Anmeldung eines Themas für ein/e

Forschungsseminar	**X**	
Methodenseminar	**X**	
Masterarbeit	**X**	(bitte eines oder mehrere ankreuzen)

Thema Datum	**How predictable is the sudden stratospheric warmings in ICON model?** **11 August 2021**
Betreuer	Prof. Christoph Jacobi jacobi@uni-leipzig.de
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Zweitgutachter	Prof. Johannes Quaas
Kurzbeschreibung:	Upward propagation of large-scale Rossby waves originated from the troposphere and their non-linear interaction with the mean flow and depositing their easterly momentum in the stratosphere leads to weakening of the westerly flow. In extreme cases, the westerly flow changes its direction and becomes easterly an event known as sudden stratospheric warming (SSW). Because the stratospheric anomalies associated with the SSWs are often persistent for several weeks, it is considered one prospect for improving the skills of longer forecasts in the extratropics. Potentially a higher skill of extratropical surface climate at longer lead times might be achievable if the onset of stratospheric polar vortex anomalies can be forecast. In this thesis, the candidate will run ICON-NWP model in its sub-seasonal to seasonal mode to examine the lead time of SSW in the model and will compare it other models participated in the S2S project of the World Weather Research Programme and the World Climate Research Programme. First we will identify SSWs in ERA5 reanalysis (1980-2021) based on the first date in which the zonal mean zonal wind at 10 hPa becomes negative (easterly) and at the same time temperature gradient between 90N and 60N changes sign. Then for each SSW, we will conduct hindcast simulations with ICON-NWP and a given SSW will be considered to be predicted when the ensemble mean zonal mean zonal wind at 10 hPa- 60N turn negative within 3 days from the actual event.
Literatur:	Tripathi, O.P., et al., 2016. Examining the predictability of the stratospheric sudden warming of January 2013 using multiple NWP systems. Mon. Weather Rev. 144, 1935–1960. https://doi.org/10.1175/MWR-D-15-0010.1. Karpechko, A. Y., et al. (2018). Predicting sudden stratospheric warming 2018 and its climate impacts with a multimodel ensemble. Geophys. Res. Lett., 45, 13,538–13,546. https://doi.org/10.1029/2018GL081091. Taguchi, M., 2014. Predictability of major stratospheric sudden warmings of the vortex split type: case study of the 2002 Southern Event and the 2009 and 1989 Northern Events. J. Atmos. Sci. 71, 2886–2904. https://doi.org/10.1175/JAS-D-13-078.1.