, A.V., Maksimenko, A.S.
NAME: Sketch-map of natural complexes resistivity impact
PUB: Moscow, Nedra, 1988
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.343
REGION: European North
LEGEND Temperature, expansion, ice content, permafrost and unfrozen ground thermal characteristics, characteristics of resistance referring to the potential exhibit of thermokarst and heave
LAT/LONG: 65°00-74°00/32°00-68°00
INSTITUTE: SO NIIOSP
NUMBER 00150

AUTHOR Khrutskii, S.F., Afanasenko, V.E., Kondratieva, K.A.
NAME: Hydrogeological zoning scheme
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:1 000 000
SOURCE: Permafrost Studies, XII, p.60
REGION: Central Siberia
LEGEND Hydrogeological structures (cryogenic massif), taliks, watery characteristics, geological structure
LAT/LONG: 69°00-71°00/140°00-143°00
INSTITUTE: Moscow State University
NUMBER 00151

AUTHOR Khrutskii, S.F., Afanasenko V.E., Kondratieva, K.A.
NAME: Permafrost sketch-map
PUB: Moscow, Moscow University Published, 1972
SCALE: 1:1 000 000
SOURCE: Permafrost Studies, XII, p.56
REGION: Central Siberia
LEGEND Permafrost thickness, average annual temperature of ground, morphostructures, genesis and lithological content
LAT/LONG: 69°00'71°00'140°00'143°00  
INSTITUTE: Moscow State University  
NUMBER 00152  

AUTHOR Koldysheva, R.I.A.  
NAME: Geocryological sketch-map of Tunkinskaya depression  
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966  
SCALE: 1:1 500 000  
REGION: Transbaikal  
LEGEND Permafrost thickness, the depths of permafrost table in wells, boundaries of zone (real, assumed): zones without permafrost, permafrost thickness 4-40 m, 40-215 m with taliks islands  
LAT/LONG: 51°00'52°00'101°00'104°00  
NUMBER 00153  

AUTHOR Koldysheva, R.I.A.  
NAME: Scheme (fragment) of aeration zone for permafrost  
PUB: Moscow, Nauka, 1977  
SCALE: 1:7 500 000  
SOURCE: "Frozen ground and snow cover", p.169  
REGION: Transbaikal  
LEGEND Boundaries of continuous, discontinuous and island permafrost  
LAT/LONG: 52°00'54°00'95°00'115°00  
NUMBER 00154  

AUTHOR Koldysheva, R.I.A.  
NAME: Scheme (fragment) of aeration zone for permafrost  
PUB: Moscow, Nauka, 1977  
SCALE: 1:7 500 000  
SOURCE: "Frozen ground and snow cover", p.178  
REGION: Transbaikal  
LEGEND Infiltration type with rather high energy exchange in system "atmosphere-ground aeration zone-suprapermafrost waters-permafrost"  
LAT/LONG: 53°00'54°00'95°00'115°00  
NUMBER 00155  

AUTHOR Kondrateva, K.A., Kudriavtsev, V.A.  
NAME: Cryolithozone map of the USSR  
PUB: Moscow, Enlightenment, 1980  
SCALE: 1:35 000 000  
SOURCE: Romanovskii, N.N. "Cold of the Earth: Textbook for student", p.18-19  
REGION: The USSR  
LEGEND Thickness, temperature, spreading. Ocean, shelf, northern, southern, subglacial cryolithozone. Relict cryolithozone, the boundary of syngenesisal freezing ground of "ice complex"  
LAT/LONG: 38°00'-82°00'20°00'-170°00  
INSTITUTE: Moscow State University  
NUMBER 00156  

AUTHOR Kondratieva, K.A., Khrutskii, S.F.  
NAME: Air temperature amplitudes map for the Central Siberia  
PUB: Moscow, Nedra, 1989  
SCALE: 1:20 000 000  
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.41
REGION: Central Siberia
LEGEND: Southern and northern limit of permafrost zones, contemporary permafrost expansion
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00157

AUTHOR: Kondratieva, K.A.
NAME: Average annual ground temperature inversion distribution in river valley
PUB: Moscow, Nedra, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.66
REGION: Central Siberia (Vilyui River)
LEGEND: Average annual ground temperatures, lithological composition
LAT/LONG: 62°00-64°30/110°00-130°00
INSTITUTE: Moscow State University
NUMBER 00158

AUTHOR: Kondratieva, K.A.
NAME: Central Siberia cryolithology map
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.88
REGION: Central Siberia
LEGEND: Type of freezing, lithological composition, cryogenic structure, macro ice inclusions, volumetric ice content, expansion, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00159

AUTHOR: Kondratieva, K.A.
NAME: Central Siberia engineering-geocryological regionalization map
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.391
REGION: Central Siberia
LEGEND: Permafrost zone boundaries, region numbers (the table gives the characteristics of engineering-geocryology), the tendency for development of cryogenic processes as a result of construction
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00160

AUTHOR: Kondratieva, K.A., Fotiev, S.M.
NAME: Central Siberia permafrost regionalization referring to types of permafrost zone structures
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.97
REGION: Central Siberia
LEGEND: Stages of frozen, frost, cool, with saline ground water and practically anhydrous ground, boundaries of districts with different permafrost structure, geocryological zones, contemporary permafrost expansion
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00161
Kondratieva, K.A.

Central Siberia regionalization referring to permafrost

Moscow, Nedra, 1989

1:20 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.130

Central Siberia

Morphostructure and geocryological features, southern limit of contemporary permafrost

50°00-75°00/80°00-135°00

Moscow State University

00162

Kondratieva, K.A., Danilova, N.S.

Cryogenic age map (onset of ground freezing) in Central Siberia

Moscow, Nedra, 1989

1:20 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.30

Central Siberia

Pleistocene, Holocene, recent (seasonal freezing of soil), age of ground, southern limit of permafrost in Pliocene and in present

50°00-75°00/80°00-135°00

Moscow State University, PNIIS, Gosstroi USSR

00163

Kondratieva, K.A., Oberman, N.G., Sukhodol'skii, S.E.

European North of the USSR zoning scheme referring to subareal permafrost thickness and vertical structure

Moscow, Nauka, 1988

1:10 000 000

Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.248

European North of the USSR

Shallow down permafrost thickness; relict permafrost under unfrozen ground; permafrost thickness with cryopegs occurring under permafrost

60°00-85°00/40°00-60°00

Moscow State University, PUGRO, PNIIS, Gosstroi USSR

00164

Kondratieva, K.A.

Frozen and unfrozen ground expansion and their average annual temperature (°C)

Moscow, Nedra, 1989

1:5 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.222

Central Siberia

Permafrost expansion and temperature

60°00-68°00/90°00-101°00

Moscow State University

00165

Kondratieva, K.A.

Geobotanical zones with dominant vegetation in Central Siberia

Moscow, Nedra, 1989

1:35 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.47

Central Siberia

Northern and southern geocryological zones boundary, southern limit of permafrost

50°00-75°00/80°00-135°00

Moscow State University

00165
Kondratieva, K.A., Kudriavtsev, V.A., Khrutskii, S.F.
Geocryological- hydrogeological map of southern Yakutia
Moscow, Moscow University Publishers, 1967
1:2 500 000
Permafrost Studies, VII, p.100-101
Southern Yakutia
Types of underground water referring to permafrost, permafrost expansion and thickness, water-bearing complexes and special forms of underground water accumulation and display
55°00-60°00/120°-135°00
Moscow State University

Kondratieva, K.A., Maksimova, L.N.
Geocryological map of Baikal-Patom region
Moscow, Nedra, 1989
1:5 000 000
Geocryology of the USSR. Mountain territories of south USSR / edited by E.D. Ershov, p.68
Transbaikal
Expansion, temperature, thickness
57°00-61°00/110°-116°00
Moscow State University

Kondratieva, K.A.
Geotemperature map of Malaya and Bolshaya Botuobiya interfluve
Moscow, Nedra, 1989
Large
Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.237
Central Siberia
Temperature, age of deposits
62°00-63°00/114°-115°00
Moscow State University

Kondratieva, K.A.
Map of average annual ground temperatures and ice sheets in Central Siberia
Moscow, Nedra, 1989
1:20 000 000
Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.61
Central Siberia
Average annual temperature of ground, geocryological zones boundary, southern limit of permafrost
50°00-75°00/80°-135°00
Moscow State University

Kondratieva, K.A., Dunaeva E.N.
Map of average annual permafrost temperature in the USSR
Moscow, Nedra, 1988
1:20 000 000
Inset-map in monograph "Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov"
REGION: USSR
LEGEND: Seasonal frozen ground and permafrost expansion, temperature, boundaries of temperature and permafrost zone
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER: 00171

AUTHOR: Kondratieva, K.A., Kudriavtsev, V.A., Khrutskii, S.F.
NAME: Map of average annual ground temperature zoning of Yano-Indigirskii interfluval
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, XII, p.70
REGION: Central Siberia
LEGEND: Average annual ground temperature zone, geological-genesis complexes
LAT/LONG: 67°30-73°00/138°00-144°00
INSTITUTE: Moscow State University
NUMBER: 00172

AUTHOR: Kondratieva, K.A.
NAME: Map of frozen ground features expansion in geology-genesis types and formation
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.124
REGION: Central Siberia
LEGEND: Soil wedges, wedge ice, frost mounds, hillocky peatland, sheet ice, hillocky terrain, thermokarst, frost fracturing, cave ice, glaciers
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER: 00173

AUTHOR: Kondratieva, K.A.
NAME: Map of generalized permafrost zones thickness in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.105
REGION: Central Siberia
LEGEND: Permafrost thickness in geocryological zones and shelf zone
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER: 00174

AUTHOR: Kondratieva, K.A.
NAME: Map of North-Siberia lowland permafrost zone thickness (m)
PUB: Moscow, Nedra, 1989
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.156
REGION: Central Siberia
LEGEND: Permafrost thickness (8 ranges ), permafrost with cryopegs boundary (permafrost thickness 100-300 and 0-100 m)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Moscow State University
NUMBER: 00175

AUTHOR: Kondratieva, K.A.
NAME: Map of permafrost thickness in the USSR
PUB: Moscow, Nedra, 1988
Inset-map in monograph "Geocryology of the USSR. European territory of the USSR"/ edited by E.D. Ershov

**REGION:** USSR  
**LEGEND:** Thickness, permafrost zones boundaries: subareal, subglacial, southern limit of relict and contemporary permafrost  
**LAT/LONG:** 38°00-82°00/30°00-170°00

**INSTITUTE:** Moscow State University  
**NUMBER:** 00176

**AUTHOR:** Kondratieva, K.A.  
**NAME:** Map of permafrost expansion and thickness (m) of upper stage in Central Siberia  
**PUB:** Moscow, Nedra, 1989  
**SCALE:** 1:20 000 000

**SOURCE:** Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.104  
**REGION:** Central Siberia  
**LEGEND:** Permafrost thickness in discontinuous and continuous permafrost zones (in valleys and on divide), permafrost zones boundaries  
**LAT/LONG:** 50°00-75°00/80°00-135°00

**INSTITUTE:** Moscow State University  
**NUMBER:** 00177

**AUTHOR:** Kondratieva, K.A., Khrutakii, S.F.  
**NAME:** Map of permafrost expansion and thickness (m) and cooling below 0° ground with cryopegs, bedding under permafrost layer  
**PUB:** Moscow, Nedra, 1989  
**SCALE:** 1:35 000 000

**SOURCE:** Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.107  
**REGION:** Central Siberia  
**LEGEND:** Thickness  
**LAT/LONG:** 50°00-75°00/80°00-135°00

**INSTITUTE:** Moscow State University  
**NUMBER:** 00178

**AUTHOR:** Kondratieva, K.A.  
**NAME:** Map of permafrost in the USSR  
**PUB:** Moscow, Moscow University Publishers, 1978  
**SCALE:** 1:35 000 000

**SOURCE:** General Permafrost Studies (Geocryology)/ edited by Kudriavtsev, V.A., p.14  
**REGION:** USSR  
**LEGEND:** Expansion, temperature, thickness  
**LAT/LONG:** 38°00-82°00/30°00-170°00

**INSTITUTE:** Moscow State University  
**NUMBER:** 00179

**AUTHOR:** Kondratieva, K.A., Kudriavtsev, V.A.  
**NAME:** Map of permafrost zoning of the USSR  
**PUB:** Moscow, Moscow University Publishers, 1979  
**SCALE:** 1:40 000 000

**SOURCE:** Inset-map in monograph "Geocryological survey methods"/ edited by V.A. Kudriavtsev  
**REGION:** USSR  
**LEGEND:** Northern and Southern permafrost zones (expansion, temperature, thickness), cryopeg zones, two layer stratas, the regular repetition of seasonal freezing soil zones  
**LAT/LONG:** 38°00-82°00/30°00-170°00

**INSTITUTE:** Moscow State University  
**NUMBER:** 00180

71
Kondratieva, K.A., Danilova, N.S., Baulin, V.V.

Map of permafrost age

Moscow, Nedra, 1988

1:20 000 000

Inset-map in monograph "Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov"

USSR

Expansion and geological age, southern limit of permafrost in Pliocene, Pleistocene, present

38°00-82°00/30°00-170°00

Moscow State University, PNIIIS, Gosstroi USSR

00181

Kondratieva, K.A.

Map of Severnaya Zemlya average annual ground and glacial cover temperatures

Moscow, Nedra, 1989

1:2 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.136

The North Polar region

Temperature in 6 ranges

82°00-87°00/90°00-110°00

Moscow State University

00182

Kondratieva, K.A.

Map of Severnaya Zemlya glacial cover thickness

Moscow, Nedra, 1989

1:2 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.135

Central Siberia

Thickness

82°00-87°00/90°00-110°00

Moscow State University

00183

Kondratieva, K.A., Khrutskii S.F.

Map of snow cover thickness in Central Siberia

Moscow, Nedra, 1989

1:35 000 000

Geocryology of the USSR. Central Siberia / edited by E. D. Ershov, p.45

Central Siberia

Southern and northern limit of permafrost zones, temporary permafrost expansion, snow cover thickness

50°00-75°00/80°00-135°00

Moscow State University

00184

Kondratieva, K.A.

