A Comparison of Arctic Cyclones between Periods of Low and High Forecast Skill of the Synoptic-scale Flow over the Arctic

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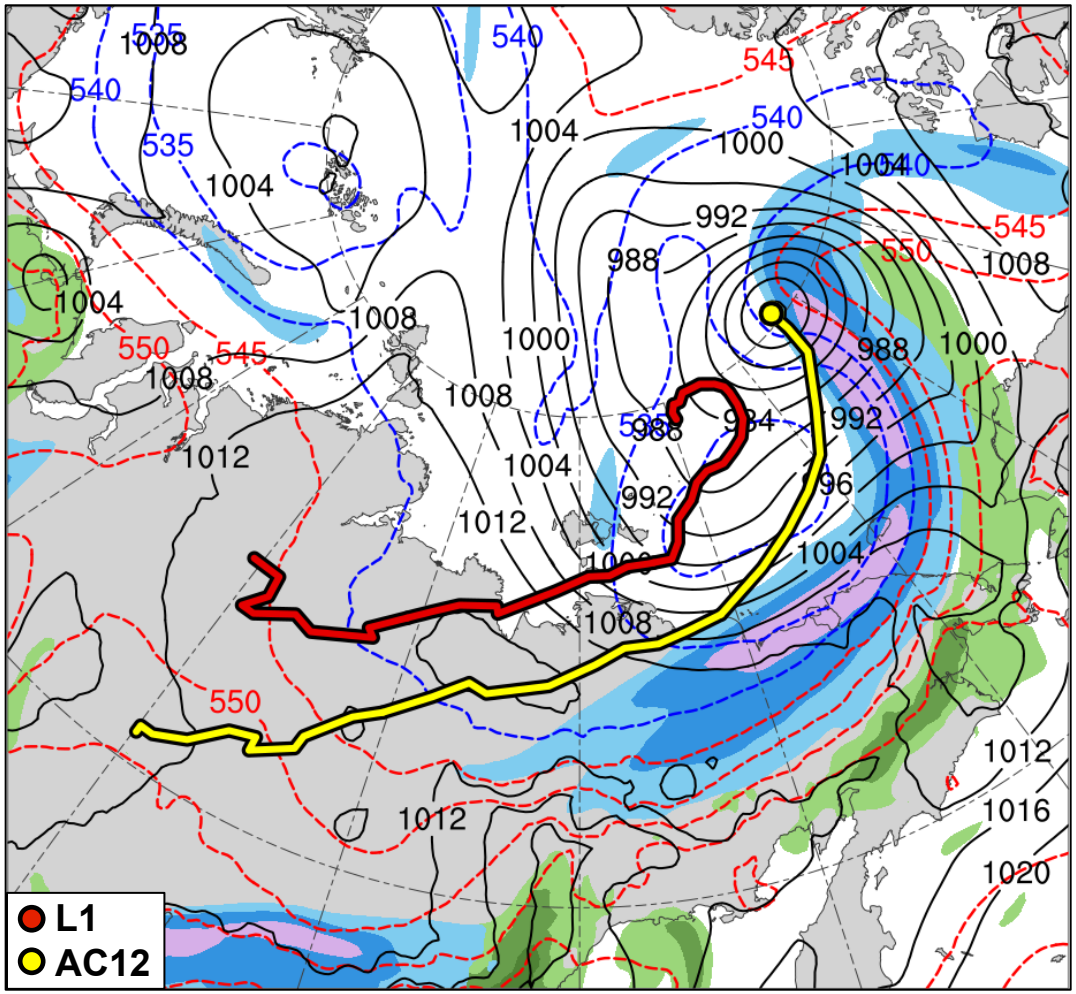
Arctic cyclones (ACs) are synoptic-scale cyclones that may originate within the Arctic or move into the Arctic from lower latitudes (e.g., Crawford and Serreze 2016)



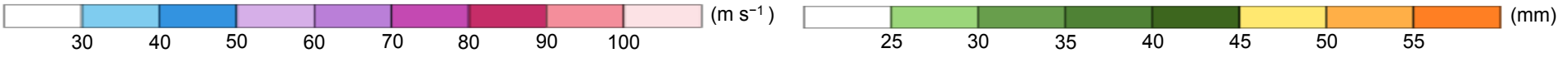
Example:

