

The regional distribution characteristics of aerosol optical depth over the Tibetan Plateau

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The Tibetan Plateau (TP) is representative of typical clean atmospheric conditions. Aerosol optical depth (AOD) retrieved by Multi-angle Imaging SpectroRadiometer (MISR) is higher over Qaidam Basin than the rest of the TP all the year. Different monthly variation patterns of AOD are observed over the southern and northern TP, whereby the aerosol load is usually higher in the northern TP than in the southern part. The aerosol load over the northern part increases from April to June, peaking in May. The maximum concentration of aerosols over the southern TP occurs in July. Aerosols appear to be more easily transported to the main body of the TP across the northern edge rather than the southern edge. This is may be partly because the altitude is lower at the northern edge than that of the Himalayas located along the southern edge of the TP. Three-dimensional distributions of dust, polluted dust, polluted continental and smoke are also investigated based on Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) data. Dust is found to be the most prominent aerosol type on the TP, and other types of aerosols affect the atmospheric environment slightly. A dividing line of higher dust occurrence in the northern TP and lower dust occurrence in the southern TP can be observed clearly at altitude of 6-8 km above sea level, especially in spring and summer. This demarcation appears around 33-35°N in the middle of the plateau, and it is possibly associated with the high altitude terrain in the same geographic location. Comparisons of CALIPSO and MISR data show that the vertical dust occurrences are consistent with the spatial patterns of AOD. The different seasonal variation patterns between the northern and southern TP are primarily driven by atmospheric circulation, and are also related to the emission characteristics over the surrounding regions.