Cloud-Aerosol-Wind-Observation Mission by using Doppler of cloud radar and Multi-FOV-High-Spectral-Resolution-Polarization-Doppler-Lidar

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We propose a synergy space-borne observation mission using 94GHz Doppler cloud radar and high spectral resolution lidar (HSRL) with doppler, multi-field-of-view, and depolarization measurement functions to study clouds, aerosol and convection. Expected products include (1) microphysics of clouds, aerosols and precipitations, (2) fall velocity of clouds, rain and snow particles, and (3) air motion in cloud, above clouds and in clear sly condition. Lidar wavelengths are 532nm and 1064nm. HSRL function is considered for 532nm. Polarization capability is implemented at least for 532nm. Direct detection method is used to estimate Doppler velocity at 532nm. 94GHz cloud radar and lidar with Doppler function measure three-dimensional air motion in clouds as well as in clear sky, respectively. High spectral resolution function at 532nm with polarization distinguishes cloud particle type and aerosols. The lidar has multiple field of views in order to obtain information from relatively thick clouds. Since the 94GHz cloud radar has capability to observe inside of the clouds and lidar measures aerosols and clouds, it will be an extended version of space-mission to CloudSat and CALIPSO launched in 2006 and EarthCARE satellite in 2022. The mission will also serve to construct long continuous records of clouds and aerosols for climate change studies with CloudSat, CALIPSO, EarthCARE and future missions such as ACCP.

Keywords: Cloud radar, lidar, cloud, aerosol, vertical motion

