Atmospheric
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Supplement of

Comparison of operational satellite SO_2 products with ground-based observations in northern Finland during the Icelandic Holuhraun fissure eruption

I. Ialongo et al.

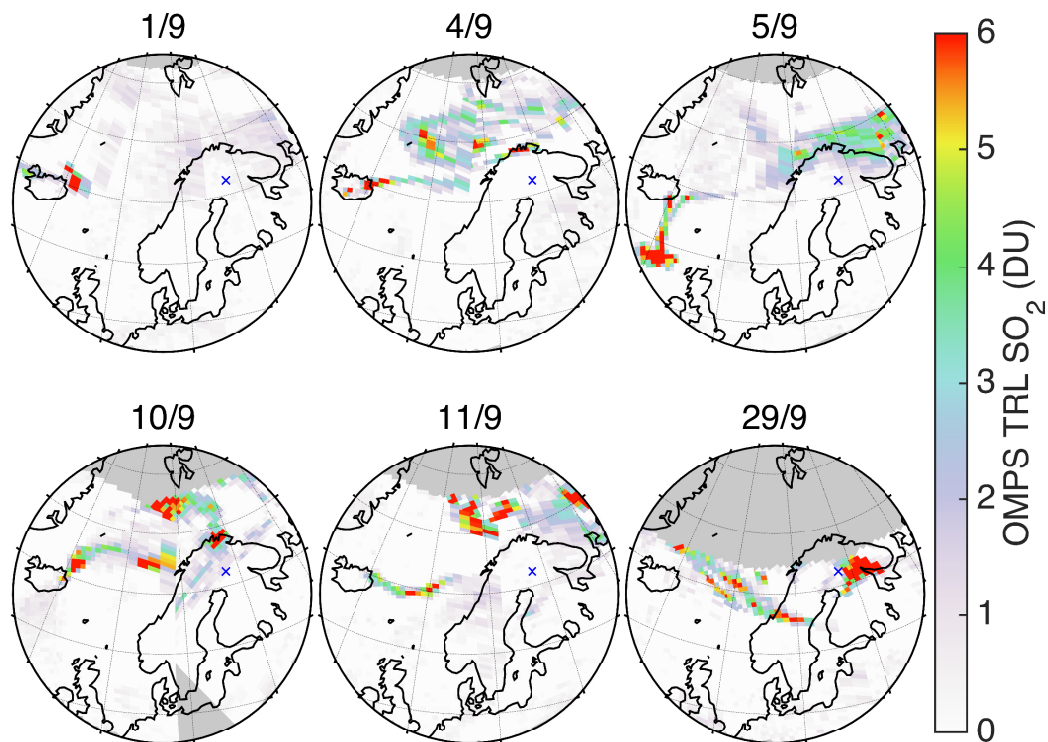*Correspondence to:* I. Ialongo (iolanda.ialongo@fmi.fi)