The Great Arctic Cyclone of August 2012 (AC12)

0000 UTC 6 Aug 2012

300-hPa wind speed (m s^{-1}, shaded);
1000–500-hPa thickness (dam, blue/red);
SLP (hPa, black);
PW (mm, shaded)

Data source: ERA5



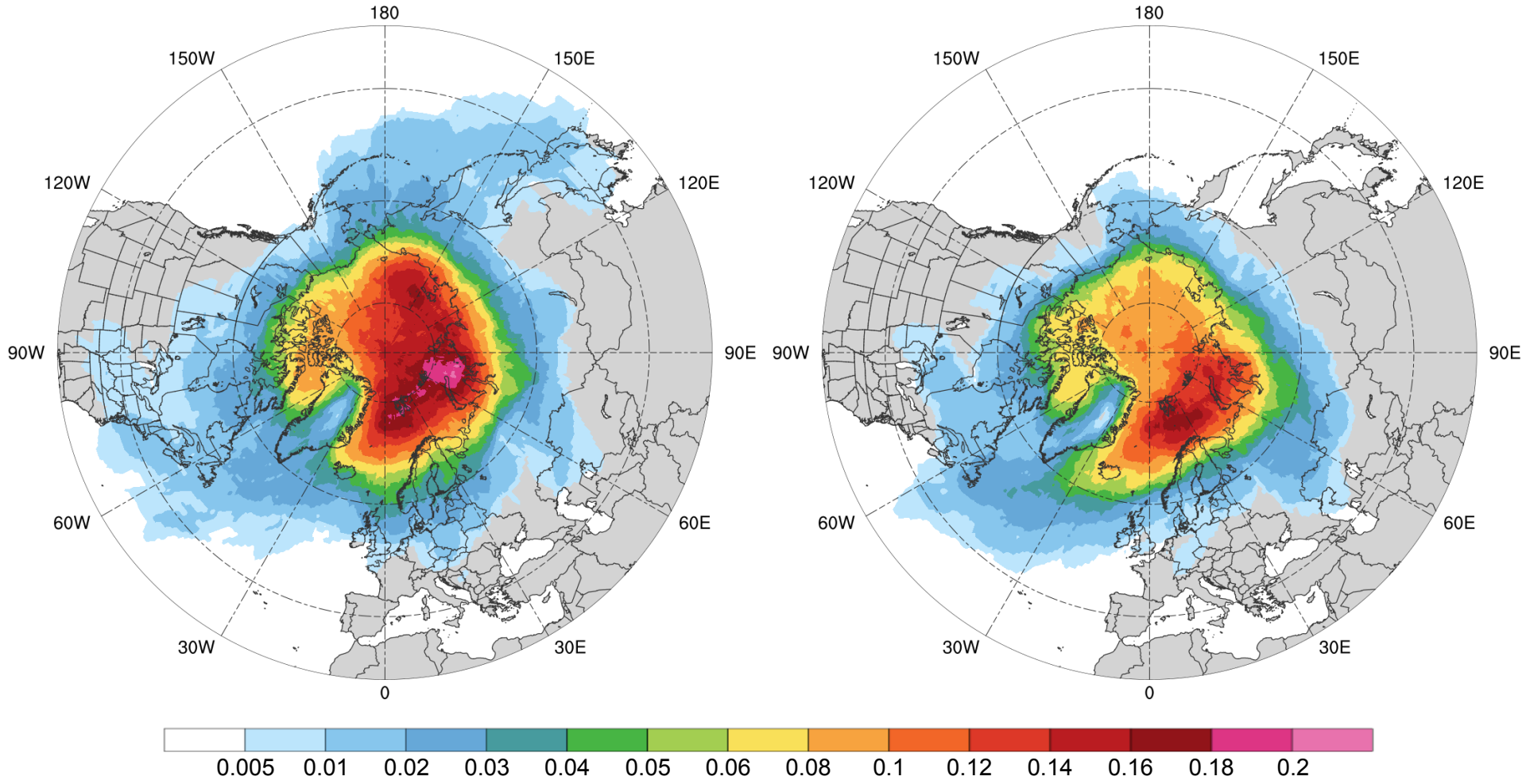
Methodology

- Created a 2007–2017 climatology of ACs
- Determined low and high forecast skill periods over the Arctic using GEFS reforecast dataset v2 and ECMWF Ensemble Prediction System
- Compared characteristics of Arctic cyclones and synoptic-scale flow patterns associated with Arctic cyclones between low and high forecast skill periods