Map of Taimyr (northern part) permafrost zone thickness (m)

Moscow, Nedra, 1989

1:10 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.144

Central Siberia

Permafrost thickness (7 ranges)

74°00-78°00/80°00-115°00

Moscow State University
AUTHOR: Kondratieva, K.A.
NAME: Map of Taimyr (northern part) permafrost zone average annual ground temperatures
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.144
REGION: Central Siberia
LEGEND: Temperature (4 ranges)
LAT/LONG: 74°00-78°00/80°00-115°00
INSTITUTE: Moscow State University

NUMBER 00186

AUTHOR: Kondratieva, K.A.
NAME: Map of temperature macrozones in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.67
REGION: Central Siberia
LEGEND: Prevalent average annual temperatures of ground, permafrost zone boundaries, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University

NUMBER 00187

AUTHOR: Kondratieva, K.A.
NAME: Map of Tungus-Vilyui region permafrost thickness (m)
PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.222
REGION: Central Siberia
LEGEND: Thickness in southern (4 ranges) and northern (5 ranges) permafrost zones
LAT/LONG: 60°00-68°00/90°00-101°00
INSTITUTE: Moscow State University

NUMBER 00188

AUTHOR: Kondratieva, K.A.
NAME: North-Siberia lowland average annual ground temperature (°C)
PUB: Moscow, Nedra, 1989
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.151
REGION: Central Siberia
LEGEND: Temperature (5 ranges)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Moscow State University

NUMBER 00189

AUTHOR: Kondratieva, K.A.
NAME: Permafrost and glaciers average annual temperatures (°C) map in Novaya Zemlya archipelago
PUB: Moscow, Nauka, 1988
SCALE: 1:3 500 000
SOURCE: Geocryology of the USSR. European territory of USSR / edited by E.D. Ershov, p.266
REGION: Novaya Zemlya
LEGEND: Temperature spans in cold and warm years
LAT/LONG: 70°00-77°00/51°00-72°00
Moscow State University

Kondratieva, K.A.

Permafrost and glaciers average annual temperatures (°C) map in Zemlya Frantsa Iosifa

Moscow, Nauka, 1988

1:20 000 000

Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.263

Franz Jozef Land

Temperature

76°00-84°00/42°00-66°00

Moscow State University

00190

Kondratieva, K.A.

Permafrost and seasonal frozen ground expansion map

Moscow, Nauka, 1988

1:50 000 000

Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.100

USSR

Expansion

38°00-82°00/20°00-170°00

Moscow State University

00191

Kondratieva, K.A., Gavrilov, A.V.

Permafrost zoning scheme of the USSR

Moscow, Nauka, 1988

1:40 000 000

Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.159

USSR

Figures are shown for the first and second order regions

35°00-82°00/30°00-170°00

Moscow State University

00192

Kondratieva, K.A., Khrutskii, S.F.

Sketch-map of the permafrost zone base depth

Moscow, Nedra, 1989

1:20 000 000

Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.102

Central Siberia

Permafrost zones base bedding below or above sea level line

50°00-75°00/80°00-135°00

Moscow State University

00193

Koniakhin, M.A.

Air temperature: air, mean winter day near surface distribution and oxygen-isotope content of contemporary wedge ice in territory of former USSR

Moscow, Moscow University Publisher, 1992

1:40 000 000

"Geoecology of the North (Introduction to Geocryecology)"/ Edited by V.I. Solomatin, p.45

The U.S.S.R.

Isotope-oxygenous content of recent wedge ice, mean temperature of mean winter air

50°00-80°00/40°00-170°00
INSTITUTE: Moscow State University
NUMBER 00195

AUTHOR Koniakhin, M.A.
NAME: Sheet ice bedding conditions (territory of Bovanenkovo CKM)
PUB: Moscow, Moscow State University, 1992
SCALE: Large
SOURCE: "Geocology of the North (Introduction to Geocryology)"/ Edited by V.I. Solomatin, p.47
REGION: West Siberia, Yamal Peninsula
LEGEND Contour lines of absolute height of sheet ice table. Absolute points of sheet ice base. Stripping sheet ice wells.
LAT/LONG: 70°00/70°00

INSTITUTE: Moscow State University
NUMBER 00196

AUTHOR Kononova R.S., Neizvestnov, I.A.V., Tolstikhin, N.I.
NAME: Boundaries of seasonal cryopeg expansion in winter (World Ocean)
PUB: Moscow, Moscow University Publishers, 1971
SCALE: 1:200 000 000
SOURCE: Permafrost Studies, XI, p.78
REGION: The Globe
LEGEND Seasonal cryopegs

INSTITUTE: Moscow State University
NUMBER 00197

AUTHOR Kostiaev, A.G.
NAME: Scheme of permafrost limit in Eurasia in maximum cold period
PUB: Moscow, Moscow University Publishers, 1965
SCALE: 1:80 000 000
SOURCE: "Ground ice", issue II / edited by A.I. Popov, p.12
REGION: Eurasia
LEGEND Southern limit of permafrost, southern limit of permafrost in Europe if glacial cover was absent, area of sedimentation with syngenesis freezing and formation of thick wedge ice, glaciers, periglacial zone of loess surface formations
LAT/LONG: 20°00-85°00/20°00-170°00

INSTITUTE: Moscow State University
NUMBER 00198

AUTHOR Kozlova, A.E.
NAME: Geomorphological sketch-map of Taz drainage basin
PUB: Moscow, Nauka, 1972
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph "Natural conditions of the Tazovskii oil-gas containing region industrialization"
REGION: West Siberia
LEGEND Polygonal relief, frost mounds, thermokarst depressions
LAT/LONG: 62°30-68°00/78°00-84°00

INSTITUTE: Geographical Institute
NUMBER 00199

AUTHOR Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G.
NAME: Permafrost regionalization scheme for West Siberia referring to permafrost resistance to technological exposure (on landscape base)
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:15 000 000
SOURCE: "Questions of geocryological mapping", p.65. In the article by Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G. p.53-67

75
West Siberia

**Legend**
Permafrost resistance at the expense of ice content, temperature and sheet ice

**Lat/long**
60°00-74°00/60°00-85°00

**Institute**
VSEGINGEO

**Number**
00200

**Author**
Kudriavtsev, V.A., Kondratieva, K.A.

**Name**
Geocryological map of USSR

**Scale**
1:2 500 000

**Region**
USSR

**Legend**
Complex of geological conditions, lithological composition, cryogenic structure, thickness, expansion, ice content, temperature, cryogenic processes and frozen ground features, depth of bedding and thickness of deposits with cryopegs

**Lat/long**
40°00-82°00/30°00-170°00

**Institute**
Moscow State University

**Number**
00201

**Author**
Kudriavtsev, V.A., Baulin, V.V., Gruzdov, A.V. /edited by E.M.Sergeev

**Name**
Map of permafrost conditions of Russian non-chernozem zone (except Ural, Zaurale, Kaliningrad region)

**PUB**
Moscow, GUGK, 1984

**Scale**
1:1 500 000

**Region**
Non-chernozem zone, Russia

**Legend**
Genesis complexes, lithological composition, temperature, annual amplitude ground temperature fluctuations

**Lat/long**
52°00-69°00/28°00-64°00

**Institute**
Moscow State University, Geological Ministry, Ministry of Education (Russia)

**Number**
00202

**Author**

**Name**
Seasonal freezing of soils type map

**PUB**
Moscow, Moscow University Publishers, 1962

**Scale**
Large

**Source**
Inset-map in symposium articles "Permafrost Studies, II"

**Region**
Central Siberia

**Legend**
Average annual ground temperature, the depth of seasonal freezing (natural and settlement), temperature amplitudes above soils, prevalent lithological composition of winter freezing layer

**Lat/long**
52°00-58°00/95°00-104°00

**Institute**
Moscow State University

**Number**
00203

**Author**
Kudryashov, V.G., Trofimov, V.T.

**Name**
Permafrost base in West Siberian platform

**PUB**
Moscow, Nedra, 1989

**Scale**
1:20 000 000

**Source**
Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.123

**Region**
West Siberia

**Legend**
Depth of permafrost base

**Lat/long**
50°00-70°30/60°00-90°30

**Institute**
Moscow State University

**Number**
00204

**Author**
Kuznetsova, I.L., Parmuzin, S.IU., Rogatina, N.P.

**Name**
Critical depth of lakes with different thermal resistance to snow cover (2 maps)

**PUB**
Moscow, Stroiizdat, 1987
"Recommendations to estimate the change of permafrost conditions in industrialization territories of West Siberia" / PNIIS, Gosstroi, USSR, p.22-23

**Recommendations to estimate the change of permafrost conditions in industrialization territories of West Siberia**

**Critical snow cover thickness with different thermal resistance of vegetation in winter and summer (3 maps)**

**Critical snow cover thickness on places with clayey, sand soil and peat for different thermal resistance of vegetation cover**

**Engineering-geocryological sketch-map (fragments) of Yakutia region littoral lowlands**

**Regionalization map of the north of West Siberia referring to potential perennial freezing ground with removal of vegetation cover**

**Sketch-map of engineering-geocryological zonality in littoral lowlands**
<table>
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<tr>
<th>AUTHOR</th>
<th>Lakhtina, O.V., Sukhodolskaia, L.A.</th>
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<td>NAME</td>
<td>Sketch-map of permafrost extent in Holocene climatic optimum</td>
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<td>SOURCE</td>
<td>&quot;History of permafrost development in Eurasia&quot;, p.120. In the article by Lakhtina, O.V., Sukhodolskaia, L.A. p.113-125</td>
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<th>Leshchikov, F.N.</th>
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<td>Geocryological map of Angaro-Ilimak interfluve</td>
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<td>SOURCE</td>
<td>Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.327</td>
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<td>LEGEND</td>
<td>Expansion, thickness, the depth of seasonal freezing and thawing, permafrost terrain: frost mounds, thermokarst pits and lakes, solifluxion features, polygonal wedge ice and hillocky terrain, icings, content of deposits</td>
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<td>SOURCE</td>
<td>Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.331</td>
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<td>Places with hillocky terrain, northern limit of permafrost terrain</td>
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<td>NAME</td>
<td>Map of seasonal freezing soil calculation of depths in the impact zone of the Boguchan reservoir</td>
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PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.370
REGION: Central Siberia
LEGEND: The depth of freezing in natural conditions and standards for silty sands and clay, permafrost expansion, content and genesis of deposits
LAT/LONG: 95°00-103°00/58°00-60°00
INSTITUTE: Permafrost Institute
NUMBER 00214

AUTHOR Leshchikov, F.N.
NAME: Scheme in permafrost conditions in Musko-Kaundinskoi and Charscoi depressions and their mountain surroundings
PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.93
REGION: Transbaikal
LEGEND: Thickness, temperature, expansion, cryogenic processes and frozen ground features
LAT/LONG: 56°00-58°00/110°00-119°00
INSTITUTE: Permafrost Institute
NUMBER 00215

AUTHOR Leshchikov, F.N.
NAME: Scheme of Angaro-Lensk permafrost region referring to the types of technogenic impact
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.373
REGION: Central Siberia
LEGEND: Regions: without permafrost, pervasive and local permafrost degradation, short-term permafrost and ice lens formation, cryogenic processes activization under technogenic impact
LAT/LONG: 51°00-62°00/95°00-110°00
INSTITUTE: Permafrost Institute
NUMBER 00216

AUTHOR Leshchikov, F.N.
NAME: Scheme of permafrost conditions in Verhne-Angarscoi depression
PUB: Moscow, Nedra, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the south USSR / edited by E.D. Ershov, p.90
REGION: Transbaikal
LEGEND: Expansion, thickness, temperature, cryogenic processes and frozen ground features
LAT/LONG: 55°00-57°00/109°00-116°00
INSTITUTE: Permafrost Institute
NUMBER 00217

AUTHOR Leshchikov, F.N., Serov, A.G.
NAME: Sketch-map of calculated depths of seasonal freezing
PUB: Novosibirsk, Nauka, 1983
SCALE: 1:1 000 000
SOURCE: Leshchikov, F.N., Shats M.M., South Central Siberia permafrost, p.148
REGION: Central Siberia
LEGEND: Expansion, genesis and content ground, calculation and natural depth of freezing
LAT/LONG: 57°00-60°00/97°00-103°00
| INSTITUTE: | Permafrost Institute |
| NUMBER | 00218 |
| AUTHOR | Leshchikov, F.N. |
| NAME: | Sketch-map of Barguzin lowland and surrounding permafrost |
| PUB: | Moscow, Nedra, 1989 |
| SCALE: | 1:1 500 000 |
| SOURCE: | Geocryology of the USSR. Mountain countries of the south USSR / edited by E.D. Ershov, p.88 |
| REGION: | Transbaikal |
| LEGEND: | Expansion, thickness, temperature, depth of freezing and thawing cryogenic processes and frozen ground features, content of deposits |
| LAT/LONG: | 53°00-55°00/108°00-112°00 |
| INSTITUTE: | Permafrost Institute |
| NUMBER | 00219 |
| AUTHOR | Leshchikov, F.N. |
| NAME: | Sketch-map of Srednego-Priangariya permafrost |
| PUB: | Novosibirsk, Nauka, 1983 |
| SCALE: | 1:2 500 000 |
| SOURCE: | Leshchikov, F.N., Shats, M.M. South Central Siberia permafrost, p.135 |
| REGION: | Central Siberia |
| LEGEND: | Expansion, thickness, temperature, frozen ground features and permafrost terrain |
| LAT/LONG: | 56°00-60°00/100°00-104°00 |
| INSTITUTE: | Permafrost Institute |
| NUMBER | 00220 |
| AUTHOR | Leshchikov, F.N. |
| NAME: | The depths (m) of seasonal freezing map in Angaro-Lenski region |
| PUB: | Moscow, Nedra, 1989 |
| SCALE: | 1:10 000 000 |
| SOURCE: | Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.326 |
| REGION: | Central Siberia |
| LEGEND: | Seasonal freezing of soils (5 ranges of the depth) |
| LAT/LONG: | 52°00-60°00/105°00-107°00 |
| INSTITUTE: | Permafrost Institute |
| NUMBER | 00221 |
| AUTHOR | Likhanov, B.N. |
| NAME: | Sketch-map of physiographic regionalization |
| PUB: | Moscow, Nauka, 1972 |
| SCALE: | 1:2 500 000 |
| SOURCE: | Inset-map in monograph"Natural conditions of the Tazovskii oil-gas containing region industrialization" |
| REGION: | West Siberia |
| LEGEND: | Flat-topped bogs and palsa peatlands |
| LAT/LONG: | 62°30-68°00/78°00-84°00 |
| INSTITUTE: | Geographical Institute |
| NUMBER | 00222 |
| AUTHOR | Lurie, I.S. |
| NAME: | Sketch-map of upper level permafrost ice content |
| PUB: | Moscow, Moscow University Publishers, 1972 |
| SCALE: | 1:3 000 000 |
| SOURCE: | Permafrost Studies, XII, p.170 |
| REGION: | West Siberia (Tazovskii peninsula) |
Lithology and ice content, ground ice genesis types, average annual ground temperature, permafrost expansion, genesis types and age deposits

LAT/LONG: 67°00-69°00/74°00-77°30
INSTITUTE: Moscow State University
NUMBER 00223

AUTHOR: Mel'nikov, E.S.
NAME: Landscape Regionalization scheme of northwest Siberia
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:15 000 000
SOURCE: "Questions of geocryological mapping", p.56. In the article by Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G., p.53-67
REGION: West Siberia
LEGEND: Boundaries and indexed landscape provinces, subprovinces, districts. Geocryological conditions and their changes (tabl. 1, p.62-63)
LAT/LONG: 60°00-74°00/60°00-85°00
INSTITUTE: VSEGINGEO
NUMBER 00224

