Workshop on "Recent advancements in remote sensing and modeling of aerosols, clouds and surfaces",
GRASP ACE Summer school,
Lille, France, May 22-26, 2023

Climate impact of atmospheric aerosols

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Atmospheric aerosols play an important role in the climate system by scattering and absorbing radiation, and by serving as cloud condensation and ice nuclei, thus affecting the life cycle, optical properties, and precipitation of clouds. There is also growing evidence that aerosols can affect terrestrial ecosystems through changes in the quality and quantity of light and deposition flux of nutrients. In this talk, we will discuss how our understanding has evolved over the years through better observations and modelling, in the context of a recent reversal in the trend of the aerosol radiative forcing over most regions of the world. This change, as shown by a range of long-term satellite observations, has consequences on the current and future rates of warming and may complicate the realization of the Paris Agreement. Aerosol absorption is of particular interest because it drives atmospheric heating and a range of rapid adjustments in the atmosphere with potentially important regional impacts in terms of atmospheric circulation and precipitation. Beyond their direct atmospheric and climate impacts, aerosols also increase diffuse radiation which penetrates deeper within the vegetation canopy than direct radiation and enhances the photosynthesis of shaded leaves at the cost of slightly decreasing sunlit leaf photosynthesis. We will show how to deconvolute and quantify this impact from other impacts of aerosols on the vegetation and the land carbon sink.

Keywords: aerosols, radiation, climate, absorption, diffuse radiation, vegetation, carbon sink

References