



Comparison between OMI-TOMS and OMI-DOAS Ozone Columns over High SO₂ regions: Volcanic and Chinese Industrial Region

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In this present study, we identified the SO₂ effect on O₃ retrieval from the Ozone Monitoring Instrument (OMI) measurement. The difference between OMI-Total Ozone Mapping Spectrometer (TOMS) and OMI-Differential Optical Absorption Spectrometer (DOAS) total O₃ is calculated in high SO₂ volcanic regions (Anatahan, La Cumbre, Sierra Negra, and Piton) and Chinese industrial region from 2005 through 2008. In volcanic plumes, OMI-TOMS total O₃ column increases with middle and upper troposphere and stratosphere (TRM-STL) SO₂, showing high correlation ($R = 0.54$) between TRM-STL SO₂ and TOMS O₃ while there is negligible correlation ($R = 0.11$) between TRM-STL SO₂ and OMI-DOAS O₃. There is a certain correlation ($R = 0.54$) between TRM-STL SO₂ and the difference between OMI-TOMS and OMI-DOAS O₃ (T-D). The T-D reaches its maximum up to 90 DU. T-D has a dependence on planetary boundary layer (PBL) SO₂ ($R = 0.36$) even though T-D in the Chinese industrial region increases more slowly with SO₂ than at the volcanic sites. Thus, the altitude at which SO₂ exists has an effect on T-D, which could be due to reduced absolute radiance sensitivity in the boundary layer at 317.5 nm (the wavelength used to retrieve OMI-TOMS ozone in boundary layer). In addition, T-D shows a seasonal tendency on PBL SO₂. In Turkey and Western USA, where PBL SO₂ concentrations are low, |T-D| shows its positive maximum in summer and negative maximum in winter. However, no seasonal variation of T-D was found in the Chinese industrial region due to the effect of low and high PBL SO₂ in summer and winter, respectively. The reason for the seasonal characteristics of T-D in the Chinese industrial region will be discussed.