AUTHOR: Mel'nikov, E.S., Moskalenko, N.G.
NAME: Map of natural complexes in northwest Siberia for forecasting and planning of environment protection referring to construction
PUB: Moscow, GUGK, 1991
SCALE: 1:1 000 000
REGION: West Siberia
LEGEND: Geomorphology, age of deposits, lithological composition (upper horizon), temperature, expansion, cryogenic processes, characteristics of seasonal frozen and thawing layers, permafrost terrain, tolerance for technological effects
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: VSEGINGEO, Geological Ministry, USSR
NUMBER 00225

AUTHOR: Mel'nikov, E.S.
NAME: Scheme of engineering-geological zoning of northern West Siberia
PUB: Moscow, Moscow State University, 1977
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.147
REGION: West Siberia
LEGEND: Engineering-geological provinces, genesis of deposits
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: VSEGINGEO
NUMBER 00226

AUTHOR: Mel'nikov, P.I.
NAME: Geocryological sketch-map of Yakutia
PUB: Novosibirsk, Nauka, 1974
SCALE: 1:25 000 000
REGION: Central Siberia
LEGEND: Permafrost thickness, temperature, wedge ice, injected ice, injected-segregated ice, depths of seasonal thaw, continuous and discontinuous permafrost zones
LAT/LONG: 55°00-77°00/105°00-160°00
INSTITUTE: Permafrost Insitute
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<th>Permafrost and landscapes map of Yakutsk Republic</th>
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<th>Mimeev, V.S., Ryashin, V.A.</th>
<th>Zoning of Transbaikal referring to depth of seasonal thawing and freezing</th>
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<th>Hillocky terrain extent and its engineering-geological parameters scheme</th>
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<td>Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.255</td>
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<th>Neizvestnov, I.A.V.</th>
<th>Hydrogeological basins of the Eurasia Arctic shelf in the Late Cenozoic (19-18 thousand years ago)</th>
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<td>&quot;The primary problems of paleogeography in Late Cenozoic of the Arctic&quot;, p.183</td>
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<th>Baikalo-Amur main line. Geocryological map</th>
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<td>Regional geocryological research in East Asia / edited by I.A. Nekrasov, p.112</td>
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<td>Morphology and temperature at the Kolyma River headstream</td>
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<td>Regional subject and geocryological investigations, p.20</td>
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<th>Nekrasov, I.A., Mikova, A.I.</th>
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<td>NAME:</td>
<td>Permafrost zone thickness and temperature of Arkagala River system</td>
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<td>&quot;Regional and special geocryological investigations &quot;/ Edited by V.S. Iakupov, I.V. Klimovskii, p.7</td>
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83
AUTHOR: Nekrasov, I.A., Zabolotnik, S.I.
NAME: Sketch-map of seasonal thaw depths zoning in Amur area
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:2 500 000
SOURCE: Regional geocryological research in East Asia / edited by I.A. Nekrasov, p.122
REGION: Far East of USSR
LEGEND: Range of variations of depth of seasonal thawing sandy and clayey soils
LAT/LONG: 48°00-56°00/120°00-135°00
INSTITUTE: Permafrost Institute
NUMBER: 00238

AUTHOR: Nekrasov, I.A.
NAME: Sketch-map of permafrost zone in Northern Hemisphere
PUB: Novosibirsk, Nauka, 1974
SCALE: 1:50 000 000
SOURCE: Inset-map in monograph "The general geocryology"/ Edited by Mel'nikov, P.I., Tolstikhin, N.I.
REGION: Northern Hemisphere
LEGEND: Continuous, discontinuous permafrost and permafrost islands
LAT/LONG: 25°00-90°00/
INSTITUTE: Permafrost Institute
NUMBER: 00239

AUTHOR: Nevecheria, V.L.
NAME: Regionalization map of southwestern Siberian South referring to rate of frost heaving processes in ground
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:15 000 000
SOURCE: "Reports of VIII All-Union Geocryological Conference", no.3. Regional geocryology, p.56. In the report by Nevecheria, V.L. p.53-59
REGION: West Siberia
LEGEND: Districts: a) with high rate, b) with average rate, c.) with low rate of frost heaving processes in ground; boundaries of districts
LAT/LONG: 50°00-58°00/72°00-92°00
INSTITUTE: Siberian Institute of Power Engineering
NUMBER: 00240

AUTHOR: Nevecheria, V.L.
NAME: The distribution of the frost-susceptible ground near the West Siberian railways
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:7 500 000
REGION: West Siberia
LEGEND: Frost-susceptible ground
LAT/LONG: 52°00-58°00/78°00-90°00
INSTITUTE: Siberian Institute of Power Engineering
NUMBER: 00241

AUTHOR: Nikitenko, F.A.
NAME: Scheme of engineering-geological zoning of West Siberia platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia", p.246
REGION: West Siberia
Expansion, provinces of structure denudation plains

**LAT/LONG:** 51°00-74°00/60°00-90°00

**NUMBER:** 00242

**AUTHOR:** Novikov, V.P., Svitoch, A.A.

**NAME:** Geomorphological scheme of Aion Island

**PUB:** Moscow, Nauka, 1980

**SCALE:** 1:1 500 000

**SOURCE:** "Recent deposits and paleogeography of Pleistocene in Chukchi", p.178

**REGION:** Chuckchee

**LEGEND:** Fluvio-lacustrine plain, active reworking by thermokarst processes, thermokarst depression

**LAT/LONG:** 69°00-70°00/167°00-170°00

**INSTITUTE:** Pacific Ocean Geographical Institute

**NUMBER:** 00243

**AUTHOR:** Oberman, N.G.

**NAME:** Hydrogeology zoning scheme of European North of the USSR

**PUB:** Moscow, Nauka, 1988

**SCALE:** 1:20 000 000

**SOURCE:** Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.221

**REGION:** European North and Northern Urals

**LEGEND:** Hydrogeological structures referring to permafrost expansion

**LAT/LONG:** 60°00-85°00/40°00-60°00

**NUMBER:** 00244

**AUTHOR:** Oberman, N.G.

**NAME:** Permafrost scheme of Trans-Urals

**PUB:** Moscow, Nauka, 1981

**SCALE:** 1:20 000 000

**SOURCE:** "History of permafrost development in Eurasia", p.62. In the article by Oberman, N.G. p.60-73

**REGION:** European North

**LEGEND:** Permafrost zones: thick, two-layer and relict permafrost; thick permafrost with sheet ice and basal cryopegs; boundaries: zone, permafrost spread, thickness; sheet ice, frost mounds

**LAT/LONG:** 66°00-70°00/58°00-66°00

**NUMBER:** 00245

**AUTHOR:** Oberman, N.G.

**NAME:** Scheme of Ural permafrost

**PUB:** Moscow, Nedra, 1988

**SCALE:** 1:5 000 000

**SOURCE:** Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.303

**REGION:** Northern and Polar Ural

**LEGEND:** Seasonal frozen ground and permafrost zones, permafrost-temperature zonations (expansion, thickness, temperature )

**LAT/LONG:** 61°00-70°00/56°00-68°00

**NUMBER:** 00246

**AUTHOR:** Oberman, N.G.

**NAME:** Zoning scheme of Malo-Bolshezemelsky region referring to permafrost structure and thickness

**PUB:** Moscow, Nauka, 1988

**SCALE:** 1:3 500 000

**SOURCE:** Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.284
REGION: European North
LEGEND: Territory with prevailing relict permafrost, unfrozen ground, places with cryopeg, depth of permafrost base isolines
LAT/LONG: 65°00-69°00/52°00-64°00
NUMBER 00247

AUTHOR: Ospennikov, E.N., Chizhova, N.E.
NAME: Map of areal extent for geological processes and phenomena and forecasting their development for construction
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:5 000 000
REGION: South Yakutia
LEGEND: Cryogenic processes and features
LAT/LONG: 57°00-69°00/123°00-128°00
INSTITUTE: Moscow State University
NUMBER 00248

AUTHOR: Ospennikov, E.N.
NAME: Map of rock stream expansion in Aldano-Timpton interfluve territory
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.305
REGION: Central Siberia
LEGEND: Rock streams areal extent
LAT/LONG: 55°00-60°00/122°00-130°00
NUMBER 00249

AUTHOR: Parmuzin, S.IU.
NAME: Map of permafrost resistance referring to potential thermokarst development
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:10 000 000
SOURCE: "Questions of geocryological mapping", p.83. In the article by Parmuzin, S.IU. p.78-85
REGION: West Siberia
LEGEND: Places with potential thermokarst development. Southern limits : wedge ice and sheet ice spread
LAT/LONG: 60°00-74°00/64°00-88°00
INSTITUTE: Moscow State University
NUMBER 00250

AUTHOR: Pavlova, O.P.
NAME: Geocryological sketch-map of eastern part of Baikal mountain country
PUB: Moscow, Nauka, 1975
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph "Neotectonic, permafrost and ground water formation"
REGION: Transbaikal
LEGEND: Scheme of geocryological regionalization, content and structure of permafrost, spreading, temperature, thickness, icings
LAT/LONG: 55°00-60°00/110°00-130°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00251

AUTHOR: Pavlova, O.P.
NAME: Scheme of icings and springs locations on alluvial fan of Verkhnii Sakukan River, April 1971
PUB: Moscow, Nauka, 1975
SCALE: Large
SOURCE: "Neotectonic, permafrost and ground water", p.45
REGION: Transbaikal
LEGEND: Icings, springs, southern limit of permafrost
LAT/LONG: 56°00-60°00/118°00-120°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00252

AUTHOR Pizhankova, A.I., Chizhov, A.B.
NAME: Map of Southern Yakutia permafrost regionalization
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.196
REGION: Central Siberia
LEGEND: Temperature, expansion, genesis and age of deposits
LAT/LONG: 55°00-60°00/120°00-135°00
INSTITUTE: Moscow State University
NUMBER 00253

AUTHOR Popov, A.G., Kostiaev, A.G.
NAME: Sketch-map of Mesopleistocene periglacial features in Asia
PUB: Moscow, Moscow University Publishers, 1962
SCALE: 1:40 000 000
SOURCE: Inset-map in monograph "Questions of geographical geocryology and periglacial morphology"/ edited by Popov, A.I.
REGION: Asia
LEGEND: Type of cryolithogenesis, area of sedimentation, southern limit of permafrost, seasonal freezing, permafrost neogenesis, ice-wedge polygons, flat-topped polygonal peatland, ground wedges, alases, hillocky terrain
LAT/LONG: 40°00-80°00/40°00-170°00
INSTITUTE: Moscow State University
NUMBER 00254

AUTHOR Popov, A.I., Rozenbaum, G.E., Tumel, N.V.
NAME: Cryolithogenesis processes zoning scheme of the USSR
PUB: Moscow, Moscow University Publishers, 1985
SCALE: 1:60 000 000
REGION: USSR
LEGEND: Ocean and continental sectors of polar, subpolar, boreal and subboreal zones
LAT/LONG: 40°00-80°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00255

AUTHOR Popov, A.I.
NAME: Cryolithology map (permafrost region)
PUB: Moscow, GUGK, 1985
SCALE: 1:4 000 000
SOURCE: 1982
REGION: USSR
LEGEND: Cryogenic structure, types of cryogenesis, type of ground
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00256

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<td>Inset-map in &quot;Geographical Faculty scientific works in the International Geophysical Year&quot;, N 1. In report by Popov, A.I., p.239-264</td>
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<td>Nekrasov, and others &quot;Geocryological investigations history in West Siberia&quot;, p.25</td>
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<td>NAME</td>
<td>Map of permafrost on European territory of the USSR and Siberia</td>
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<td>NAME</td>
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<td>AUTHOR</td>
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<th>Sketch-map of permafrost in West Siberia</th>
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<td>Pure ice in the ground (content, genesis, cryogenic structure, freezing types ), frozen earth material (content, genesis, age, cryogenic structure, freezing types, ice content)</td>
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<tr>
<th>AUTHOR</th>
<th>Popov, A.I.</th>
<th>Sketch-map of the Northern Eurasia in Mesopleistocene</th>
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<tr>
<td>PUB:</td>
<td>Moscow, Moscow University Publishers, 1965</td>
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<td>SCALE:</td>
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<tr>
<td>SOURCE:</td>
<td>&quot;Ground ice&quot;, issue II / edited by A.I. Popov, p.37</td>
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<td>REGION:</td>
<td>Eurasia</td>
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<td>LEGEND:</td>
<td>Area of maximum permafrost extent in Northern Eurasia in the Pleistocene, permafrost boundaries on continental areas, relict shore line</td>
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<th>AUTHOR</th>
<th>Ravdonekas, O.V.</th>
<th>Map-scheme of permafrost base near Ust-Port settlement</th>
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<td>SCALE:</td>
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<td>SOURCE:</td>
<td>Baulin, V.V. &quot;Permafrost in oil-gas containing regions of the USSR&quot;, p.99</td>
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<td>REGION:</td>
<td>The Yenisei North</td>
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<td>LEGEND:</td>
<td>Isolines of permafrost base</td>
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<td>LAT/LONG:</td>
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| AUTHOR         | Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.        | Chemical hydrological zoning scheme                            |
|---------------|---------------------------------------------------------------|
| PUB:          | Moscow, Moscow University Publishers, 1970                      |
| SCALE:        | 1:1 000 000           |
| SOURCE:       | Permafrost Studies, X, p.42                                    |
| REGION:       | Central Siberia                                                |
| LEGEND:       | Places of fresh water and brackish water expansion and ground ice with sulphate magnesium-calcium content |
| LAT/LONG:     | 68°00-70°00/140°00-144°00 |

90
Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.

**NAME:** Scheme of Cenozoic deposits extent in Uyandinskaya superimposed basin

**PUB:** Moscow, Moscow University Publishers, 1970

**SCALE:** 1:500 000 000

**SOURCE:** Permafrost Studies, X, p.82

**REGION:** Central Siberia

**LEGEND:** Thermokarst lake, alasses recent beds, solifluction deposits, thermokarst lakes, genesis and age deposits

**LAT/LONG:** 68°00-70°00/140°00-142°00

**INSTITUTE:** Moscow State University

**NUMBER:** 00270

Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.

**NAME:** Scheme of hydrogeological zoning and icings location: Selenyakhski hydrogeological cryogenic massif, Polousnensko-Tuostachcki hydrogeological cryogenic massif

**PUB:** Moscow, Moscow University Publishers, 1970

**SCALE:** Large

**SOURCE:** Permafrost Studies, X, p.52

**REGION:** Central Siberia

**LEGEND:** The icings can be distinguished by special feature of ground-water recharge, individual hydrolaccoliths, places with open talik, geological structure

**LAT/LONG:** 68°00-70°00/140°00-144°00

**INSTITUTE:** Moscow State University

**NUMBER:** 00271

Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.

