Anmeldung eines Themas für eine Bachelorarbeit

Thema Datum	Aerosol-cloud invigoration in the ICON-LEM model.
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Kurzbeschreibung:	Atmospheric aerosols are the suspension of the solid and liquid particle in the air, which play an important role in the Earth's energy budget. Aerosols affect the Earth's energy budget, both through direct and indirect interaction. It interacts directly by scattering and absorbing shortwave and longwave radiation. Almost all the liquid cloud droplets form on the aerosol particle which cloud serve as cloud condensation nuclei (CCN). A change in the number and composition of the aerosol particle can modify the cloud microphysical properties, such as cloud droplet number, size, etc., which leads to change in the cloud albedo, cloud lifetime, cloud dimension etc., (Kaufman et al., 2005, Albrecht, 1989; Jiang et al., 2006]). This effect is often referred to as the aerosol indirect effect (Twomey, 1977). However, the magnitude and sign of the indirect effect depend on cloud type and environmental condition [Khain, 2009; Rosenfeld et al., 2008; Stevens and Feingold, 2009]. Furthermore, aerosols can significantly affect the deepening of convective clouds, which referred to as aerosol-cloud invigoration (Koren et al., 2010). An increased aerosol loading leads to deepening of convective clouds due to the strong coupling between cloud microphysics and cloud dynamics. So, in the proposed study, the aerosol-cloud invigoration is investigated using a high-resolution ICON-LEM model simulation over Germany.

Literatur:	1. Koren, I., Y. J. Kaufman, D. Rosenfeld, L. A. Remer, and Y. Rudich (2005), Aerosol invigoration and restructuring of Atlantic convective clouds, Geophys. Res. Lett., 32, L14828, doi:10.1029/2005GL023187, https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2005GL023187 2. Twomey, S. (1977), Influence of pollution on shortwave albedo of clouds, J. Atmos. Sci., 34(7), 1149–1152, doi:10.1175/1520-0469(1977)034<1149:TIOPOT>2.0.CO;2. 3. Khain, A., D. Rosenfeld, and A. Pokrovsky (2005), Aerosol impact on the dynamics and microphysics of deep convective clouds, Q. J. R. Meteorol. Soc., 131(611), 2639–2663, doi:10.1256/qj.04.62. 4. Rosenfeld, D., U. Lohmann, G. B. Raga, C. D. O'Dowd, M. Kulmala, S. Fuzzi, A. Reissell, and M. O. Andreae (2008), Flood or drought: How do aerosols affect precipitation?, Science, 321(5894), 1309–1313. 5. Stevens, B., and G. Feingold (2009), Untangling aerosol effects on clouds and precipitation in a buffered system, Nature, 461(7264), 607–613, doi:10.1038/nature08281. 6. Heiblum, R. H., Koren, I., and Altaratz, O. (2012), New evidence of cloud invigoration from TRMM measurements of rain center of gravity, *Geophys. Res. Lett.*, 39, L08803, doi:10.1029/2012GL051158.