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Detecting Super-thin Clouds with Polarized Sunlight

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Super-thin clouds exist globally but are extremely difficult to be detected by satellite instruments. These clouds can tremendously impact the remote sensing of aerosols, surface temperature, and atmospheric composition gases. They are also very important for climate modeling. In this presentation, a novel method for detecting cloud particles in the atmosphere with measuring the polarized sunlight from the Earth-atmosphere system (Sun et al., 2014) is reviewed. Preliminary modeling results suggest that this method can be used to detect super-thin cirrus clouds having an optical depth of only about 0.06 and super-thin liquid water clouds having an optical depth of only about 0.01. Such clouds are too thin to be sensed using any current passive satellite instruments. This method has potential to become an innovative satellite mission of NASA to advance Earth observation from space and improve scientific understanding of all clouds and cloud-aerosol interactions.

Reference
Wenbo Sun, Gorden Videen, and Michael I. Mishchenko: Detecting super-thin clouds with polarized sunlight. Geophy. Res. Lett. 41, doi: 10.1002/2013GL058840 (2014).

Keywords: Remote Sensing, Super-thin clouds, polarized sunlight, angle of linear polarization of light