**NAME:** Scheme of permafrost thickness spreading

**PUB:** Moscow, Moscow University Publishers, 1970

**SCALE:** Large

**SOURCE:** Permafrost Studies, X, p.36

**REGION:** Central Siberia

**LEGEND:** Permafrost thickness, open taliks, boundaries of different permafrost thickness expansion, geological-tectonic structure

**LAT/LONG:** 68°00-70°00/140°00-144°00

**INSTITUTE:** Moscow State University

**NUMBER:** 00272

Rozenberg, L.I.

**NAME:** Scheme of Kuraiskoi lowland permafrost

**PUB:** Moscow, Nauka, 1989

**SCALE:** Large

**SOURCE:** Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.233

**REGION:** Southern Siberia (Altai)

**LEGEND:** Expansion, genesis of deposits

**LAT/LONG:** 49°30-50°30/87°00-89°00

**NUMBER:** 00273

Rozenberg, L.I. (using maps by N.I. Trush and K.A. Kondrateva)

**NAME:** Scheme of Kuznetsk highland permafrost spreading

**PUB:** Moscow, Nauka, 1989

**SCALE:** Large

**SOURCE:** Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D.
Ershov, p.252
REGION: Southern Siberia
LEGEND: Expansion, temperature, thickness
LAT/LONG: 50°00-55°00/85°00-90°00
NUMBER: 00275

AUTHOR: Rozenberg, L.I. (using map by N.I. Trush)
NAME: Scheme of permafrost of Tuva Central area
PUB: Moscow, Nauka, 1989
SCALE: 1:7 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.280
REGION: Southern Siberia (Tuva)
LEGEND: Expansion, temperature, thickness
LAT/LONG: 50°00-55°00/90°00-100°00
NUMBER: 00276

AUTHOR: Rozenberg, L.I. (using maps by M.M. Shats and N.I. Trush)
NAME: Scheme of permafrost in Altai
PUB: Moscow, Nauka, 1989
SCALE: 1:3 000 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.231
REGION: Southern Siberia (Altai)
LEGEND: Expansion, temperature, thickness
LAT/LONG: 48°00-53°30/81°00-89°00
NUMBER: 00277

AUTHOR: Rozenberg, L.I.
NAME: Scheme of seasonal frozen ground and permafrost extent in Enisey ridge
PUB: Moscow, Nauka, 1989
SCALE: 1:3 000 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.290
REGION: Southern Siberia
LEGEND: Expansion, temperature, thickness
LAT/LONG: 55°00-62°00/93°00-100°00
NUMBER: 00278

AUTHOR: Rozenberg, L.I. (using map by N.I. Trush)
NAME: Scheme of seasonal frozen ground and permafrost extent in East Sayan
PUB: Moscow, Nauka, 1989
SCALE: 1:7 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.267
REGION: Southern Siberia (Easten Sayan)
LEGEND: Expansion, temperature, thickness, dynamic short-term permafrost, seasonal freezing of ground
LAT/LONG: 51°00-54°00/92°00-99°00
NUMBER: 00279

AUTHOR: Rozenberg, L.I. (using map by N.I. Trush)
NAME: Scheme of West Sayan permafrost extent
PUB: Moscow, Nauka, 1989
SCALE: 1:7 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D.
Ershov, p.261
REGION: Southern Siberia (Western Sayan)
LEGEND: Expansion, temperature, thickness
LAT/LONG: 53°00'-54°00'/91°00'-93°00'
NUMBER 00280

AUTHOR Sendek, S.V., Barbashinov, G.L.
NAME: Okhotsk Sea shore geocryology
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:1 000 000
SOURCE: "Regional and special geocryological investigations "/ Edited by V.S. Iakupov, I.V. Klimovskii, p.19
REGION: East Siberia
LEGEND Permafrost expansion, thickness, taliks
LAT/LONG: 59°00'-61°00'/151°00'-155°00'
NUMBER 00281

AUTHOR Sergeev, E.M.
NAME: Engineering-geological map of West Siberian platform
PUB: Moscow, GUGK, 1972
SCALE: 1:1 500 000
REGION: West Siberia
LEGEND Formations, genesis complexes, lithological composition of upper complex, permafrost conditions, expansion, temperature, thickness, ice content, cryogenic processes, permafrost terrain
LAT/LONG: 50°00'-70°30'/60°00'-90°30'
INSTITUTE: Moscow State University, Geological Ministry, the Second Hydrogeological Department
NUMBER 00282

AUTHOR Severskii, I.V., Severskii, E.V.
NAME: Scheme of deep seasonal freezing of soil area in Central Asia mountains and south-eastern Kazakhstan
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:7 500 000
SOURCE: "Questions of geocryological mapping", p.36. In the article by Severskii, I.V., Severskii, E.V. p.29-38
REGION: Central Asia, southeastern Kazakhstan
LEGEND Deep seasonal freezing of soil areas and their boundaries
LAT/LONG: 37°00'-44°00'/70°00'-83°00'
NUMBER 00283

AUTHOR Shats, M.M., Leshchikov, F.N.
NAME: Map of permafrost in the southern part of Central Siberia
PUB: Novosibirsk, Nauka, 1983
SCALE: 1:2 500 000
SOURCE: Insert-map in monograph "South Central Siberia permafrost" by Leshchikov, F.N., Shats, M.M.
REGION: Central Siberia
LEGEND Seasonal frozen and permafrost grounds
LAT/LONG: 53°00'-61°00'/90°00'-110°00'
INSTITUTE: Permafrost Institute
NUMBER 00284

AUTHOR Shats, M.M.
NAME: Sketch-map of permafrost expansion in the Krasnoyarsk region south
PUB: Novosibirsk, Nauka, 1980
SCALE: 1:5 000 000
SOURCE: Permafrost studies in development of regions of the USSR, p.122
REGION: Central Siberia
LEGEND: Seasonal frozen ground, permafrost (islands, discontinuous, sporadic)
LAT/LONG: 52°00′-56°00′/89°00′-95°00′
INSTITUTE: Permafrost Institute
NUMBER: 00285

AUTHOR: Sheko, A.I., Fotiev, S.M.
NAME: Map of permafrost zoning of Baikalo-Amur main line zone
PUB: Moscow, GUGK, 1988
SCALE: 1:3 000 000
SOURCE: Atlas of geological maps of Baikalo-Amur main line zone
REGION: Baikal, Transbaikal, Amur regions
LEGEND: Expansion, temperature, thickness, depth of seasonal freezing and thaw, cryogenic processes
LAT/LONG: 52°00′-58°00′/105°00′-141°00′
INSTITUTE: Tsentrgeologiya
NUMBER: 00286

AUTHOR: Shevchenko, V.K.
NAME: Map of permafrost zoning of Transbaikal
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Mountain territories south USSR / edited by E.D. Ershov, p.63
REGION: Transbaikal
LEGEND: Expansion, temperature, thickness
LAT/LONG: 51°00′-80°00′/103°00′-120°00′
NUMBER: 00287

AUTHOR: Sheveleva, N.S.
NAME: Geocryological sketch-map of the Yenisei-North region
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:1 500 000
SOURCE: Inset-map in monograph "Reports of VIII All-Union Geocryological Conference", issue3. Regional geocryology
REGION: The Yenisei-North
LEGEND: Type of freezing, ice content, cryogenic structure, thaw settlement, permafrost thickness, temperature, spreading; age, lithological composition and genesis of deposits; regionalization
LAT/LONG: 67°20′-70°00′/84°00′-92°00′
INSTITUTE: PNIIS, Gosstroiy USSR
NUMBER: 00288

AUTHOR: Sheveleva, N.S.
NAME: Sketch-map of permafrost temperature in Central Siberia
PUB: Moscow, Nedra, 1975
SCALE: 1:20 000 000
SOURCE: Fotiev, S. M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.110
REGION: Central Siberia
LEGEND: Temperature isolines of grounds on base of layer with annual temperature fluctuations
LAT/LONG: 52°00′-80°00′/78°00′-138°00′
INSTITUTE: PNIIS, Gosstroiy USSR
NUMBER: 00289
| AUTHOR | Shpolianskaia, N.A. |
| NAME | Permafrost in Kazan epoch |
| PUB | Moscow, Moscow University Publishers, 1981 |
| SCALE | 1:25 000 000 |
| SOURCE | Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.108 |
| REGION | West Siberia |
| LEGEND | Active freezing areas, initial permafrost degradation areas, southern limit of permafrost, permafrost thickness and temperature |
| LAT/LONG | 55°00-72°00/60°00-85°00 |
| INSTITUTE | Moscow State University |
| NUMBER | 00292 |

| AUTHOR | Shpolianskaia, N.A. |
| NAME | Permafrost in maximum glacial epoch |
| PUB | Moscow, Moscow University Publishers, 1981 |
| SCALE | 1:25 000 000 |
| SOURCE | Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.104 |
| REGION | West Siberia |
| LEGEND | Active freezing areas in the divides, areas of glaciation, areas of freezing in river valleys, permafrost thickness and temperature, southern limit of permafrost |
| LAT/LONG | 50°00-72°00/50°00-85°00 |
| INSTITUTE | Moscow State University |
| NUMBER | 00293 |

| AUTHOR | Shpolianskaia, N.A. |
| NAME | Permafrost in thermic maximum stage |
| PUB | Moscow, Moscow University Publishers, 1981 |
| SCALE | 1:25 000 000 |
| SOURCE | Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.109 |
| REGION | West Siberia |
Disequilibrium, equilibrium, relict permafrost, southern limit of permafrost, northern forest boundary, permafrost thickness and temperature on the depth of annual temperature fluctuations, the depth of relict permafrost table and base

LAT/LONG: 55°00'72°00'/60°00'-85°00'
INSTITUTE: Moscow State University
NUMBER: 00294

AUTHOR: Shpolianskaia, N.A.
NAME: Permafrost in Zyriansk glaciation epoch
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:25 000 000
SOURCE: Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.108
REGION: West Siberia
LEGEND: Glaciation areas, active freezing places on the divides and river valleys, disequilibrium permafrost, southern limit of permafrost, permafrost thickness and temperature

LAT/LONG: 55°00'-72°00'/60°00'-85°00'
INSTITUTE: Moscow State University
NUMBER: 00295

AUTHOR: Shpolianskaia, N.A.
NAME: Permafrost map
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph "Reports of VIII All-Union Geocryological Conference", issue 3. Regional geocryology
REGION: Transbaikal
LEGEND: Temperature, thickness, spreading

LAT/LONG: 49°00'-53°00'/103°00'-118°00'
INSTITUTE: Moscow State University
NUMBER: 00296

AUTHOR: Shpolianskaia, N.A.
NAME: Quaternary changes in permafrost
PUB: Moscow, GUGK, 1971
SCALE: 1:16 000 000
SOURCE: Tyumen region atlas, p.15
REGION: West Siberia
LEGEND: Temperature, thickness, southern limit of permafrost

LAT/LONG: 56°00'-73°00'/60°00'-87°00'
INSTITUTE: Moscow State University
NUMBER: 00297

AUTHOR: Shpolianskaia, N.A.
NAME: Seasonal freezing and thawing
PUB: Moscow, GUGK, 1971
SCALE: 1:4 000 000
SOURCE: Tyumen region atlas, p.15
REGION: West Siberia
LEGEND: Depths and dates freezing and thawing

LAT/LONG: 56°00'-73°00'/60°00'-87°00'
INSTITUTE: Moscow State University
NUMBER: 00298

AUTHOR: Shpolianskaia, N.A.
NAME: Seasonal freezing and thawing dynamics


Shpolianskaia, N.A. West Siberian North Regionalization scheme referring to the Ob River run off shortening influence under the permafrost. Moscow, Moscow University Publishers, 1981. 1:10 000 000. "West Siberian permafrost region and the tendency for development", p.146. 


Areas of untouched and closed contemporary and relict permafrost, deep bedding of relict permafrost; zones: permafrost expansion, permafrost steady-state conditions, permafrost degradation, forecast to the end of century. 

Southern limit of permafrost in ground and peatlands, southern limit of relict permafrost. 

Areas, zones, types referring to permafrost expansion, temperature and thickness,
single-layer and two-layer permafrost, southern limit of permafrost

LAT/LONG: 58°00'-74°00'/65°00'-85°00'
INSTITUTE: Moscow State University
NUMBER: 00303

AUTHOR: Slavianskii, A.M., Shpakov, O.N.
NAME: Okhotsk Sea shore geocryology
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:1 000 000
SOURCE: "Regional and special geocryological investigations"/ Edited by V.S. Iakupov, I.V. Klimovskii, p.19
REGION: East Siberia
LEGEND: Permafrost expansion, thickness, taliks
LAT/LONG: 59°00'-61°00'/150°00'-151°30'

AUTHOR: Solomatin, V.I.
NAME: Scheme of geocryological zonality
PUB: Novosibirsk, Nauka, 1986
SCALE: 1:50 000 000
SOURCE: Solomatin, V.I. "Petrogenesis of ground ice", p.203
REGION: USSR
LEGEND: Boundaries: geocryological zone, natural zonality
LAT/LONG: 50°00'-80°00'/40°00'-170°00'
INSTITUTE: Moscow State University
NUMBER: 00305

AUTHOR: Solomatin, V.I.
NAME: Cryolithozone landscape structure
PUB: Moscow, Moscow University Publishers, 1992
SCALE: 1:80 000 000
SOURCE: "Geocology of the North (introduction in geocryocology)"/ Edited by V.I. Solomatin, p.19
REGION: Northern Hemisphere
LEGEND: Boundary of cryolithozone, types and subtypes: subarctic, boreal, subboreal
LAT/LONG: 40°00'-90°00'
INSTITUTE: Moscow State University
NUMBER: 00306

AUTHOR: Solomatin, V.I.
NAME: Scheme of regionalization of cryolithozone in Eurasia
PUB: Novosibirsk, Nauka, 1986
SCALE: 1:50 000 000
SOURCE: Solomatin, V.I. "Petrogenesis of ground ice", p.206
REGION: The USSR
LEGEND: Boundaries: geocryological zone, morphostucture, natural zonality
LAT/LONG: 50°00'-80°00'/40°00'-170°00'
INSTITUTE: Moscow State University
NUMBER: 00307

AUTHOR: Solovev, P.A.
NAME: Alas valley is in a primitive state of development on Lena River
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:10 000
SOURCE: "Conditions and permafrost development features in Siberia and North-East", p.84. In the article by Solovev, P.A. p.80-90
REGION: Central Yakutia

98
Polygon wedge ice thawing, bed of thermokarst depression, limit of icy complex, polygonal system in depression, slope brow of alas valley

