

Vertical profile of cloud and radiation budget observed by satellite

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Vertical profile of cloud is obtained from space-borne active sensors such as CPR/CloudSat and CALIOP/CALIPSO. We used three CloudSat products, 2B-GEOPROF-LIDAR, 2B-TAU, and 2B-FLXHR-LIDAR to reveal spatial and seasonal properties of clouds. Cloud vertical profiles are classified into 10 types referred to ISCCP. Obtained cloud profiles are discussed with meteorological and sea surface conditions such as wind, water vapor surface air temperature and sea surface temperature. The results show that a combination of low-cloud and high-cloud is frequently observed in tropical and mid-latitude regions and these clouds are formed according to different mechanisms. It is also shown that overlapping of cloud affect longwave radiation budget at the top of the atmosphere. Overlying cloud decreases the cooling rate at the uppermost layer of low-cloud, and it affect the formation and dissipation of low-cloud. In the analysis of three data products, some inconsistency was found, which was attributed to unsuccessful retrieval of cloud water content and effective radius of cloud particle. Therefore, it is noted that quantitative evaluation of the product is critical to application of these cloud data to radiation and climate change studies.

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