AC Track Frequency

Low skill (N = 401)

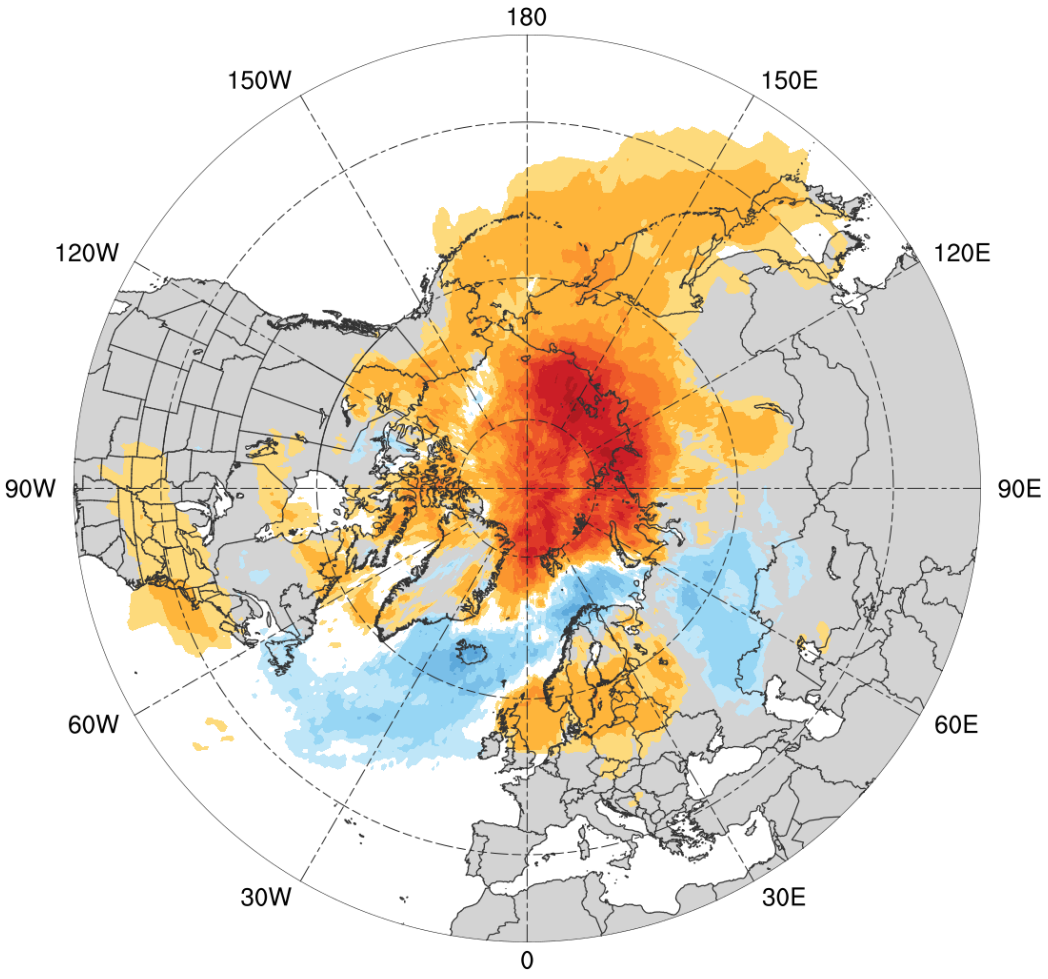
High skill (N = 345)

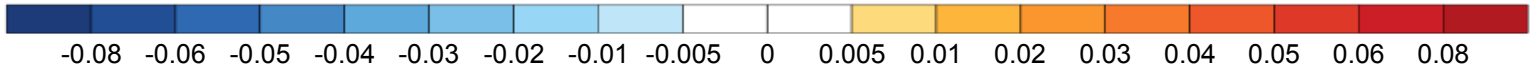


Total number of ACs within 500 km of a grid point,
divided by number of days in period (number of ACs day^{-1})