**LEGEND**

**LAT/LONG:** 60°00'00"-68°00'120°00'-140°00'

**INSTITUTE:** Geocryological Institute

**NUMBER** 00308

**AUTHOR** Solovev, P.A.

**NAME:** Lithological composition of ground at a depth of 2 m in the Yakutsk district

**PUB:** Yakutsk, Yakutsk Republican Printing Plant, 1958

**SCALE:** Large

**SOURCE:** "Transactions of the North-East Permafrost Institute department", no. 1, p.182. In the article by Solovev, P.A. p.179-191

**REGION:** Yakutia

**LEGEND** Average annual temperature geoisotherms at the depth of 10 m, lithological composition

**LAT/LONG:** 62°30'129°30'

**INSTITUTE:** Permafrost Institute

**NUMBER** 00309

**AUTHOR** Solovev, P.A.

**NAME:** Mature alas valley of Kokhara River

**PUB:** Moscow, Academy of Sciences Publishers, 1963

**SCALE:** 1:1000000000

**SOURCE:** "Conditions and permafrost development features in Siberia and North-East", p.83. In the article by Solovev, P.A. p.80-90

**REGION:** Central Yakutia

**LEGEND** Thermokarst is in a primitive state of development, alas depression, lake depression on alas valley floor

**LAT/LONG:** 60°00'00"-68°00'120°00'-140°00'

**INSTITUTE:** Geocryological Institute

**NUMBER** 00310

**AUTHOR** Solovev, P.A., Telepnev, E.V.

**NAME:** The geoisotherms arrangement dependent on the age of Yakutsk town construction

**PUB:** Yakutsk, Yakutsk Republican Printing Plant, 1958

**SCALE:** Large

**SOURCE:** "Transaction of the North-East Permafrost Institute department", no. 1, p.184. In the article by Solovev, P.A. p.179-191

**REGION:** Yakutia

**LEGEND** Geoisotherms, geomorphological levels, places of building

**LAT/LONG:** 62°30'/129°30'

**INSTITUTE:** Permafrost Institute

**NUMBER** 00311

**AUTHOR** Solovev, V.A., Telepnev, E.V.

**NAME:** Sketch-map of arctic shelf cryolithozone

**PUB:** Leningrad: Nedra, 1983

**SCALE:** 1:1000000000

**SOURCE:** "The primary problems of paleogeography of the Late Cenozoic in the Arctic", p.188

**REGION:** Arctic shelf

**LEGEND** Predominant unfrozen cryolithozone with cryopegs. Relict permafrost islands in area of extent of above zero temperature ground on ocean bed, cryopegs, predominant continuous permafrost, island permafrost

**LAT/LONG:** 68°00'00"-84°00'20°00'-162°00'

**NUMBER** 00312

**AUTHOR** Soloviev, V.A.
NAME: Forecast map of Laptev and East-Siberian seas Arctic shelf permafrost
PUB: Yakutsk, Permafrost Insitute Publishers, 1979
SCALE: 1:10 000 000
SOURCE: Permafrost zone of Arctic shelf, p.36
REGION: Arctic shelf of the USSR
LEGEND Expansion and thickness of relict and contemporary permafrost
LAT/LONG: 70°00-80°00/108°00-170°00
INSTITUTE: Permafrost Institute
NUMBER 00313

AUTHOR Soloviev, V.A.
NAME: Ground with cryopegs expansion and permafrost in Arctic Ocean and Barents sea shelf zones
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.260
REGION: Barents Sea
LEGEND Ground thickness with seasonal and perennial cryopegs, permafrost and seasonal frozen ground with cryopegs, sporadic and continuous permafrost thickness less than 50 m, relict ground ice
LAT/LONG: 64°00-82°00/30°00-75°00
NUMBER 00314

AUTHOR Soloviev, V.A., Michaluk, U.N.
NAME: Laptev Sea and East-Siberian Sea shelf in late Cenozoic
PUB: Leningrad, PGO "Sevmorgeologia", 1982
SCALE: 1:20 000 000
SOURCE: Hydrogeological and permafrost conditions of Arctic and Continental shelf of Eurasia, p.25
REGION: East Arctic shelf of the USSR
LEGEND Areas of the longest period of Pleistocene freezing, areas of short duration of freezing before Holocene, boundaries of the sea advance
LAT/LONG: 70°00-80°00/108°00-180°00
NUMBER 00315

AUTHOR Soloviev, V.A., Ginsburg, G.D.
NAME: Map of research areas location in Enisei-Khatanga and Leno-Anabar depression
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.156
REGION: Central Siberia
LEGEND Permafrost zone thickness (established and assumed)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Permafrost Institute
NUMBER 00316

AUTHOR Spesivtsev, V.I., Leshchikov, F.N.
NAME: Sketch-map of permafrost conditions in upper part of Kulenga River
PUB: Novosibirsk, Nauka, 1983
SCALE: Large
SOURCE: Leshchikov, F.N., Shats, M.M. South Central Siberia permafrost, p.140
REGION: Central Siberia
LEGEND Expansion, temperature, thickness, depth of seasonal freeze and thaw, cryogenic processes and permafrost terrain
LAT/LONG: 56°00-59°00/105°00-107°00
INSTITUTE: Permafrost Institute

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<tr>
<td>AUTHOR</td>
<td>Sukhodolskii, S.E.</td>
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<td>NAME:</td>
<td>European North-East zoning scheme referring to conditions of paragenesis association between ground water and permafrost</td>
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<td>PUB:</td>
<td>Moscow, Nauka, 1982</td>
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<td>1:7 500 000</td>
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<td>SOURCE:</td>
<td>Sukhodolski S.E. &quot;Underground water and permafrost paragenesis&quot;, p.135</td>
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<td>REGION:</td>
<td>North-East European part of the USSR</td>
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<td>LAT/LONG:</td>
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<td>AUTHOR</td>
<td>Sukhodolskii, S.E., Kaznacheeva, I.A., Kondratieva, K.A., Oberman, N.G., Soloviev, V.A.</td>
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<td>NAME:</td>
<td>European North of the USSR zoning scheme referring to discontinuous permafrost</td>
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<td>Moscow, Nauka, 1988</td>
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<td>SOURCE:</td>
<td>Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.229</td>
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<td>Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.212</td>
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<td>LEGEND:</td>
<td>Age and genesis of permafrost, permafrost expansion, vertical structure</td>
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<td>NAME:</td>
<td>Geocryological scheme of Yanei-ti-vis head stream</td>
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<td>Sukhodolski S.E. &quot;Underground water and permafrost paragenesis&quot;, p.117</td>
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<td>PUB:</td>
<td>Moscow, Nedra, 1985</td>
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<td>SCALE:</td>
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<td>SOURCE:</td>
<td>Baulin, V.V. &quot;Permafrost in oil-gas containing regions of the USSR&quot;, p.86</td>
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<td>REGION:</td>
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<td>LEGEND:</td>
<td>Permafrost zones, of continuous and discontinuous permafrost</td>
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LAT/LONG: 66°00-70°00/52°00-66°00
INSTITUTE: PNIIS, Gosstroii, USSR
NUMBER 00322

AUTHOR Sukhodolskii, S.E.
NAME Map of native taliks in North-East European part of the USSR
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.110
REGION: North-East European part of the USSR
LEGEND Under interblock depression taliks, under drainage line taliks, under temporary stream valley taliks: closed, open, saline water interpermafrost taliks, intrapermafrost taliks in Cenozoic deposits, permafrost zones boundaries

LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: PNIIS, Gosstroii USSR
NUMBER 00323

AUTHOR Sukhodolskii, S.E., Kondratieva, K.A.
NAME Map of permafrost expansion and average annual temperature in North-East European part of the USSR
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.30
REGION: North-East European part of the USSR
LEGEND Permafrost average annual temperature and taliks, permafrost expansion, permafrost zones and zonal boundaries, index geocryological zones

LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: Moscow State University, PNIIS, Gosstroii USSR
NUMBER 00324

AUTHOR Sukhodolskii, S.E.
NAME: North-East European part of the USSR permafrost thickness map
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.42
REGION: North-East European part of the USSR
LEGEND Permafrost thickness (14 ranges), unfrozen ground, depth of relict permafrost table

LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: PNIIS, Gosstroii USSR
NUMBER 00325

AUTHOR Sukhodolskii, S.E., Parmuzin, S.IU., Streletskaia, I.D.
NAME: Sketch-map of geocryological zoning of Bovanenkovo tectonic structure territory
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in the primary development regions of the North, p.69
REGION: West Siberia
LEGEND Geocryological regions and subregions (types of freezing, genesis, age, ice content, lithological composition, temperature, depth of thaw, depth of sheet ice table, cryogenic processes and frozen ground features)

LAT/LONG: 70°00-71°00/68°00-69°00
INSTITUTE: PNIIS, Gosstroii USSR
NUMBER 00326

AUTHOR Sumgin, M.I.
Southern limit of permafrost in West Siberia plain on evidence from some scientists

Novosibirsk, Nauka, 1990

1:8 000 000


West Siberia

Boundaries by Vild (1882), Yachevskomu (1989), Shtini and Mushketov (1925), Shostakovich (1928), Berg (1931), Evdokinov-Rokotovski (1931), Sumginu (1931)

62°00-74°00/60°00-90°00

00327

Svitoch, A.A., Khorev, V.S.

Geomorphological scheme of Anadyr lowland southern shore

Moscow, Nauka, 1980

Large

"Recent deposits and paleogeography of Pleistocene in the Chukchi Sea", p.47

Chukchi Sea

Solifluction slopes

63°00-65°00/175°00-180°00

Institute Geophysical Insitute

00328

Svitoch, A.A.

Geomorphological scheme of the shore (northern Konergino settlement)

Moscow, Nauka, 1980

Large

"Recent deposits and paleogeography of Pleistocene in the Chukchi Sea", p.9

Chukchi Sea

Places of active wedge ice thawing

65°00-68°00/180°00-175°00

00329

Tolstikhin, O.N.

Hydrogeological scheme

Novosibirsk, Nauka, 1974

1:12 000 000

Inset-map in monograph "Icing and underground water of the North-East USSR" by

Tolstikhin, O.N.

North-East of USSR

Cryogenic basins, hydrogeological massifs and structures

60°00-75°00/125°00-170°00

Institute Geophysical Insitute

00330

Tomirdiaro, S.V.

Contemporary extent of Neopleistocene icy complex (edoma) and Holocene lake-alas plains (East-Siberian lowland)

Moscow, Nauka, 1980

1:20 000 000

Tomirdiaro, S.V. "Ice complex of East-Siberia in Neopleistocene and Holocene", p.26

North-East

Holocene thermokarst lake-alas plain, large icy complexes and relict Neopleistocene plain

62°00-74°00/130°00-170°00

00331

Tomirdiaro, S.V., in base of map by Velichko A.A.

General permafrost-glacial condition in Neopleistocene
Tomirdiaro, S.V. "Natural processes and industrialization of territory in permafrost zone", p.8

Global

Limits of permafrost in Neopleistocene and at present, limits of glaciations, sea ice, Neopleistocene sea ice cover

NUMBER 00332

AUTHOR Tomirdiaro, S.V., Shilo, N.A.
NAME Geocryological-geomorphological sketch-map of North-East of the USSR
PUB: Moscow, Nedra, 1978
SCALE: 1:15 000 000
SOURCE: Tomirdiaro, S.V. "Natural processes and industrialization of territory of permafrost zone", p.4
REGION: North-East
LEGEND Polygonal wedge ice (active, degradation, stable), degradation island permafrost, solifluction lobes, larger ictings, annual temperature of ground isotherms in upper part of permafrost
LAT/LONG: 55°00-80°00/125°00-170°00
NUMBER 00333

AUTHOR Tomirdiaro, S.V.
NAME: Permafrost-landscape sketch-map of Anadyr lowland
PUB: Magadan, Knizh. izd-vo, 1972
SCALE: 1:5 000 000
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization of the mountain countries and lowlands, the Magadan area and Yakutia", p.64
REGION: North-East
LEGEND The landscapes: alas, undulating-morainic, kettlehole-lake on different geomorphological levels
LAT/LONG: 62°00-67°00/168°-178°00
NUMBER 00334

AUTHOR Tomirdiaro, S.V.
NAME: Scheme of glacier, loesses and loessial-glacial plains in the Northern Hemisphere
PUB: Magadan, Knizh. izd-vo, 1972
SCALE: 1:200 000 000
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization in mountain countries and lowlands, the Magadan area and Yakutia", p.6
REGION: Northern Hemisphere
LEGEND Contemporary limit of permafrost in Eurasia and North America, loessial-glacial plains, loessial surface formations, glaciers, assumed zone of marine glaciation"
NUMBER 00335

AUTHOR Tomirdiaro, S.V.
NAME: Sketch-map of periglacial condition in the Northern Hemisphere
PUB: Magadan, Academy of Sciences Publishers, 1971
SCALE: 1:300 000 000
SOURCE: "Periglacial processes", no.38, p.139
REGION: Global
LEGEND Contemporary limit of permafrost zone
NUMBER 00336

AUTHOR Trofimov, V.T., Badu, IU.B, Vasilchuk, IU.K.
NAME: A change of macro-ice content in deposits of Mamont and Olenii peninsula (active growth
of polygon wedge ice)

**PUB:** Moscow, Moscow University Publishers, 1986

**SCALE:** 1:1,000,000

**SOURCE:** “Engineering-geological conditions of Gydan Peninsula”, p.184

**REGION:** West Siberia, Gydan Peninsula

**LEGEND** Situation in different periods: on boundary of Pleistocene and Holocene, at present time, macro-ice content shown in scale map

**LAT/LONG:** 71°00’-72°30’/76°30’-78°30

**INSTITUTE:** Moscow State University

**NUMBER:** 00337

**AUTHOR:** Trofimov, V.T., Badu, I.U.B., Vasilchuk, I.U.K.

**NAME:** Permafrost extent and contemporary trend of polygonal ice wedge development in territory of Gydan Peninsula

**PUB:** Moscow, Moscow University Publishers, 1986

**SCALE:** 1:3,000,000

**SOURCE:** “Engineering-geological conditions of Gydan Peninsula”, p.183

**REGION:** West Siberia, Gydan Peninsula

**LEGEND** Zones of combined extent of relict and contemporary wedge ice, subzones of contemporary syngenesis and epigenesis polygonal wedge ice, degradation of wedge ice as a result of activity of erosion and temperature rise

