



Aerosol-cloud interactions in the ECHAM6-HAM2 GCM and Aerosol_cci/Cloud_cci satellite products

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The first indirect aerosol effect or cloud albedo effect can be estimated as a radiative forcing. While the sign of this forcing is agreed to be negative, model-based estimates of its magnitude show a large variability. The responses of cloud liquid water content and cloud cover to aerosol increases also referred to as secondary indirect aerosol effects or fast adjustments are uncertain as well. In studies that use the variability in the present day satellite data to infer aerosol–cloud interactions (ACI), or that constrain model parameterizations to better agree with satellite observations a less negative ACI radiative forcing is found.

The projects of the Climate Change Initiative (CCI) programme of ESA aim at producing long time series of satellite data of essential climate variables with specific information on errors and uncertainties. The quantification of uncertainty in satellite retrievals provides an opportunity to get insights in the discrepancy between model based and satellite based estimates of ACI.

Within the Aerosol_cci project susceptibilities of cloud properties from Cloud_cci to aerosol properties from Aerosol_cci datasets are to be compared to susceptibilities from the aerosol climate model ECHAM6-HAM2. Particularly interesting relationships for the first indirect aerosol effect and the second aerosol indirect effect will be investigated. Satellite studies show a strong effect of aerosol on cloud amount, which could be a methodological artefact such as aerosol swelling or meteorological covariation. The immediate vicinity of clouds needs to be excluded due to these potential cloud contaminations although it would be the most interesting region for associations between aerosol and clouds. As the resolution of the data can have an impact on statistical correlations between cloud and aerosol properties, the assessment will be done on different scales.

First results will be presented at the conference.