

Dust detection and dust intensity estimation based on Himawari-8/AHI data

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The deserts in western/northern China are one of the major mineral dust source regions of the world. Large amount of dust are emitted and blown east and southeast. The long-distance transport of dust often caused strong dust storms over northern China. In this study, we presented a simplified dust detection and dust intensity estimation method using Himawari-8/ Advanced Himawari Imager (AHI) data. Based on the comparison of spectral reflectivity and brightness temperature (BT) characteristics of typical objects, BT at multi-bands, including 3.9, 8.6, 11.2, and 12.4 μm channels were used to identify dust particles. Considering the different radiation effects of dust particle over different land cover types, we proposed two different dust detection thresholds for desert and relatively dark land surfaces, respectively. The dust Aerosol Optical Depths (AOD) were also retrieved using an optimal estimation method. Furthermore, a Dust Intensity Index (DII) were calculated to estimate the dust intensity based on the BT at TIR, reflectance at VIS and the retrieved AOD. The EDII developed in this study can not only reveal the dust area, but also infer the dust intensity. We used this method to monitor the dust events over China during spring season in 2017. The dust detect results were compared with Aerosol Robotic Network (AERONET) observations from 4 typical stations located in northern China, with a total dust detection accuracy of 85%, a probability of correct detection (POD) of 78%. A good agreement was also obtained between DII and visibility from ground measurements, with a correlation coefficient of 0.81. Demonstrating the usefulness of EDII in monitoring the dust status.