**LAT/LONG:** 67°30’-74°00’/73°00’-84°00’

**INSTITUTE:** Moscow State University

**NUMBER:** 00338

**AUTHOR:** Trofimov, V.T., Gruzdov, I.V., Tyrtikov, A.P.

**NAME:** Permafrost thickness (m)

**PUB:** Moscow, Nauka, 1972

**SCALE:** 1:2,500,000

**SOURCE:** “Natural conditions of the Tazovskii oil-gas containing region industrialization”, p.86

**REGION:** West Siberia

**LEGEND** Permafrost thickness (5 ranges)

**LAT/LONG:** 63°00’-68°00’/78°00’-87°00

**INSTITUTE:** Moscow State University

**NUMBER:** 00339

**AUTHOR:** Trofimov, V.T., Gruzdov, I.V., Tyrtikov A.P.

**NAME:** Scheme of distribution of average annual temperature of perennial frozen and unfrozen ground

**PUB:** Moscow, Nauka, 1972

**SCALE:** 1:2,500,000

**SOURCE:** “Natural conditions of the Tazovskii oil-gas containing region industrialization”, p.89

**REGION:** West Siberia

**LEGEND** Average annual temperature of ground (4 ranges)

**LAT/LONG:** 63°00’-68°00’/78°00’-87°00

**INSTITUTE:** Moscow State University

**NUMBER:** 00340

**AUTHOR:** Trofimov, V.T., Badu, I.U.B., Vasilchuk, I.U.K.

**NAME:** Scheme of engineering-geological regionalization of Gydan Peninsula

**PUB:** Moscow, Moscow University Publishers, 1986

**SCALE:** 1:3,000,000

**SOURCE:** “Engineering-geological conditions of Gydan Peninsula”, p.197

**REGION:** West Siberia, Gydan Peninsula

**LEGEND** Engineering-geological subzones, areas (description of permafrost conditions in monograph)
LAT/LONG:  67°30'-74°00'/73°00'-84°00'
INSTITUTE:  Moscow State University
NUMBER  00341

AUTHOR:  Trofimov, V.T.
NAME:  Scheme of engineering-geological regionalization of Taz drainage basin
PUB:  Moscow, Nauka, 1972
SCALE:  1:2 500 000
SOURCE:  "Natural conditions of the Tazovskii oil-gas containing region industrialization", p.36
REGION:  West Siberia
LEGEND:  Engineering-geological regions and their indexes (explanations in text p.35-37: permafrost spread)
LAT/LONG:  63°00'-68°00'/78°00'-87°00'
INSTITUTE:  Moscow State University
NUMBER  00342

AUTHOR:  Trofimov, V.T.
NAME:  Scheme of engineering-geological zoning of West Siberia platform
PUB:  Moscow, Moscow University Publishers, 1977
SCALE:  1:10 000 000
SOURCE:  Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.248
REGION:  West Siberia
LEGEND:  Expansion, geological-genesis complexes
LAT/LONG:  51°00'-74°00'/60°00'-90°00'
INSTITUTE:  Moscow State University
NUMBER  00343

AUTHOR:  Trofimov, V.T., Datsko, L.T.
NAME:  Scheme of ground type in West Siberian platform
PUB:  Moscow, Moscow University Publishers, 1977
SCALE:  1:10 000 000
SOURCE:  Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.184
REGION:  West Siberia
LEGEND:  Unfrozen ground, permafrost, permafrost in the lowermost layer of ground and unfrozen ground in upper part of section, ice content
LAT/LONG:  62°00'-74°00'/60°00'-90°00'
INSTITUTE:  Moscow State University
NUMBER  00344

AUTHOR:  Trofimov, V.T., Gruzdov, I.V., Tyrtikov, A.P.
NAME:  Scheme of permafrost and unfrozen ground on different geomorphological levels
PUB:  Moscow, Nauka, 1972
SCALE:  1:2 500 000
SOURCE:  "Natural conditions of the Tazovskii oil-gas containing region industrialization", p.82
REGION:  West Siberia
LEGEND:  Permafrost extent, geomorphological levels, lines of schematic geocryological sections
LAT/LONG:  63°00'-68°00'/78°00'-87°00'
INSTITUTE:  Moscow State University
NUMBER  00345

AUTHOR:  Trofimov, V.T., Firsov, N.G.
NAME:  West-Siberian platform zoning scheme referring to contemporary exogenesis geological processes and phenomena
PUB:  Moscow, Moscow University Publishers, 1986
SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.179
REGION: West Siberia
LEGEND Contemporary processes and phenomena of extent zone in permafrost region (continuous and discontinuous permafrost expansion)
LAT/LONG: 50°00'120°00'60°00'-92°00'
INSTITUTE: Moscow State University
NUMBER 00346

AUTHOR Trush, N.I., Chizhova, N.E.
NAME: Geocryological map of Aldano-Timpton interfluve
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:2 000 000
REGION: South Yakutia
LEGEND Expansion, temperature, thickness, ice content, cryogenic structure, cryogenic phenomena, lithological composition of grounds
LAT/LONG: 57°00'-69°00'/123°00'-128°00'
INSTITUTE: Moscow State University
NUMBER 00347

AUTHOR Tsitovich, N.A.
NAME: Map of the depth of seasonal freezing of loam, loamy sand and clay in the USSR by normatives and specifications
PUB: Moscow, Academy of Sciences Publishers, 1958
SCALE: 1:30 000 000
SOURCE: Tsitovich, N.A. "Foundations in permafrost”, p.14
REGION: European part of the USSR and West Siberia
LEGEND Isoline of normative depths of freezing loam, loamy sand and clay
LAT/LONG: 40°00'-68°00'/24°00'-84°00'
NUMBER 00348

AUTHOR Turnel, V.F.
NAME: Map of permafrost in the USSR
PUB: Moscow, Academy of the USSR, 1946
SCALE: 1:8 000 000
SOURCE: Permafrost Studies, 1(1), p.5-11
REGION: USSR
LEGEND Expansion, northern boundaries of area with temperature at the depth of 10 m above a -5, -3, -1°C, thickness
LAT/LONG: 40°00'-82°00'/30°00'-170°00'
NUMBER 00349

AUTHOR Vasilchuk, I.U.K.
NAME: A correlation between oxygen-18 content in contemporary wedge ice (formed in Eurasian permafrost over the last 100 years) and summary of winter temperature
PUB: Moscow, Nauka, 1991
SCALE: 1:35 000 000
SOURCE: Vasilchuk, I.U.K. "Late Quaterary syngenesis permafrost strata of the North of Eurasia: structure, oxygen-isotope content and conditions of formation", abstract thesis, p.16
REGION: North of Eurasia
LEGEND Southern limit of contemporary active growth wedge ice
LAT/LONG: 60°00'-80°00'/40°00'-170°00'
INSTITUTE: PNIIIS, Gosstroi USSR

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<td>AUTHOR</td>
<td>Vasilchuk, I.U.K., Badu, I.U.B., Trofimov, V.T.</td>
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<td>NAME:</td>
<td>Map of cryogenic formations and ice content of upper part (10 m) permafrost</td>
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<td>PUB:</td>
<td>Moscow, Moscow University Publishers, 1986</td>
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<td>SOURCE:</td>
<td>&quot;Engineering-geological conditions of Gydan Peninsula&quot;, p.73</td>
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<td>Cryogenic formations, ice content, lithological composition, macro-ice content at the expense of polygonal-wedge ice, buried ice, injective-segregated ice, pingos, hydrolaccolith</td>
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<td>Moscow State University</td>
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| AUTHOR  | Vasilchuk, I.U.K., Kudriashov, V.G., Trofimov, V.T. |
| NAME:   | Schemes of forecast changes in engineering-geological conditions for Northwest Siberia (Yamal-Gydan Province) under the effect of natural climatic trend |
| PUB:    | Moscow, Moscow University Publishers, 1986 |
| SCALE:  | 1:7 500 000 |
| SOURCE: | West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.218 |
| REGION: | Northwest Siberia |
| LEGEND  | Towards the end of the 19th century and by 2020 AD location of places with ground temperature above -3°, -5°, wedge ice growth-southern limit, frost mounds formation-northern limit |
| LAT/LONG: | 65°00'-85°00'/68°00'-72°00' |
| INSTITUTE: | Moscow State University |
| NUMBER  | 00352 |

| AUTHOR  | Vasiliev, I.S. |
| NAME:   | Map of thawing ground in East Yakutia |
| PUB:    | Novosibirsk, Nauka, 1982 |
| SCALE:  | 1:2 500 000 |
| SOURCE: | Inset-map in monograph by Vasiliev, I.S. "Conformity to natural laws seasonal freezing and thawing of ground in East Yakutia" |
| REGION: | East Yakutia |
| LEGEND  | Depth of seasonal thaw, lithological composition of ground, genesis complexes, vegetation |
| LAT/LONG: | 59°00'-76°00'/126°00'-162°00' |
| INSTITUTE: | Permafrost Institute |
| NUMBER  | 00353 |

| AUTHOR  | Vasiliev, I.S. |
| NAME:   | Sketch-map of ground thawing season duration |
| PUB:    | Novosibirsk, Nauka, 1982 |
| SCALE:  | 1:7 500 000 |
| SOURCE: | Inset-map in monograph by Vasiliev, I.S. "Conformity to seasonal freezing and thawing of ground in East Yakutia" |
| REGION: | East Yakutia |
| LEGEND  | Duration seasonal freezing (days), average long term dates of onset and end of thawing season |
| LAT/LONG: | 59°00'-76°00'/126°00'-162°00' |
| INSTITUTE: | Permafrost Institute |
| NUMBER  | 00354 |

| AUTHOR  | Velichko, A.A. |
| NAME:   | Assumed limit of permafrost in North America in the third stage of Pleistocene |
Moscow, Nauka, 1973

1:80 000 000

"Natural process in Pleistocene", p.174

North America

Assumed permafrost zones, contemporary permafrost zone

30°00'-80°00'/00°00'-160°00'

Geographical Institute

00355

Velichko, A.A.

Cryogenic area of Northern Hemisphere in third stage of Pleistocene

Moscow, Nauka, 1973

1:150 000 000

"Natural process in Pleistocene", p.114

Northern Hemisphere

Sea glaciation, permafrost, ice cover glaciation

40°00'-90°00'

Geographical Institute

00356

Velichko, A.A.

Degradation of sea ice and permafrost in passing from the third stage of Pleistocene to present time

Moscow, Nauka, 1973

1:200 000 000

Inset-map in the monograph by Velichko, A.A. "Natural process in Pleistocene"

Global

Areas of degradation: permafrost, sea ice, limits of cover ice, permafrost, pack ice, sea ice, relict permafrost

Geographical Institute

00357

Velichko, A.A.

Marine cover ice spread, permafrost and regression of the ocean in upper Pleistocene (the third stage)

Moscow, Nauka, 1973

1:200 000 000

"Natural process in Pleistocene", p.173

Global

Limits: permafrost, sea ice, pack ice, area of ocean regression (northern permafrost zone)

Geographical Institute

00358

Velichko, A.A.

Relict permafrost degradation in Eurasia

Moscow, Nauka, 1973

1:80 000 000

"Natural process in Pleistocene", p.130

USSR and Eastern Europe

Zone of degradation on the land and on the sea, contemporary permafrost, contemporary sea ice spread, limit of permafrost

40°00'-80°00'/00°00'-170°00'

Geographical Institute

00359

Velichko, A.A.
European part of the USSR
Southern limits of contemporary and Pleistocene permafrost zones, cryogenic relief in permafrost zone: relict cryogenic and thermokarst relief, contemporary polygon relief, hillocky terrain, thermokarst, relict thermokarst

LAT/LONG: 40°00-70°00/30°00-60°00
INSTITUTE: Geographical Institute
NUMBER 00360

NAME: Engineering-geological conditions of Transbaikal region
PUB: Moscow-Irkutsk, 1967
SCALE: 1:5 000 000
SOURCE: "Natural process in Pleistocene", p.111
REGION: European part of the USSR
LEGEND Southern limits of contemporary and Pleistocene permafrost zones, cryogenic relief in permafrost zone: relict cryogenic and thermokarst relief, contemporary polygon relief, hillocky terrain, thermokarst, relict thermokarst

LAT/LONG: 58°30'-49°50/100°00-140°00
INSTITUTE: Siberia and Far East Institute Academy of Science of the USSR
NUMBER 00361

AUTHOR Vtiurin, B.I.
NAME: Sketch-map for total evident ground ice reserves in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.174
REGION: USSR
LEGEND Reserves of various types of ice
LAT/LONG: 38°00-80°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00362

AUTHOR Vtiurin, B.I.
NAME: Sketch-map for ice wedges extent in USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.142
REGION: USSR
LEGEND Wedge ice expansion in percent of area, boundaries: contemporary permafrost, relict permafrost and expansion of wedge ice
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00364

AUTHOR Vtiurin, B.I., Shum'kii, P.A.
NAME: Sketch-map of injective ice extent
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:40 000 000
SOURCE: "Permafrost International Conference reports"/ edited by Tsitovich, N.A., p.45
REGION: The USSR
LEGEND Southern limit of permafrost, frost mounds (seasonal, perennial) on lake taliks and springs, relict sheet ice and injective ice (existence and assumed)
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Geographical Institute
NUMBER 00365

AUTHOR Vtiurin, B.I.
NAME: Sketch-map of permafrost with various structures
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.166
REGION: USSR
LEGEND Permafrost (epigenesis and syngenesis types), polygenesis, two horizon permafrost
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00366

AUTHOR Vtiurin, B.I.
NAME: Sketch-map of massive ice extent in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:25 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.136
REGION: USSR
LEGEND Frost mounds, sheet ice, wedge ice, cave ice, buried ice, unknown origin ice, glaciers
LAT/LONG: 38°00-82°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00367

AUTHOR Vtiurin, B.I.
NAME: Sketch-map the extent of permafrost with various structures
PUB: Moscow, Nedra, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.102
REGION: USSR
LEGEND Syngenesis and epigenesis permafrost
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00368

AUTHOR Vtiurin, B.I.
NAME: Sketch-maps of area and volumetric macro-ice content at the expanse of wedge ice in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.179-180
REGION: USSR
LEGEND Ice area in percent, volumetric macro-ice content on the different depths (to 30m )

111
LAT/LONG: 38°00-80°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00369

AUTHOR Vtiurina, E.A.
NAME: General map of seasonal frozen ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND: Types of seasonal frozen ground of northern, intermediate and southern zones
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroii USSR
NUMBER 00370

AUTHOR Vtiurina, E.A.
NAME: General map of seasonal cryogenic ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND: Northern, transitional, intermediate, southern seasonal frozen ground and their combinations
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroii USSR
NUMBER 00371

AUTHOR Vtiurina, E.A.
NAME: Sketch-map of cryogenic structure of seasonal frozen ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND: Type of seasonal frozen ground, cryogenic structure, present wedge ice, icing, lake, glacial, river buried ice
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroii USSR
NUMBER 00372

AUTHOR Vtiurina, E.A.
NAME: Sketch-map of landscapes of Bolshezemeln tundra
PUB: Moscow, TSINIS, 1971
SCALE: Large
SOURCE: "Geocryological and hydrogeological research for engineering investigations", Transactions of PNIIIS, vol. 8, p.100
REGION: European North
LEGEND: Peatlands, spot medallions, frost mounds
LAT/LONG: 65°00-70°00/45°00-65°00
INSTITUTE: PNIIIS, Gosstroii USSR
NUMBER 00373

