

The link between jet stream variability, storm tracks, and high-latitude weather and climate

Erica Madonna (Geophysical Institute, University of Bergen, Norway)

Abstract

In recent decades the Arctic has experienced rapid warming, which is more pronounced in the Atlantic sector. On top of this warming signal, there is a large year-to-year variability, arising in part from dynamical linkages from the mid-latitudes, for example via the poleward transport of heat and moisture in extratropical cyclones, which can influence the sea ice extent. The eddy-driven jet stream may play an important role for such linkages, as it steers cyclones from their genesis location along the storm tracks.

This study aims to understand how the large-scale mid-latitude atmospheric circulation (i.e. the jet stream) influences atmospheric conditions (e.g. temperature) in the polar and subpolar regions on different time scales. First, we identify the dynamical link between the jet stream configurations in the North Atlantic and the temperature anomalies in the Arctic. We then investigate the long-term temperature variability using the ECMWF ERA-20C reanalysis (1900-2010) to show that regional differences in the warming and cooling patterns in the Arctic are related to changes in the mid-latitude circulation. Finally, we question whether the sea ice retreat in recent decades has any impact on the track of cyclones.