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Aerosol impact on the Asian Summer Monsoon oberved by CALIPSO

J. Kuhlmann (1), J. Quaas (1), A. Devasthale (2), and S. Kinne (1)

(1) Max Planck Institute for Meteorology, Hamburg, Germany (julian.kuhlmann@zmaw.de), (2) Swedish Meteorological and Hydrological Institute, Norrköping, Sweden

Different, sometimes opposed theories about the impact of aerosols above and around the Tibetan Plateau on the Asian Summer Monsoon exist, one being the “Elevated Heat Pump” (EHP) proposed by Lau et al. (2006) which holds local aerosol induced heating close to the Tibetan Plateau during pre-monsoon season responsible for an advance and intensification of the monsoon. However, observational evidence for mechanisms of aerosols either strengthening or weakening the monsoon are still lacking.

CALIPSO satellite data provides a three-dimensional view of aerosols and a classification into six different aerosol types according to their radiative properties. We use this data to examine possible aerosol sources, ways of transportation and patterns of concentration in the region. Combination with wind data shows that especially dusts from Taklamakan and Thar deserts possibly contribute to an EHP-like regime, but long-range transport from the Arabian peninsula cannot be excluded either. Furthermore, we use the CALIPSO aerosol data as an input to a radiative transfer model and compute resulting heating rates in order to quantify aerosol impacts on the atmosphere in the region.