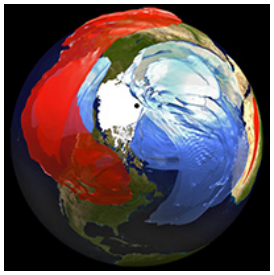

Contribution ID: **43** Type: **Oral presentation**

# Dependence of simulated atmospheric teleconnections on biases in stratospheric circulation

*Wednesday, 20 November 2019 10:00 (30 minutes)*

Atmospheric teleconnections play a key role in long-range climate predictability. Important question is how well these teleconnections are represented in forecast models which usually have biased climate with respect to observations. Here we investigate the effect of systematic model biases on teleconnections influencing the Northern Hemisphere wintertime circulation. We perform a two-step nudging/bias-correcting scheme where annually repeating bias-correction terms are added to the dynamic variables of the ECHAM6 atmospheric model to reduce errors in the annual climatology, relative to ERA Interim. This results in a reduction of errors in the DJF zonal stratospheric winds by up to 60%, in particular in an increase in the strength of the Northern Hemisphere wintertime stratospheric polar vortex during early winter.
We compare the responses in the bias-corrected and control runs to two factors: an increased Siberian snow cover in October, and a Quasi-Biennial Oscillation (QBO) in equatorial stratospheric zonal winds. For both factors, we find considerable differences between teleconnections in bias-corrected and control simulations. In the case of QBO teleconnection, bias corrected model shows stronger response of extratropical circulation to QBO variability, better reproducing the observed response than the original biased model. In the case of Siberian snow forcing - a forcing that has been suggested as a factor weakening the stratospheric polar vortex and inducing negative Arctic oscillation in winter –we find differences in the stratosphere-troposphere coupling, downward propagation of the signal, and subsequent surface response. Our results demonstrate the importance of atmospheric basic state for simulating teleconnections.

**Primary authors:** Dr KARPECHKO, Alexey (Finnish Meteorological Institute); Dr TYRRELL, Nicholas (Finnish Meteorological Institute); Dr RAST, Sebastian (Max Planck Institute for Meteorology)

**Presenter:** Dr KARPECHKO, Alexey (Finnish Meteorological Institute)

**Session Classification:** Session 5 : Model development, impact of model biases