WindBorne Systems Global Sounding Balloon

WindBorne Systems has developed a novel balloon-based system that collects atmospheric observations throughout the troposphere over extended periods of time compared to traditional radiosondes. WindBorne's Global Sounding Balloons (GSBs) collect measurements of temperature, humidity, wind speed and direction, and incoming and outgoing radiation throughout the troposphere. WindBorne GSBs fly for many days (as much as 16 days) and are remotely controlled to ascend and descend, collecting observations from a few hundred meters above the surface to the lower stratosphere (~17 km above the surface). GSBs travel long distances (as much as 30,000 km) following the flow of the horizontal wind and are autonomously navigated by flying at altitudes where winds propel the balloon toward locations that provide the greatest forecast impact as selected by flight controllers assessing ensemble sensitivity analyses. WindBorne currently assesses the value and impact of GSB observations by assimilating into internally run and partner forecast demonstration systems.

WindBorne GSBs are especially well suited for collecting atmospheric observations in the Arctic. During summer of 2021 and summer of 2022, WindBorne launched over 100 GSBs from Svalbard and Fairbanks, Alaska. The observations were collected in partnership with the THINICE field campaign. As shown below, flights generally circled the Arctic, collecting observations throughout. The impact of observations on weather forecasts has been assessed by assimilating the observations into retrospectively run forecasts, and have generally provided positive forecast improvements. Additional uses of the data for studying Arctic climate and environmental processes are being explored.

Over time, WindBorne will extend GSB duration and increase the launch frequency and launch locations to maintain a global constellation of GSBs. The GSBs will circulate throughout the atmosphere targeting regions where in-situ observations will have the largest impact on forecast accuracy. WindBorne plans to assimilate the observations into operational numerical weather predictions systems to provide improved weather forecasts.

Flight paths of Global Sounding Balloons that were flown between August and September of 2022.