Announcement of a topic for:

Seminar Research ✓
Seminar Methods ✓
Master Theses ✓ (please mark one or more)

Topic	Comparison of ice nucleating particle concentrations from a global aerosol model against an observation database
Release Date	2024/07/17
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Description:	Ice nucleating particles (INP) in the atmosphere can cause freezing of cloud droplets at temperatures much warmer than homogeneous freezing (< -37 °C). The INP concentration has therefore impacts on cloud microphysics during cloud glaciation (freezing of cloud droplets) and precipitation formation. Hence, it is important for climate models to be capable of simulating INP concentrations and their spatio-temporal variation worldwide. In such models, INP concentrations are diagnosed from the simulated aerosol mass and number concentrations (e.g., from mineral dust) using INP parameterizations. In the master thesis, the resulting INP concentrations of a simulation covering 20 years with the global atmospheric model ECHAM-HAM will be compared against an observation database that comprises a large number of field campaigns from many places on Earth. Thereby, different available INP parameterizations will be utilized. Research questions are e.g., How well does ECHAM-HAM simulate INP concentrations? Which INP parameterizations or combination thereof give the best result?
Literature:	INP in general: Petters, M. D., and T. P. Wright (2015), Revisiting ice nucleation from precipitation samples, Geophys. Res. Lett., 42, 8758–8766, doi:10.1002/2015GL065733. Example of INP parameterization: DeMott, P. J.; Prenni, A. J.; McMeeking, G. R.; Sullivan, R. C.; Petters, M. D.; Tobo, Y.; Niemand, M.; Möhler, O.; Snider, J. R.; Wang, Z.; Kreidenweis, S. M., Integrating laboratory and field data to quantify the immersion freezing ice nucleation activity of mineral dust particles. Atmos. Chem. Phys. 2015, 15, 393–409. ECHAM-HAM: Salzmann, M., Ferrachat, S. et al. The Global Atmosphere-aerosol Model ICON-A-HAM2.3–Initial Model

	Evaluation and Effects of Radiation Balance Tuning on Aerosol Optical Thickness. Journal of Advances in Modeling Earth Systems 14, e2021MS002699, doi:https://doi.org/10.1029/2021MS002699 (2022).