AC Track Frequency Differences

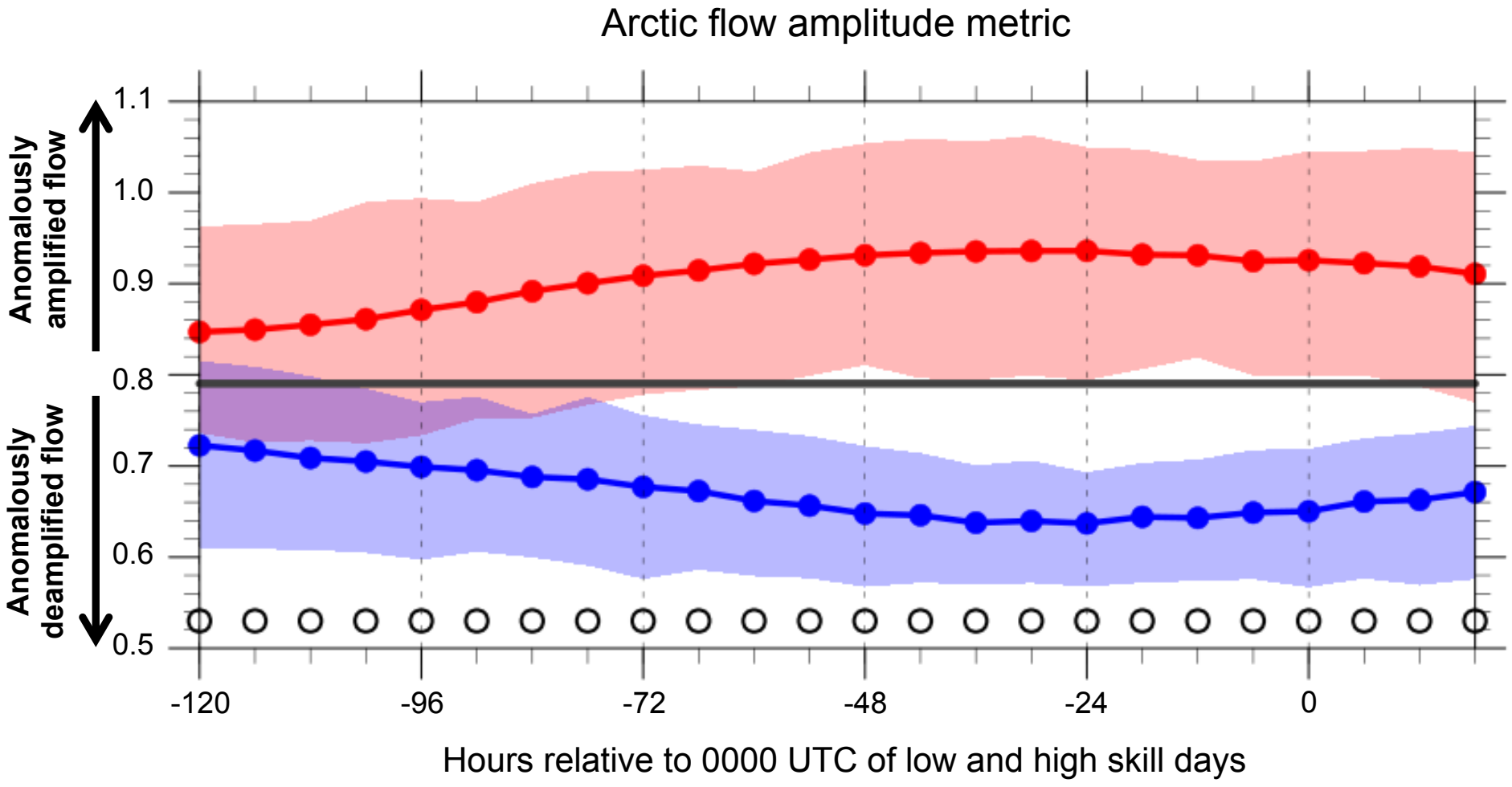
Low skill minus high skill





Difference in AC track density (number of ACs day^{-1})

Flow Amplitude



1979–2017 climo mean

low-skill mean

high-skill mean

shading: interquartile range

statistically significant difference between low/high skill mean and climo mean

statistically significant difference between low and high skill means