Abstract: This Special Issue contains twelve publications that, through different remote sensing techniques, investigate how the atmospheric aerosol layers and their radiative effects influence cloud formation, precipitation and air-quality. The investigations are carried out analyzing observations obtained from high-resolution optical devices deployed on different platforms as satellite and ground-based observational sites. In this editorial, the published contributions are taken in review to highlight their innovative contribution and research main findings.

Keywords: lidar; aerosols; remote sensing; precipitation; wind lidar; air-pollution; radiative effects
range of 25–45° N and reaching eastern China, Japan and Korea and, eventually, the Pacific Ocean. In [5], an improved above low-level cloud–aerosol (ACA) identification and retrieval methodology was developed to provide a new global view of the ACA distribution by combining three-channel Cloud–Aerosol Lidar with Orthogonal Polarization (CALIOP) observations. The new method can reliably identify and retrieve both thin and dense ACA layers, providing consistent results between the day- and night-time retrieval of ACAs. Then, new four-year (2007 to 2010) global ACA datasets were built, and new seasonal mean views of global ACA occurrence, optical depth, and geometrical thickness were presented and analyzed. In [6], the authors carried out the retrieval of the aerosol properties through sunphotometer observation data from March 2012 to February 2014 in Kunming, China, speculating possible causes about seasonal variations. In [7], the authors presented a proof-of-concept algorithm to automatically detect precipitation from lidar measurements obtained from the National Aeronautics and Space Administration micro-pulse Lidar network (MPLNET). In [8], the authors, utilizing the satellite observations and reanalysis data, investigated the effects of Black Carbon on the climate over the Tibetan Plateau, finding that the emissions intensify the East Asian Summer monsoon. In [9], the authors employed the wind profiling observations from the fine-time-resolution radar wind profiler (RWP), together with hourly ground-level PM$_{2.5}$ measurements, to explore the wind features in the planetary boundary layer (PBL) and their association with aerosols in Beijing for the period from December 1, 2018, to February 28, 2019. In [10], the authors developed a prototype of a homemade portable no-blind zone lidar system designed to map the three-dimensional distribution of aerosols based on a dual-field-of-view receiver system. This innovative lidar prototype has a spatial resolution of 7.5 m and a time resolution of 30 s. In [11], the author developed a Three-Dimensional Real-time Atmospheric Monitoring System to measure and analyze the vertical profiles of horizontal wind speed and direction, vertical wind velocity as well as aerosol backscatter obtained from lidar measurements. The system was applied to Hong Kong, a highly dense city with complex topography, during each season and including hot-and-polluted episodes (HPEs) in 2019. In [12], the authors conducted Doppler lidar measurements in 2019 to reveal the characteristics of typical daytime turbulent mixing processes in the convective boundary layer over Hong Kong. The authors assessed the contribution of cloud-radiative cooling on turbulent mixing and determined the altitudinal dependence of the contribution of surface heating and vertical wind shear to turbulent mixing.

References


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