Anmeldung eines Themas für eine Bachelorarbeit

Thema Datum	Effect of radiative forcing components on precipitation in CMIP6 simulations.
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Kurzbeschreibung:	Atmospheric aerosols exert direct and indirect forcing on the climate system by perturbing its radiation budget. Aerosols interact directly by scattering and absorbing shortwave and longwave radiation. Also, they interact indirectly by modifying cloud microphysical properties and cloud albedo, hence the precipitation. A large uncertainty is associated with the estimates of aerosol radiative forcing of climate. The radiative effect of the anthropogenic aerosols is often quantified by the effective radiative forcing (ERF), defined as the top-of-atmosphere radiative effect caused by anthropogenic emissions of aerosols and aerosol precursors. Despite the instantaneous radiative forcing, ERF allows water vapour and clouds to adjust. The basic questions in motivating the CMIP6 (the Coupled Model Intercomparison Project, Phase 6, Eyring et al., 2016) is “How does the Earth system respond to forcing?”. The Radiative Forcing Model Intercomparison Project (RFMIP) endorsed by CMIP6 aims to provide a basis for answering the above question (Pincus et al., 2016). The RFMIP simulation uses fixed sea surface temperature and sea ice distributions, a simple approach to estimate ERF, and it could be used to estimate the components of effective radiative forcing (ERF). The proposed study investigates the effect of effective radiative forcing components on precipitation in CMPI6 models.

Literatur:	1. Smith, C. J., Kramer, R. J., Myhre, G., Alterskjær, K., Collins, W., Sima, A., Boucher, O., Dufresne, J.-L., Nabat, P., Michou, M., Yukimoto, S., Cole, J., Paynter, D., Shiogama, H., O'Connor, F. M., Robertson, E., Wiltshire, A., Andrews, T., Hannay, C., Miller, R., Nazarenko, L., Kirkevåg, A., Olivié, D., Fiedler, S., Lewinschal, A., Mackallah, C., Dix, M., Pincus, R., and Forster, P. M.: Effective radiative forcing and adjustments in CMIP6 models, Atmos. Chem. Phys., 20, 9591–9618, https://doi.org/10.5194/acp-20-9591-2020, 2020. 2. Pincus, R., Forster, P. M., and Stevens, B.: The Radiative Forcing Model Intercomparison Project (RFMIP): experimental protocol for CMIP6, Geosci. Model Dev., 9, 3447–3460, https://doi.org/10.5194/gmd-9-3447-2016, 2016. 3. Eyring, V., Bony, S., Meehl, G. A., Senior, C. A., Stevens, B., Stouffer, R. J., and Taylor, K. E.: Overview of the Coupled Model Intercomparison Project Phase 6 (CMIP6) experimental design and organization, Geosci. Model Dev., 9, 1937–1958, doi:10.5194/gmd-9-1937-2016, 2016. 4. Myhre, G., Shindell, D., Bréon, F.-M., et al.: Anthropogenic and Natural Radiative Forcing, in: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, edited by: Stocker, T. et al.., Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 659–740, 2013, https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf. 5. Thornhill, G. D., Collins, W. J., Kramer, R. J., Olivié, D., O'Connor, F., Abraham, N. L., Bauer, S. E., Deushi, M., Emmons, L., Forster, P., Horowitz, L., Johnson, B., Keeble, J., Lamarque, J.-F., Michou, M., Mills, M., Mulcahy, J., Myhre, G., Nabat, P., Naik, V., Oshima, N., Schulz, M., Smith, C., Takemura, T., Tilmes, S., Wu, T., Zeng, G., and Zhang, J.: Effective Radiative forcing from emissions of reactive gases and aerosols – a multimodel comparison, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-1205, in review, 2020.