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The Current Status of Remote Sensing of Aerosols and Clouds in China

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Atmospheric aerosols play a critical role in the global radiation balance, while they are still not well understood due to their mal-distribution and rapid variation in terms of both spatial and temporal dimensions, therefore regarded as one of the main uncertainties in meteorological and other related fields of research, urgently calling for comprehensive observations and studies, including remote sensing techniques.

Unlike laboratory sampling and analysis, remote sensing is a modern observation technique detecting electromagnetic signals interacted with aerosols. Satellite remote sensing is an ideal way to gain knowledge of aerosol properties, e.g. the aerosol optical depth (AOD), for its large spatial coverage and high cycling frequency. But many research works have shown that for China, the most popular AOD products were an overestimation for small AOD and underestimation for high AOD. Both daily and monthly AOD retrievals showed poor performance in extreme aerosol conditions, e.g. under dust events or heavy urban/industrial haze. This is because of complex heterogeneity of land surface in China.

In recent years Chinese researchers have made great contributions to the developments and applications of remote sensing technique for aerosol observation and cloud research. In this paper, main progresses are comprehensively summarized, which can be divided in terms of three main research directions — satellite retrieval, ground based observation, and product evaluation and applications. The current ongoing projects about the aerosol and cloud research in China are also presented

Keywords: Aerosol remote sensing, satellite retrieval, ground based observation, China