Anmeldung eines Themas für ein/e

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

Thema Datum	**The sensitivity of the polar vortex to a combined effect of the Arctic sea ice loss and doubling of CO_2 radiative forcing in the ICON model** **22.2.2022**
Betreuer	Prof. Christoph Jacobi, jacobi@uni-leipzig.d
ggf. weitere Kontaktperson	Dr. Khalil Karami, khalil.karami@uni-leipzig.de
Zweitgutachter	Prof. Johannes Quaas
Kurzbeschreibung:	Understanding potential changes of the both tropospheric and stratospheric polar vortices in response to global warming is of huge scientific and societal relevance because different states of the polar vortices affect the North Atlantic oscillation and associated storm tracks and weather regimes. However, in what way the polar vortices will respond to a warming climate in the future is highly uncertain. Previous studies suggest that there is a huge inter-model spread and there exist no agreement on the sign of change of the polar vortex due to a warming climate. The spread is not just attributable to different resolutions and model lids but also to different wave parameterizations and dynamical processes resolved in the models. Overall, the future polar vortex change remains completely undefined. Here the master thesis candidate will narrow the knowledge gap by employing simulations with ICON model: Experiment 1 (time-slice): it employs repeated annual cycle sea surface temperatures, sea ice content and other external forcing such as greenhouse gases for the "present-day" climate. Experiment 2: is similar to Experiment 1, but with a change in CO2 concentrations, sea ice loss and sea surface temperature appropriate for a "doubled CO2" climate. Then the candidate will investigate how the above-described experiments are different in the various characteristics of the polar vortices.
Literatur:	Kretschmer, M., Zappa, G., Shepherd, T: The role of Arctic sea ice loss in projected polar vortex changes, Weather and Climate Dynamics, 2020, https://doi.org/10.5194/wcd-2020-29. Manzini, E., Karpechko, A. Y., & Kornblueh, L. (2018). Nonlinear Response of the Stratosphere and the North Atlantic-European Climate to Global Warming. Geophysical Research Letters, 45(9), 4255–4263. https://doi.org/10.1029/2018GL077826