



Investigation of the Cloud Characteristics and their Impact on Atmospheric Processes

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Atmospheric clouds are one of the most important components of the hydrological cycle and play a vital role in the weather and climate of the Earth-atmosphere system and play a crucial role in the modulation of Earth's radiation balance, dynamics, and thermal balance of the atmosphere. The impact of clouds on the radiation budget of the atmosphere depends on the cloud properties, such as, their frequency of occurrence, the number of cloud layers, cloud base height, cloud thickness, spatial distribution, and water/ice content. An excess surface radiative heating produces instability in the atmosphere, resulting in convection and transfer of energy from the surface and its subsequent cooling and it affects the atmospheric circulation pattern which initiates several processes and also affects the meteorology of different regions.

An in-depth understanding of the spatial and vertical distribution of clouds, their properties, and temporal evolution are essential for understanding the origin and impact of clouds and their feedback on the above-mentioned processes and their parameterization in weather and climate models for improving forecast. This is correspondingly essential for investigating the cloud-aerosol interaction, heterogeneous chemistry in the atmosphere, and other associated processes. Cloud properties can be investigated using in-situ observations, ground-based lidar and radar remote sensing, airborne detectors, and space-borne payloads (onboard satellites). These techniques and observing platforms are having their advantages and limitations. Lidar and Radar-based observations are having very good temporal and vertical resolution but have limited spatial coverage. Satellite observations have the advantage of providing global distribution of clouds.

This talk will focus on the investigation of clouds and their importance in several atmospheric processes, feedback mechanisms, cloud characteristics over the western Indian region, and their impact on atmospheric energetics. Furthermore, observation of clouds using various techniques and the implication of the advanced techniques in improving the understanding of the atmospheric clouds will be presented and discussed.