

Near tropopause discrepancy in air temperature during the YOPP special observing period

Masatake E. Hori^{1*}, Jun Inoue¹, Alexander Makshtas², and Vasilii Kustov²

¹*National Institute of Polar Research, Japan*

²*Arctic and Antarctic Research Institute, Russia*

Using radiosonde observations conducted during the special observing period (SOP) of YOPP, we investigate the consistency of station-based upper-level observation and the assimilated data using the ERA5 reanalysis dataset. We use the observation data from the Research station “Ice Base Cape Baranovo” located at the Bolshevik Island of the Severnaya Zemlya archipelago (79°18'N, 101°48'E), and also the data from the polar station “GMO IM. E. K. Fedorova” located at Cape Chelyuskin in the northern tip of the Taymyr peninsula (77°43'N, 104°17') for comparison. We match the observations of these two stations to the assimilated climate reanalysis ERA5 data using the nearest grid point in its 0.25° resolution dataset. While the distance between the stations is only 185km, the two play a different role in the ERA5 dataset in which Fedorova is included in the assimilation, data from Baranovo is not. We found that while the air temperature profile of Baranovo is mostly consistent during both the SOP1 (Jan.-Feb. 2018) and SOP2 (Jul.-Sep. 2018) periods, the Fedorova station shows a systematic difference near the tropopause. During SOP1, air temperature in Fedorova station is about 1-2°C cooler than ERA5 in the level higher than 300hPa. During SOP2, the difference is in the magnitude of 2-4°C warmer below the tropopause at 300-400hPa and 4-6°C cooler above the tropopause at 200-300hPa. A possible source of this discrepancy are the difference in sensors used in the observations and the method of assimilation used for the Fedorova station.

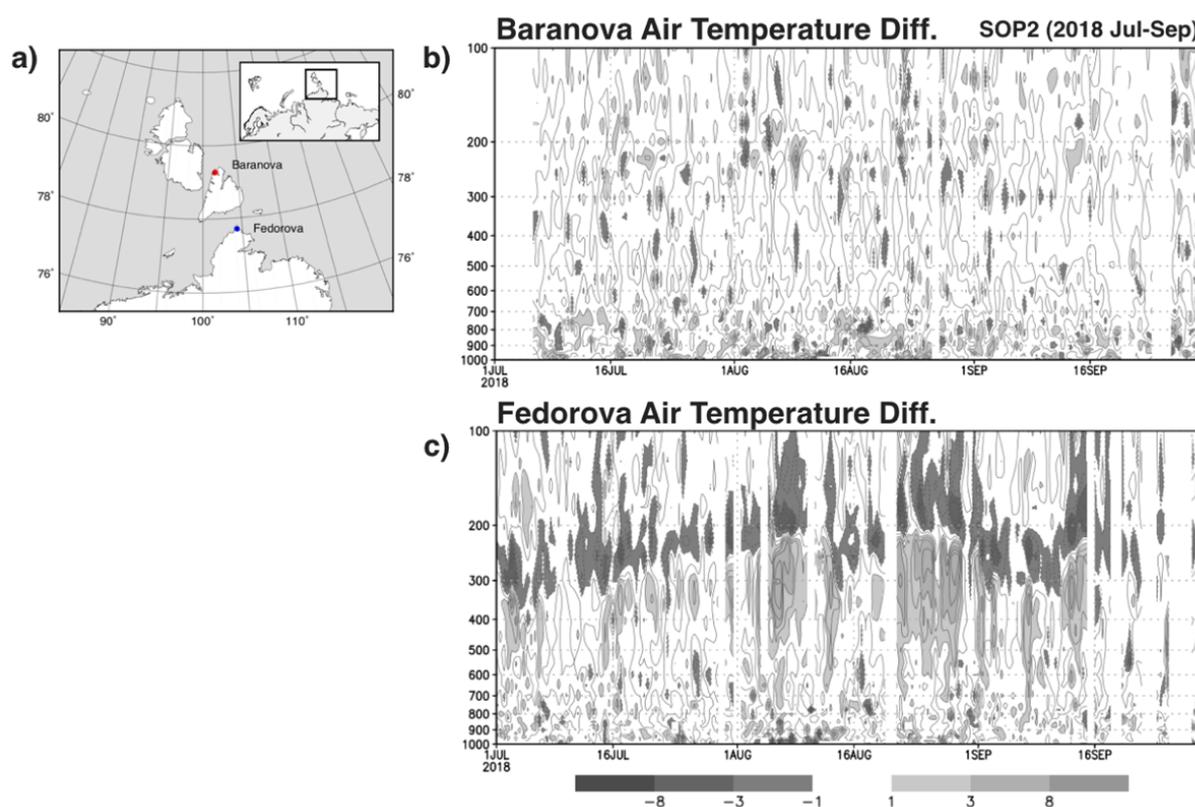


Figure 1. a) Map of observation site, b) Difference in air temperature observation between the station sounding data of Ice Base Cape Baranovo and nearest ERA5 grid for the SOP2 period, c) same as b, but for observation at GMO IM. E. K. Fedorova (Cape Chelyuskin).