Figure S1. SO$_2$ total columns as seen from OMPS TRL product (from direct broadcast) during the Holuhraun fissure eruption for six days in September 2014. The dates (day/month) are indicated in the title of each panel. The blue crosses indicate the location of Sodankylä ground-based station.
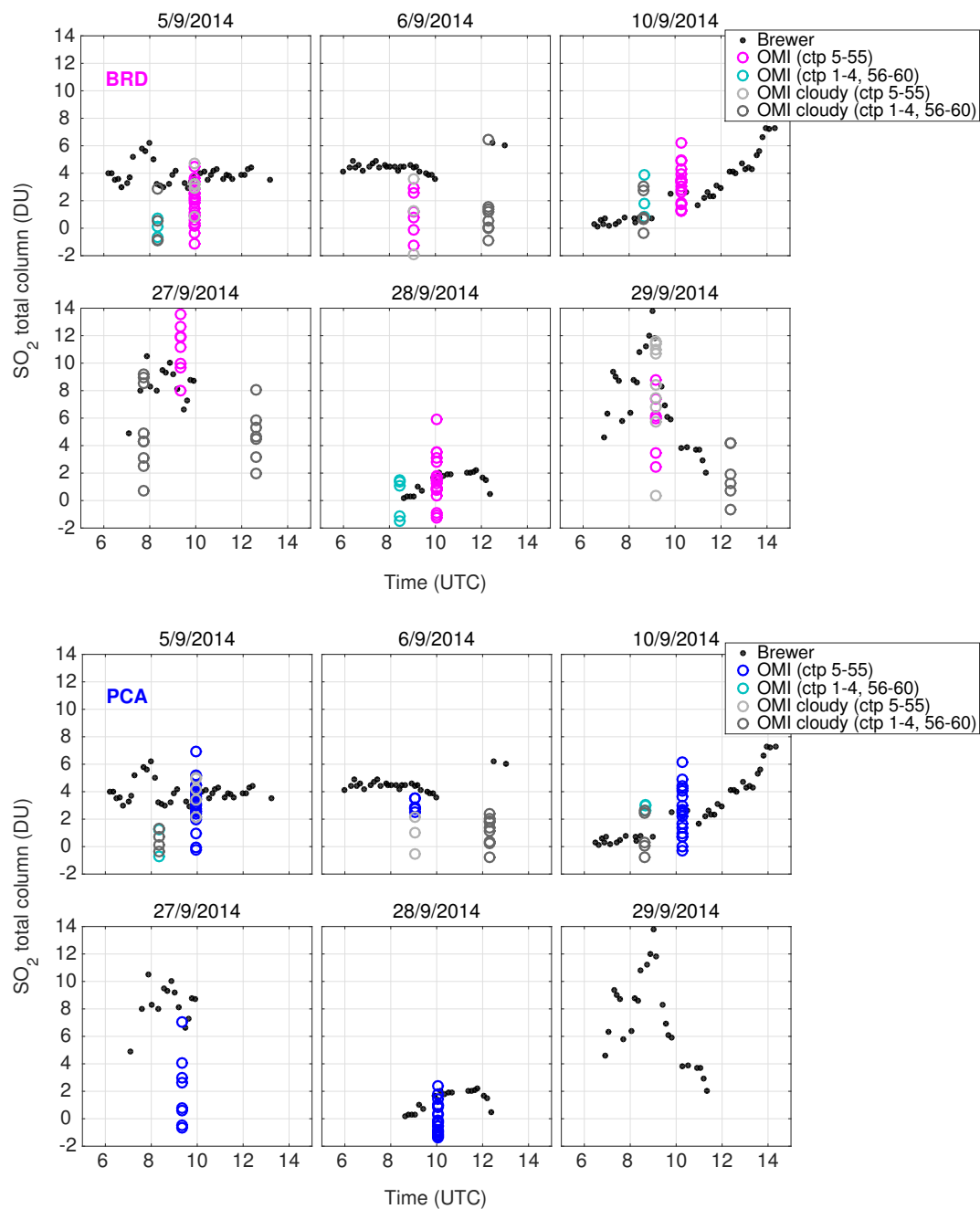
Figure S2. SO$_2$ vertical columns in Sodankylä, Finland during selected days of September 2014. Black dots refer to ground-based Brewer measurements and the circles to OMI SP PBL products. BRD and PCA SO$_2$ vertical column density are shown in the upper and lower panel, respectively. The cloudy scenes (cloud fraction larger than 0.3) are shown in grey. The large pixels are shown in green and dark grey, for clear sky and cloudy conditions, respectively.
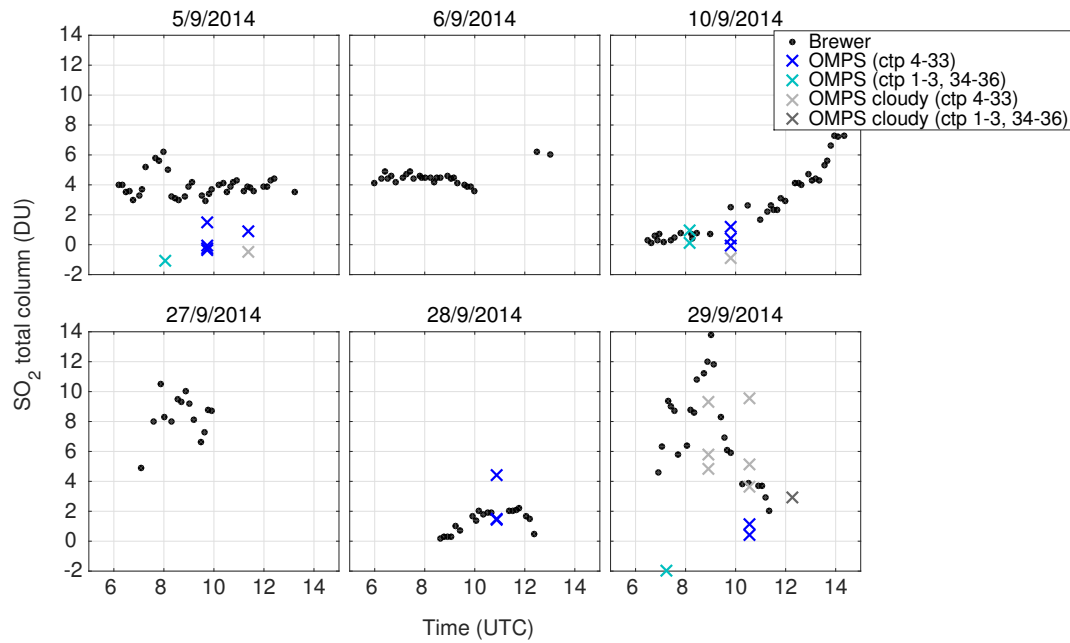
Figure S3. SO$_2$ vertical columns in Sodankylä, Finland during selected days of September 2014. Black dots refer to ground-based Brewer measurements and the crosses to OMPS PBL product. The cloudy scenes (cloud fraction larger than 0.3) are shown in grey. The large pixels are shown in green and dark grey, for clear sky and cloudy conditions, respectively.
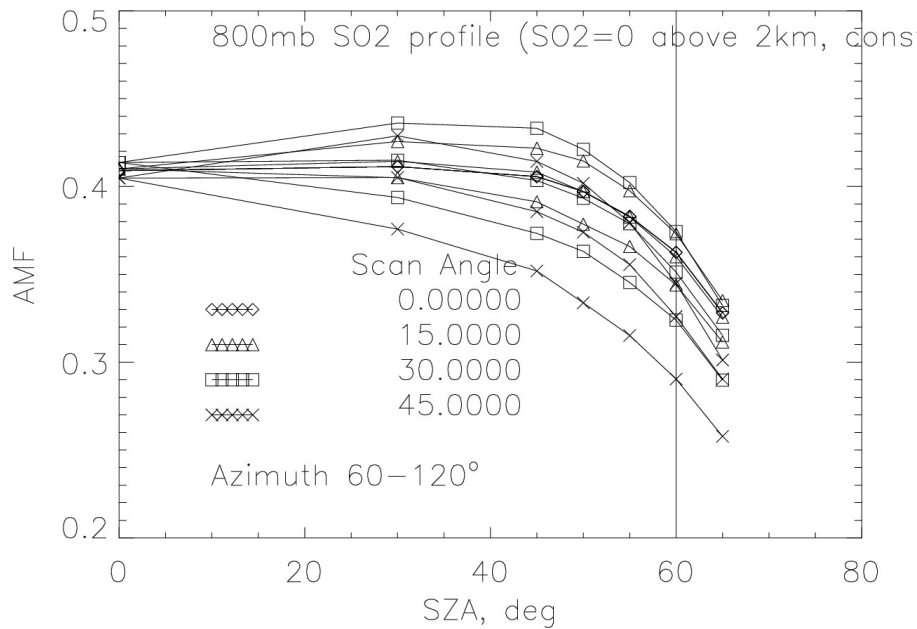

