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Aerosol anomalies associated with occurrence of recent strong earthquakes (>M8.0)

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To promote understanding of lithospheric–atmospheric interaction during seismic activity, this study investigated the spatial and temporal variations of aerosol optical depth (AOD) associated with eight global strong earthquakes (>M8.0) with the focal depth less than 30 km after the year of 2009 using AQUA satellite moderate-resolution imaging spectroradiometer data. AOD is the most basic optical characteristic of atmospheric aerosol and an important index to characterize atmospheric turbidity. It was observed that the original AOD values increased before, during, and after the occurrence of each of the eight strong earthquakes. Spatially, AOD anomalies were found to occur around the earthquake epicenters from the monthly scale and each event case had the same AOD anomaly area both one month before the events and the month that the earthquake occurred. Moreover, the AOD spatial variation has the trend of the increasing, then decreasing and last increasing from the 8-day scale. Temporally, at the scale of one year, AOD anomaly values ([U+FF1E] 3.0) appeared before all eight strong earthquakes and the frequency of AOD anomaly values prior to and after earthquakes was high. From the original value, AOD had an abnormal uplift and downtrend before the eight events. The AOD anomalies occurred before, while, and after the eight strong earthquakes, partially due to release of radon, other gases, and heat and to a series of reactions that increased aerosol concentrations.