



Can MODIS AOD be employed to derive PM_{2.5} in Beijing-Tianjin-Hebei over China?

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The fine particular matter (PM) concentrations in China have increased considerably due to the rapid economic growth and urbanization in the last few decades, especially in the most populated and industrialized regions. The Beijing-Tianjin-Hebei is one of the most polluted regions in China, so to monitor the PM_{2.5} concentrations over this region is quite critical for human health. By making use the new released hourly PM_{2.5} mass concentration from ground-based observations in Beijing-Tianjin-Hebei over China, and the collocated MODIS level 2 AOD data from April 2014 to March 2015, we explored the relation between surface PM_{2.5} mass concentration and MODIS AOD and possibility to derive the surface PM_{2.5} from satellite retrieval in the region. Our study show that the relation strongly depend on the seasons due to distinct seasonal characteristics of PM_{2.5} and AOD, with a relatively better correlation in spring and summertime than autumn and wintertime. Our analysis give an evidence that worse relationship and/or smaller number of sample in wintertime is associated with the significantly high PM_{2.5} concentration and a lot of missing data occurring in MODIS AOD, implying that current MODIS AOD retrieval scheme does not work very well in highly polluted cases. The derived PM_{2.5} mass concentration from MODIS AOD in summertime can basically capture the major observed features of the time series and about 20% large bias of the derived values compared to the observation is expected to be reduced once longer time period data is available and used for analysis.