

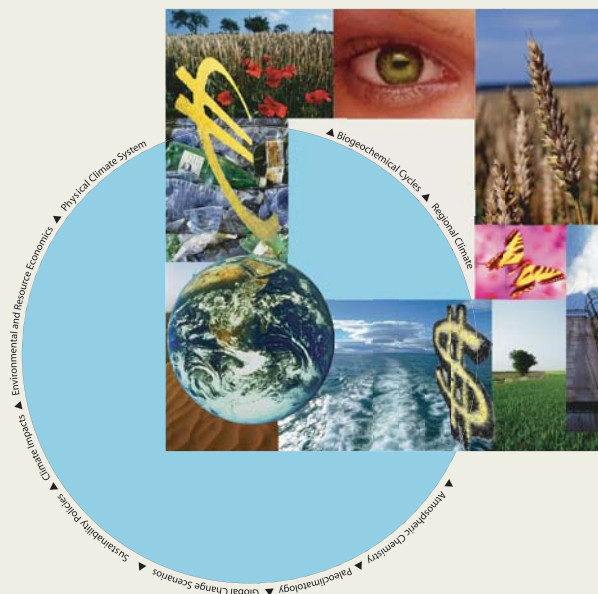


International Max Planck Research School on EARTH SYSTEM MODELLING

Aerosol Indirect Effect in the Thermal Spectral Range as Seen from Satellites

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Abstract

Insufficient knowledge about aerosol-cloud interactions has caused uncertainty in the Earth Radiation Budget. Lack of information about aerosol type, composition and concentration on global and regional scales also has restrained numerous efforts that have been made in the past to quantify the modulation of cloud properties by aerosols. Clouds, which cover more than half of the earth at any given time, have a key role in radiation budget. Most of the work has been done so far to understand modulation of cloud microphysical properties (in visible spectrum) by aerosols neglecting the thermal part. Satellites play unique role in improving knowledge about aerosol-cloud interactions through their ability to quantify spectral signatures of clouds and uniform, continuous sampling of the earth. Using long-term satellite data evaluations, this study reveals an entirely new aspect of these interactions and suggests that there exists indirect aerosol effect in the thermal spectrum. It suggests that anthropogenic aerosols, finer particles in particular, and cloud top temperature co-vary. This thermal effect could be equally important and hence cannot be neglected in radiation budget studies. First evidence of the impact of ship emissions on cloud properties over coastal waters is also presented.