Geophysical Research Abstracts
Vol. 19, EGU2017-4022, 2017
EGU General Assembly 2017

Seasonal predictability of stratospheric Polar Jet Oscillation Events and their surface impact

Daniela Domeisen (1), Peter Hitchcock (2), Mikhail Dobrynin (3), Wolfgang Müller (4), and Johanna Baehr (3)

(1) GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany (ddomeisen@geomar.de), (2) National Center for Atmospheric Research, Boulder, CO, USA, (3) Institute of Oceanography, Center for Earth System Research and Sustainability (CEN), University of Hamburg, Germany, (4) Max-Planck-Institute for Meteorology, Hamburg, Germany

The prediction of mid-winter stratospheric sudden warming (SSW) events tends to be limited to time scales of about two weeks. This renders their prediction difficult on seasonal time scales, which further limits the prediction of surface impacts of these events, although these tend to be long-lived, i.e. up to several weeks. SSW events can sometimes be followed by so-called Polar Jet Oscillation (PJO) events, which are characterized by an extended recovery of the stratospheric flow and long-lasting temperature anomalies in the lower stratosphere. These events may therefore lead to an extended duration of the surface impact of SSW events (though PJO events may also occur independently of SSW events).

An improvement in the prediction of PJO events along with a better understanding of their surface impact could therefore significantly improve winter predictability in the extratropical troposphere. We here report on a 30-member ensemble of seasonal hindcasts initialized on November 1st of each year from 1979 to 2014 in the seasonal prediction system based on the Max Planck Institute Earth System Model (MPI-ESM) at MR resolution. Evidence is found that the ensemble provides improved statistical predictability for both SSW and PJO events. In addition, the surface impact of PJO events is well represented in the model as compared to reanalysis, and it is significantly stronger and longer-lived than for SSW events. These results suggest that stratospheric PJO events may add significant predictability to the tropospheric winter evolution.