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Impact of multidecadal climate' modes variability on the Northern Hemisphere temperature trend in the recent decades

Abhishek Savita[1], Joakim Joakim Kjellsson[1,2], Mojib Latif[1,2], Hyacinth Nnamchi[1], and Sebastian Wahl[1]

[1]GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany
[2]Faculty of Mathematics and Natural Sciences, Christian Albrechts University of Kiel, Kiel, Germany

In recent decades, the Northern Hemisphere (NH) exhibits a long-term regional cooling (central Eurasia) and warming (Arctic and Northern America) trend caused by human-induced anthropogenic forcing and internal decadal variability. In this study, we quantify the contribution of internal decadal variability to recent NH temperature trend using an atmosphere general circulation model (OpenIFS) by designing some sensitivity experiments for the period 1950-2014. In the reanalysis dataset (ERA5), we find a significant teleconnection between Interdecadal Pacific Variability (IPV) and surface air temperature (SAT) over Eastern Eurasia, the Barents Sea, and the Kara Sea for the periods 1950-2014 and 1993-2014, whereas we have not seen such a significant teleconnection with Atlantic Multidecadal Variability (AMV). The model simulates temperature anomalies associated with the IPV consistent with the ERA5, except for northern Eurasia where the sign of the temperature anomaly is reversed compared to ERA5. The model simulates AMV teleconnection with SAT is positive and significant over most of the places during 1950-2014, and it is significant over central Asia during 1993-2014. By analyzing the sensitivity experiments, in which we removed the decadal variability associated with IPV and AMV, we find that Eurasian cooling significantly increases without IPV and there is not much change without AMV. This indicates that some of the recent cooling over the Eurasian region is not driven by the IPV at least in the OpenIFS model, which shows IPV contributes to warm the Eurasian region. The preliminary results of this study suggest the potential importance of the internal variability of the Pacific Ocean is not only crucial on a regional scale but also crucial on a on a hemispheric scale (high latitudes).