



Arctic and mid-latitude weather extremes during the YOPP Special Observation Period in winter 2018

Timo Vihma (1), Edward Hanna (2), Xiangdong Zhang (3), James Overland (4), Irene Suomi (1), and Alexey Karpechko (1)

(1) Finnish Meteorological Institute, Meteorological Research, Helsinki, Finland (timo.vihma@fmi.fi), (2) School of Geography and Lincoln Centre for Water and Planetary Health, University of Lincoln, UK, (3) University of Alaska Fairbanks, USA, (4) NOAA/Pacific Marine Environmental Laboratory, USA

Extreme weather events occurred during the YOPP Special Observations Period in February – March 2018. In February 2018, the circumpolar mean 2-m temperature north of 80 N was approximately 10 K higher than the mean over 1958-2002, with an extreme anomaly reaching 20 K for a few days. The February extremes were associated with occurrence of a predominant wavenumber 2 pattern of the atmospheric circulation, with a strong vortex over northeastern Canada, an extreme northwestward displacement of the Aleutian Low, and negative Greenland blocking. This displacement was also accompanied by a buildup of the Pacific Ridge, and these factors generated anomalous poleward advection of warm, moist air masses from both the North Atlantic and North Pacific into the central Arctic. March 2018 was characterized by cold anomalies over the Kara Sea, northern Russia and large parts of Europe, with warm anomalies over the Labrador region as well as the Beaufort and Bering seas. Movement of low geopotential heights from the central Arctic into Eurasia and high geopotential heights over the west of Scandinavia gave the extreme “beast from the east” cold conditions over Europe. End of February – early March extremes were associated with an extremely low NAO index and high Greenland blocking, following a sudden stratospheric warming on 12 February. Rather than depicting the NAO, the monthly mean large-scale circulation was better characterized by a record-high Tropical/Northern Hemisphere Pattern and an extremely low Polar/Eurasia Pattern in February and a record high East Atlantic/Western Russia Pattern in March.

The unusual large-scale dynamical conditions are considered in evaluation of the performance of forecast models with the added value of extra observations acquired during YOPP SOPs. In particular, conditions over the marine Arctic were strongly affected by heat and moisture transports from lower latitudes. Hence, the role of Arctic observations was smaller during this period as suggested by modeling experiments. The role of observations from the North Atlantic and North Pacific oceans and terrestrial Arctic/sub-Arctic on the forecast quality in the marine Arctic deserves an increased attention.