Dekan

UNIVERSITÄT LEIPZIG

Fakultät für Physik und Geowissenschaften

Fakultätskolloquium

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Professor-Ludwig-Weickmann-Preise 2015

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Hörsaal für Theoretische Physik, Linnéstraße 5, 04103 Leipzig

Programm:
1. Grußwort
2. Vorstellung der Preisträger
3. Kolloquium Dr. Gryspeerdt
4. Preisverleihung

Dr. Edward Gryspeerdt

(Universität Leipzig)

Uncertainty in climate change: How do aerosols influence cloud development?

Atmospheric aerosols are small (20 nm to 1 μm diameter) particles that interact with radiation and clouds in the Earth's atmosphere. All cloud droplets form on an aerosol particle, so a change in the number of aerosol particles is able to alter the concentration of cloud droplets in a cloud. This increase in the concentration of cloud droplets can change the optical properties of a cloud and may modify the development and the lifecycle of the cloud, cooling the Earth's climate. However, the extent to which aerosols emitted by human activity are able to modify cloud properties is one of the largest uncertainties in the understanding of current and historical anthropogenic climate change.

Previous studies have demonstrated that aerosols can have a strong impact on cloud properties in certain situations, but obtaining a global estimate of the impact of aerosols on cloud properties is difficult as both cloud and aerosol properties are strongly affected by other meteorological factors, such as relative humidity. These meteorological factors are the main drivers of the strong relationship between aerosol optical depth (AOD – used as a proxy for aerosol number concentration) and cloud fraction (CF). As many other cloud properties are strongly related to CF, the AOD-CF relationship can generate strong relationships between AOD and other cloud properties (such as cloud top altitude), making it particularly important to determine what effect aerosols have on CF. In this talk, I demonstrate new techniques that can constrain the sign and the magnitude of the aerosol influence on CF and cloud development using satellite data. By building composite diurnal cycles of cloud development, the impact of relative humidity and other meteorological factors can be reduced, enabling the influence of aerosol on CF and cloud development over short timescales to be observed. To gain an understanding of how aerosols can impact cloud fraction globally, techniques more common to economics and public health are used to determine the causal relationship between aerosol and CF, reducing the uncertainty in the human impact on the climate system.

Alle Interessenten sind herzlich eingeladen.