AUTHOR Zhigarev, L.A.
NAME: Map-scheme of permafrost of East-Siberian Sea and Chukchi Sea
PUB: Moscow, Nauka, 1981
SCALE: 1:12 000 000
SOURCE: Inset-map in Collection articles "History of permafrost development in Eurasia". In the
article by Zhigarev, L.A. p.181-191

REGION: North-East USSR
LEGEND: Permafrost and seasonal supercooled ground, relict permafrost, contemporary and relict permafrost extent in sea shore zone, isolines of the depth of zero annual amplitude, limit of permafrost complexes
LAT/LONG: 65°00-76°00/135°00-170°00
INSTITUTE: Moscow State University
NUMBER: 00374

AUTHOR: Zhigarev, L.A., Parmuzin, O.IU.
NAME: Thermal stability of permafrost for cold and warm climatic rhythms for different snow and vegetation cover thicknesses (18 maps)
PUB: Moscow, Moscow University Publishers, 1992
SCALE: 1:20 000 000
SOURCE: "Geocology of the North (Introduction in geocryology)"/ Edited by V.I. Solomatin, p.190-192

REGION: The North of West Siberia
LEGEND: Thermal stability of permafrost for cold and warm climatic rhythms for different snow and vegetation cover thicknesses
LAT/LONG: 66°00-73°00/60°00-84°00
INSTITUTE: Moscow State University
NUMBER: 00375
RUSSIAN PERMAFROST MAP INVENTORY
INDEX BY SCALE

Numbers given refer to citations given in the inventory, p.33-113

SCALE: 1:1 000 000 — 1:5 000 000
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00153, 00120, 00243, 00222, 00217,
00032, 00219, 00288

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00032, 00219, 00288

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00256, 00291, 00048, 00124, 00131

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00283, 00280, 00279, 00072

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00317, 00311, 00079, 00309, 00029, 00272,
00077, 00076, 00064, 00236, 00237, 00054,
00273, 00252, 00052, 00040, 00275, 00274
APPENDIX 6

LIST OF INSTITUTIONS IN RUSSIA AND THE COMMONWEALTH OF INDEPENDENT STATES INVOLVED IN STUDIES OF PERMAFROST AND SEASONALLY-FROZEN GROUND

Compiled by M. Liebmam with additional entries extracted from “Spravochnik Organizatstsi Nauchno-Tekhnicheskoj Sfery”, All-Russian Scientific and Technical Information Center, Moscow, 1994, translated by R.G. Barry. We have included telephone numbers where available. However they may be incomplete. Please contact an international operator before placing a call.

<table>
<thead>
<tr>
<th>INSTITUTE</th>
<th>CITY</th>
<th>ADDRESS</th>
<th>COUNTRY</th>
<th>PHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-Russia Federal Institute for Planning and Research</td>
<td>319922 Kharkhov</td>
<td>Prosp. Pravdy, 10</td>
<td>UKRAINE</td>
<td>94-0687</td>
</tr>
<tr>
<td>All-Russia Gold and Rare Metal Research Institute (VNII-1)</td>
<td>685000, Magadan</td>
<td>Gagarina str., 12</td>
<td>RUSSIA</td>
<td>2-5739</td>
</tr>
<tr>
<td>All-Russia Institute for Natural Protection and Reservations (VNIIpriroda)</td>
<td>113628, Moscow</td>
<td>Znamenskoe-Sadky</td>
<td>RUSSIA</td>
<td>(095)423-0311</td>
</tr>
<tr>
<td>All-Russia Oil Geological Prospecting Research Institute (VNIGRY)</td>
<td>191104, St. Petersburg</td>
<td>Litejny Prospekt, 39</td>
<td>RUSSIA</td>
<td></td>
</tr>
<tr>
<td>All-Russia Research and Planning-Surveying Institute for Pipeline Hydrotransport (VNIIPi Gidrotruboprvovod)</td>
<td>125422, Moscow</td>
<td>Solomennoi Storozhki Prosp., 12</td>
<td>RUSSIA</td>
<td>(095) 257-9852</td>
</tr>
<tr>
<td>All-Russia Research Institute for Hydrogeology and Engineering Geology (VSEGINGEO)</td>
<td>142452, Moscow Region</td>
<td>Noginsky District, Pos Zeleny</td>
<td>RUSSIA</td>
<td>(095)521-1101</td>
</tr>
</tbody>
</table>
INSTITUTE: All-Russia Research Institute for Hydrometeorological Information World Data Center-B (VNIIGMI-MCD)
CITY: 249020, Moscow Region
ADDRESS: Obninsk, Koroleva str., 6
COUNTRY: RUSSIA
PHONE: (08439)255-2194

INSTITUTE: All-Russia Research Institute for Survey Methods and Techniques (VITR)
CITY: 199106, St. Petersburg
ADDRESS: Vesel'naya, 6
COUNTRY: RUSSIA
PHONE: (812) 217-5049

INSTITUTE: Arctic and Antarctic Research Institute
CONTACT: Ivanov, Vladimir
CITY: 199226, St. Petersburg
ADDRESS: Bering str., 38
COUNTRY: RUSSIA
PHONE: (812) 352-26-88

INSTITUTE: Bashkirskiy State Scientific and Planning Insitute for the Oil Industry (Bashnipinefte")
CITY: 450077, Ufa
ADDRESS: Lenina str., 86
COUNTRY: RUSSIA

INSTITUTE: Byelorussian Research Institute for Geological Survey (Byel NIERI)
CITY: 22060, Minsk GSP
ADDRESS: Staroborisovskiy Prop. 14
COUNTRY: BYELORUS

INSTITUTE: Center for International Projects (CMP)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Tikhanov, Sergei Eduardovich
CITY: 107078, Moscow
ADDRESS: Kedrov str., 8-1
COUNTRY: RUSSIA
PHONE: (095)207-4929

INSTITUTE: Chita Branch of the All-Russia Research, Planning and Construction Institute of Mining and Metallurgy of Non-ferrous Metals
CITY: 672078 Chita
ADDRESS: Lermontova str., 2
COUNTRY: RUSSIA

INSTITUTE: Chita Institute of Natural Resources
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Malchikova, Irina
CITY: 672014, Chita
ADDRESS: Nedorezov str., 16, ChIPR
COUNTRY: RUSSIA
PHONE: (30222)6-2233
INSTITUTE: Chita Polytechnical Institute
MINISTRY: Ministry for Higher Education, RF
CITY: 672076, Chita
ADDRESS: Kalinin str., 17
COUNTRY: RUSSIA
PHONE: (30222)3-1825

INSTITUTE: Coal Institute
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CITY: 650610, Kemerovo
ADDRESS: Rukavishnikova str., 21
COUNTRY: RUSSIA
PHONE: 28-1329

INSTITUTE: DalGiprotrans
MINISTRY: Ministry for Transport Construction
CONTACT: Solodovnikov, Boris Ivanovich
CITY: 680628, Khabarovsk
ADDRESS: Sheronov str., 56
COUNTRY: RUSSIA
PHONE: (4210)38-4860

INSTITUTE: Deep-Sea Oceanological Institute (TOL DVO RAN)
MINISTRY: Far Eastern Branch of the Russian Academy of Sciences
CITY: 690032 Vladivostok
ADDRESS: Radio str., 7
COUNTRY: RUSSIA
PHONE: 9-6500

INSTITUTE: Dokuchaev Soil Institute
MINISTRY: Academy for Agriculture
CONTACT: Naumov, Evgeny Mikhailovich
COUNTRY: RUSSIA
PHONE: (095) 230-8302

INSTITUTE: Far Eastern Research Institute for Planning-Surveying and Technological Construction (Dal’NIIS)
CITY: 690106, Vladivostok
ADDRESS: Borodinskaya, 14
COUNTRY: RUSSIA
PHONE: 6-0077

INSTITUTE: Federal Center for Geocological Systems (FCGS)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Gavrilov, Vsevolod Valerianovich
CITY: 101000 Moscow
ADDRESS: Central Post Office, P.O.Box 785
COUNTRY: RUSSIA
PHONE: (095)254-4933

INSTITUTE: Federal Scientific Center for Problems of Ecological Risk (Ecorisk)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Kharchenko, Sergei Grigorievich
CITY: 103064, Moscow
ADDRESS: Obukh str., 10, INTEKO
COUNTRY: RUSSIA
| INSTITUTE: | Fundamentproekt |
| MINISTRY: | Ministry for Construction RF |
| CONTACT: | Minkin, Mark Abramovich |
| CITY: | 125843, Moscow |
| ADDRESS: | Volokolamskoe Shosse, 1 |
| COUNTRY: | RUSSIA |
| PHONE: | (095)158-9538 |

| INSTITUTE: | Geofond |
| MINISTRY: | All-Russia Geological Archive |
| CITY: | 123806, Moscow |
| ADDRESS: | 3 Magistralnaya str, 38 |
| COUNTRY: | RUSSIA |
| PHONE: | 61-8869 |

| INSTITUTE: | Geographical Institute of the Kazakh Republic (IGAN RK) |
| CITY: | 480100, Alma-Ata |
| ADDRESS: | Pushkina str., 99 |
| COUNTRY: | KAZAKHSTAN |
| PHONE: | |

| INSTITUTE: | Geographical Institute of the Russian Academy of Sciences (IGAN RF) |
| CITY: | 109017 Moscow |
| ADDRESS: | Staromonetny Per., 29 |
| COUNTRY: | RUSSIA |
| PHONE: | (095) 128-2854 |

| INSTITUTE: | Geological Geophysical Institute of the Uzbek Academy of Sciences (IGIGAN Ruz) |
| CITY: | 017, Tashkent |
| ADDRESS: | Suleimanovoy str., 33 |
| COUNTRY: | UZBEKISTAN |
| PHONE: | (3912) 33-7741 |

| INSTITUTE: | Geological Institute of the Estonia Academy of Sciences |
| CITY: | 200101, Tallinn |
| ADDRESS: | Estonia Boul., 7 |
| COUNTRY: | ESTONIA |
| PHONE: | 60-5120 |

| INSTITUTE: | Gidroproekt |
| CITY: | 125813, Moscow |
| ADDRESS: | GSP, Volokolamskoe Shosse, 2 |
| COUNTRY: | RUSSIA |

| INSTITUTE: | Gidroproekt. Bratsk Department |
| CITY: | 665705, Irkutsk Region, Bratsk |
| ADDRESS: | Gydrostroitelei str., 57 |
| COUNTRY: | RUSSIA |

| INSTITUTE: | Gidroproekt. East-Siberian Department |
| CONTACT: | Pochekutov, K.E. |
| CITY: | 660607, Moscow |
| ADDRESS: | Prospekt Mira, 94 |
| COUNTRY: | RUSSIA |
Gidrospetsgeologia
123436, Moscow
Marshal Rybalko str., 4
RUSSIA

Giprogor
125124, Moscow
1st Yamskoe Pole, 15
RUSSIA

Giprotyumenneftegaz
625000, Tyumen
Respublika str., 62
RUSSIA

Giprotyumenneftegaz. Nizhnevartovsk Branch
626440, Nizhnevartovsk
Chapaev str., 36a
RUSSIA

Hydrometeorological Research Institute of the Russian Federation
( 绕romet-tsentr RF)
234353, Moscow
Bol'shevistskaya, 9-13
RUSSIA
(095) 255-2222

Institute for Biological Problems of the North (IBPS DVO RAN)
Far Eastern Branch of the Russian Academy of Sciences
685000, Magadan
Prosp. Kal Marxa, 24
RUSSIA
2-0166

Institute for Earth Cryosphere
Siberian Branch of the Russian Academy of Sciences
Melnikov, Vladimir Pavlovich
625033, Tyumen
P.O. Box 2774
RUSSIA
(3452)24-5267

Institute for Ecological Problems of Nature Usage
Ministry for Environmental Protection and Natural Resources, RF
Ignatiev, Aleksei Evgenievich
125319, Moscow
Kochkovsky proezd, 3
RUSSIA

Institute for Problems in Mechanics
Russian Academy of Sciences
117526, Moscow
Prosp. Vernadskogo, 101
RUSSIA
(095) 434-2210
INSTITUTE: Institute for Problems in the Use of Natural Resource and Ecology (IPIPRE AI RB)
MINISTRY: Russian Academy of Sciences
CITY: 220114, Minsk
ADDRESS: Staroborisovskiy Route, 10
COUNTRY: BYELORUS
PHONE: 64-2161

INSTITUTE: Institute for Problems of Industrial Ecology of the North
MINISTRY: Kola Scientific Branch of the Russian Academy of Sciences
CITY: 184200 Apatity
ADDRESS: Persman str., 14
COUNTRY: RUSSIA

INSTITUTE: Institute for Problems of Northern Development (IPOS SO RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Cibulsky, Vladimir Romanovich
CITY: 625033, Tyumen
ADDRESS: P.O. Box 2774
COUNTRY: RUSSIA

INSTITUTE: Institute for Soil Sciences and Photosynthesis (IPFS)
MINISTRY: Russian Academy of Sciences
CONTACT: Gilichinsky, David Abramovich
CITY: 142292, Moscow Region
ADDRESS: Pushchino
COUNTRY: RUSSIA
PHONE: (2777)3-2604

INSTITUTE: Institute of Geography
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Alekseev, Vladimir Romanovich
CITY: 664033, Irkutsk
ADDRESS: Ulan-batorskaya str., 1
COUNTRY: RUSSIA
PHONE: (3952)46-2639

INSTITUTE: Institute of Oil and Gas Problems
MINISTRY: Russian Academy of Sciences
CITY: 117917, Moscow
ADDRESS: GSP-1, Leninsky Prospect,65, IPNG
COUNTRY: RUSSIA
PHONE: (095)135-8286

INSTITUTE: Institute of the Earth's Crust (IK RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Leshchikov, Fedor Nikolaevich
CITY: 664033, Irkutsk
ADDRESS: Lermontov str., 128
COUNTRY: RUSSIA
PHONE: (3952)46-5568
INSTITUTE: Institute YakutNIIPROalmaz
MINISTRY: Industrial and Research Joint Company "Yakutalmaz"
CONTACT: Novik, Pavel Evgenievich
CITY: 678170, Sakha (Yakutia) Republic
ADDRESS: Lenin str., 39
COUNTRY: RUSSIA
PHONE: (41136)2-2849

INSTITUTE: IrkutskGiprotrans
MINISTRY: Ministry for Transport Construction, RF
CITY: 664007, Irkutsk
ADDRESS: Dekabrskikh Sobytii str., 49
COUNTRY: RUSSIA
PHONE: (3952)4-1774

INSTITUTE: Kiev Construction Bureau. Main Office of Mechanized Construction
MINISTRY: Ministry for Transport Construction
CITY: 252033, Kiev
ADDRESS: Tarasovskaya, 9
COUNTRY: UKRAINE
PHONE: 224-4930

INSTITUTE: LenGidrproekt
MINISTRY: Ministry for Transport Construction
CITY: 197136, St. Petersburg
ADDRESS: prosp. Shchorsa, 77/77
COUNTRY: RUSSIA
PHONE: (812)298-8777; (812)298-9388

INSTITUTE: Main A.V.Voeikov Geophysical Observatory (GGO)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CITY: 194018, St. Petersburg
ADDRESS: Karbyshev str., 7
COUNTRY: RUSSIA

INSTITUTE: Melnikov's Permafrost Institute (IMZ SO RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Kamenskii, Vyacheslav
CITY: 677010 Yakutsk
COUNTRY: RUSSIA

INSTITUTE: Melnikov's Permafrost Institute. Chita Division
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Salnikov, Pavel Ivanovich
CITY: 672010, Chita-10
ADDRESS: P.O.Box 539
COUNTRY: RUSSIA
PHONE: (3022)3-9270

INSTITUTE: Melnikov's Permafrost Institute. Igarka Permafrost Research
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Karpov, Egor Gavrilovich
CITY: 663200, Igarka
ADDRESS: Bolshoi Theater str., 13, INIMS
COUNTRY: RUSSIA
PHONE: (operator)2-4170

INSTITUTE: Melnikov's Permafrost Institute, North-East Permafrost Research
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Perlshtein, Georgy Zakharovich
CITY: 685000 Magadan
ADDRESS: Gorkogo str., d.20a
COUNTRY: RUSSIA
PHONE: (operator)7-12

INSTITUTE: Melnikov's Permafrost Institute, Viluiskaya Permafrost Research Station
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Velikin, Sergei Aleksandrovich
CITY: 678185, Sakha (Yakutia) Republic
ADDRESS: Pos.Chernyshevskii, VNIMS, 2-6
COUNTRY: RUSSIA
PHONE: (operator)7-12

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APPENDIX 7

INTERNATIONAL ARCTIC ENVIRONMENTAL DATA DIRECTORY

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In 1986 NOAA sponsored a workshop, with federal and academic representatives for the U.S. and Canada, to identify and focus interest in the establishment of a system to identify the existence of and provide access to environmental data for the Arctic. The U.S. Geological Survey took the initiative to organize a representative group to develop a plan for the Arctic Environmental Data Directory, AEDD. This AEDD Working Group designed and implemented an Arctic-wide, on-line database of data set descriptions, based on and hosted by the USGS-Reston Environmental Science Data Directory, ESDD. The primary focus of the incorporation of directory entries into the AEDD was on U.S.-held data sets, and on improving the quality of the descriptions in the AEDD. During 1994 the AEDD was moved to a PC-based system hosted by the USGS-Anchorage. The "new" AEDD is fully searchable using WAIS and World Wide Web software. The next project identified by the AEDD Working Group is to convert the existing AEDD descriptions to the DIF (Directory Interchange Format) used by the Global Change Master Directory. Future efforts will focus on obtaining additional data descriptions for inclusion in the directory. The primary benefit of the AEDD to the Arctic research community is the ability to search for available data using keywords and obtain contact information to order copies of the data.

The International Arctic Environmental Data Directory (ADD) effort was initiated at a workshop, organized by the USGS-hosted AEDD and UNEP/GRID, in Arendal, Norway, in September 1993. The goal of ADD is to provide a comprehensive compilation of existing sources of Arctic environmental data. The objectives of ADD are:

1. To establish the International Arctic Environmental Data Directory (ADD) as an authoritative, high-quality, and user-friendly directory of environmental data sources covering the circum-polar Arctic.

2. To assess the quality and reliability of data-set descriptions by means of a set of internationally agreed-upon, well-defined criteria, specifically the DIF (Directory Interchange Format) data description format of the Global Change Master Directory.

3. To provide access to the ADD internationally using the Internet and appropriate international standards. This will link the directory components into a consistent, high quality data and information source for the international Arctic community.

4. To identify and form working relationships with institutions that hold Arctic environmental data, inform them about the ADD, and seek to reference their data in the ADD.

5. To seek advice and counsel from, and develop feedback mechanisms with, the international Arctic science and user community to establish and maintain relevance of the ADD to key environmental issues.

6. To develop and implement a process using agreed upon standards to identify, gather, and maintain data set descriptions in the ADD which are consistent, complete, accurate, and timely to meet the needs of the user community.

7. To publish and disseminate ADD to promote the preservation and use of Arctic environmental data and information.
The ADD user community encompasses researchers in governmental agencies and academia, public interest groups and the private sector, the interested public, educators at all levels, and decision and public policy makers.

The ADD Steering Committee has defined Arctic environmental sciences as "... the broad spectrum of disciplines investigating the physical, biological, and cultural resources and environments of the Arctic."

The Steering Committee has recommended the ADD Council consist of a Data Manager Group, with one representative from each country participating in ADD, and the Advisory and User Group, with representatives from major Arctic monitoring and research organizations. The ADD Council will appoint the ADD Executive Committee, a group of five persons providing circum-Arctic geographic representation. The main task of the Executive Committee is to plan and carry out activities of the ADD, with recommendations from the ADD Council.

ADD is seeking strong involvement with institutions in Russia. A workshop is planned (in Fall 1995) in Moscow, to focus on accessibility of Russian data holdings and development of data directories. The Ministry of Environment Protection, Moscow, has offered to host the workshop and the USGS and UNEP/GRID have offered support.

As an active member of the AEDD Working Group, WDC-A for Glaciology is maintaining a close interest and involvement in the development of ADD. It will seek to ensure that the IPA GGD is entered into the AEDD/ADD system and that the operating procedures for the GGD are commensurate with those of the ADD and other international information systems.
ACRONYMS

ACSYS  Arctic Climate System Study
ADD  International Arctic Environmental Data Directory
AEDD  Arctic Environmental Data Directory
AMIP  Atmospheric Model Intercomparison Project
ARCSS  Arctic System Science
CLIMEX  Climate Extremes of the Past
CNIIS  Ministry for Transport Construction (Russian)
COMNAP  Council of Managers of National Antarctic Programs
CRREL  Cold Regions Research and Engineering Laboratory
DIF  Directory Interchange Format
DZAA  Depth of Zero Annual Amplitude
ESDIM  Earth Science System Data and Information Management
GCM  General Circulation Model
GCMD  Global Change Master Directory
GD  Glaciological Data
GEWEX  Global Energy and Water Experiment
GGD  Global Geocryological Database
GISP  Greenland Ice Sheet Program
GLOCOPH  Global Palaehydrology Database Project
GRID  Global Resources Information Database
IASC  International Arctic Science Committee
IGBP  International Geosphere Biosphere Program
INQUA  International Union for Quaternary Research
IPA  International Permafrost Association
IPFS  Institute for Soil Sciences and Photosynthesis (Russia)
IPNG  Institute of Oil and Gas Problems (Russia)
ITEX  International Tundra Experiment
IUGG  International Union of Geodesy and Geophysics
LAIi  Land/Atmosphere/Ice Interactions
NGD  National Geocryological Database
NIIOSP  Research Institute of Foundations and Underground Structures (Russia)
NOAA  National Oceanic and Atmospheric Administration
NSF  National Science Foundation
NSIDC  National Snow and Ice Data Center
OAIi  Ocean/Atmosphere/Ice Interactions
PAGES  Past Global Environmental Changes
PALE  Paleoenvironments of Arctic Lakes and Estuaries
PNIIIS Production and Research Institute for Engineering Survey and Construction (Russia)
RF Russian Federation
RGD Regional Geocryological Database
SCAR Scientific Committee on Antarctic Research
SHEBA Surface Heat Budget of the Arctic
UKMO United Kingdom Meteorological Office
UNEP United Nations Environment Program
VNIIGMI All-Russia Research Institute for Hydrometeorological Information
WAIS Wide Area Information Servers
WCMC World Conservation Monitoring Center
WG Working Group
WGMS World Glacier Monitoring Service
BOOK NOTES


This monograph by Dr. Veniamin Balobayev, Deputy Director of the Permafrost Institute in Yakutsk, provides a detailed treatise on the thermophysical controls of temperature regime at the surface, in the upper lithosphere, and at depth in frozen rock strata. Throughout, the mathematical expressions of the physical relationships are fully presented, together with observational material. In the foreword, the author traces the twentieth century worldwide development of geophysics and study of ground temperature regimes. Nineteenth century observations on ground temperature in Siberia by A. Middendorf are noted, as well as technical advances in measurements at the Yakutsk Permafrost Institute in the 1960s to 1980s under I.V. Mel'nikov's leadership. The author himself published extensively during this period.

Chapter 1 treats the surface energy budget and atmospheric influences, illustrated by a range of climatic maps and diagrams for northeastern Siberia, before proceeding to describe ground temperature conditions. Chapter 2 discusses the principles of ground heat flow and the role of soil properties, snow cover, and vegetation. Mean ground temperature conditions along the Lena River and elsewhere are described and data tables are included for a selection of localities. Chapter 3 follows a similar treatment for deep ground temperatures in frozen and unfrozen material. Ground heat flux is characterized for the structural zones of northern Asia and western Siberia, including the influence of surface and structural inhomogenieties, and the thickness distribution is mapped. The final chapter examines the non-stationary cryolithozone in the past, present and future. Temperature profiles and cross-sections are shown and methods for reconstructing past conditions are detailed. Pleistocene and Holocene geothermal parameters are calculated and there is a brief discussion on possible future conditions associated with anthropogenic influences. There is a 16 page bibliography of Russian and Western literature. The book contains much information on permafrost conditions and the geothermal regime in northern Asia that would be of great interest to western scientists.


This text by Professor Nikolai Romanovskiy is developed from courses in geology and geocryology taught at Moscow State University. It is aimed at advanced students in those fields, as well as hydrogeologists, exploration geologists, geographers, mining and petroleum engineers, and construction workers. The author previously published monographs on patterned ground formation.

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and ground water in the permafrost zone. Following an outline of historical development of studies of ground freezing and thawing and the associated surface phenomena, or cryogenesis, there are chapters on the climate and geomorphic factors determining the zonal and altitudinal characteristics of permanently and seasonally frozen ground, and periglacial phenomena. Chapter 4 deals with the formation and composition of syngenetic and epigenetic frozen ground, thermokarst complexes, including taber soils and alas depressions, and sediments deformed by cryoturbation and ice wedge growth. Chapter 5 addresses the processes of permafrost development and characteristics of permafrost thickness in relation to ground heat flow and thermal regime, drawing particularly on V.T. Balobayev's work. The influence of structural and hydrogeological conditions, glacial history, and Arctic marine transgressions and regressions is also treated and the relationship of these factors to gas hydrate occurrence is examined. The final three chapters describe the characteristics of cryogenetic processes and permafrost in the Eurasian platform area, in mountain areas, and offshore in the Arctic shelf seas, respectively. Here, specific regional information is presented and illustrated with maps and cross-sections.

The book is illustrated by some 89 figures, including a few half-tone photographs. Most of the diagrams are schematic, in keeping with the textbook character of the work. Surprisingly, it contains only seven tables of numerical information. There is a brief index and a list of 132 references, all but 13 of them to Russian sources. Focusing as it does primarily on northern and eastern Russia, the book provides an up-to-date and useful overview of Russian geocryological research. An English translation would be useful to western readers in the field.

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Other Activities

NSIDC Distributed Active Archive Center

NSIDC participates as one of the NASA-funded Distributed Active Archive Centers (DAACs) in the Earth Observing System Data and Information System Project (EOSDIS). The Earth Observing System (EOS) is a long-term interdisciplinary and multidisciplinary research effort to study globalscale processes that shape and influence the Earth as a system. EOSDIS will manage the data resulting from NASA’s research satellites and field measurement programs, and other data essential for the interpretation of these measurements. It will also facilitate access to data held in the archives of other government agencies, organizations, and countries.

ARCSS

NSIDC is the Data Coordination Center for the Arctic System Science (ARCSS) Program, a long-term multidisciplinary research effort funded by the National Science Foundation in an attempt to understand the Arctic physical, chemical, biological, and social processes that interact with the total Earth system in order to advance the scientific basis for predicting environmental change.

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Snow and Ice on land and water are dominant components of the polar regions and seasonally cover large areas of the northern hemisphere. Seasonal snow cover and sea ice are key regulators of the climate system, while perennial ice in glaciers, in ice sheets, and underground (permafrost) provides records of past climatic conditions and also stores vast quantities of fresh water.

Data on snow and ice conditions are required in assessment of hazards (snowstorms, avalanches, icebergs, glacier outburst floods), prediction of water resources and winter recreation (mountain snowpacks), navigation in the polar seas (sea ice and icebergs), and shipping on rivers and lakes (lake and river ice).

The World Data Center-A (WDC-A) for Glaciology archives and distributes data on all forms of snow and ice. It collaborates with other WDCs for Glaciology in Moscow, Russia (B); Cambridge, England (C), and Lanzhou, China (D), and with the World Glacier Monitoring Service in Zürich, Switzerland, to facilitate international access to data and information. It also works with the International Commission on Snow and Ice (ICSI), the International Permafrost Association (IPA), and the World Climate Research Programme (WCRP).

*Mean annual ice drift vectors, based on drifting buoys, manned and unmanned camps, and mean annual surface pressure (isolines in millibars); H is high pressure.*
IPA Global Geocryological Database Inventory

The International Permafrost Association is conducting a survey of available data on past and current investigations of permafrost, seasonally frozen ground and periglacial conditions and related laboratory studies. An electronic mail form is available (see reverse). You may submit more than one form if data types differ substantially. Results of this survey will be reported in Frozen Ground and other relevant publications. Please complete this form and return it to your IPA national representative with a copy to the World Data Center-A for Glaciology, Attn: Claire Hanson, Campus Box 449, University of Colorado, Boulder, Colorado 80309-0449, U.S.A.

<table>
<thead>
<tr>
<th>Name of data set</th>
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<tbody>
<tr>
<td>Principal investigator</td>
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<td>Name</td>
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<td>Data compiler/author</td>
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<td>Name</td>
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| Coverage |
| Study location (region/country) | Latitude (south to north) to |
| Longitude (east to west) to |
| Period of investigation |

Summary: Give brief details of site, collection technique, measurement frequency, and quality. Indicate what ancillary data on site, climate, data processing and metadata are available or can be reliably obtained (with sources).

| Current storage medium: CD-ROM / Spreadsheet / Word processor / Database / Data centre (give name) / Paper |
| Are your data at risk of being lost? YES / NO |
| Bibliography (Published and unpublished reports about this data set; attach additional sheets if necessary) |

Key Words: (Maximum of 10 such as Active layer, Permafrost thickness, Temperature, Moisture content, Ice content, Chemistry, etc.)