Figure S4. Air mass factor dependence on SZA for different viewing and azimuthal angle values. The results are based on TOMRAD RT calculations assuming SO$_2$ profile below about 2 km (800 mb).
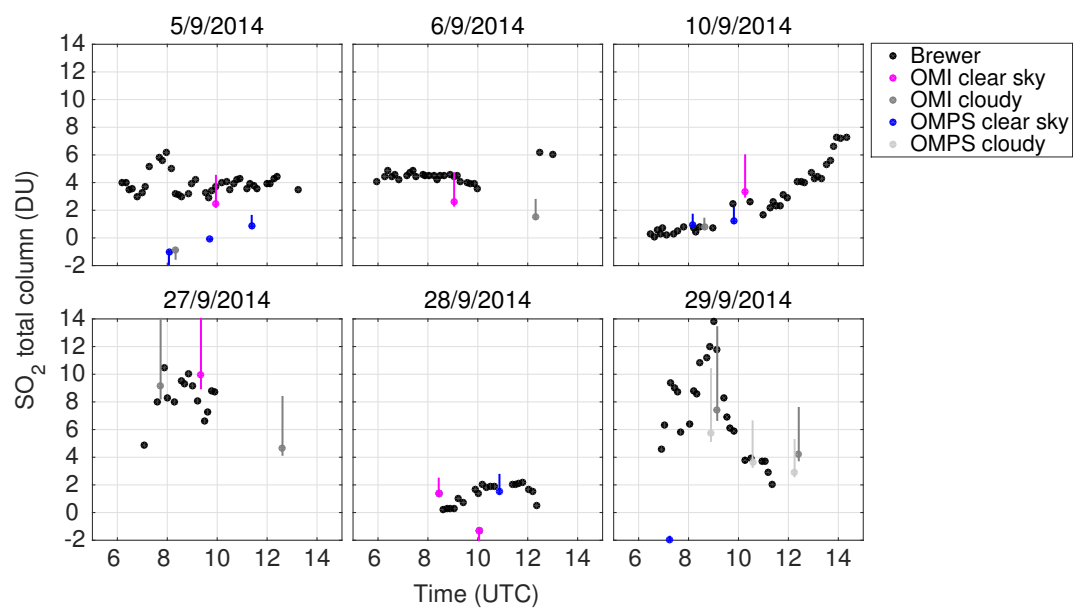
Figure S5. Comparison between Brewer SO$_2$ columns (black dots) and satellite PBL products corrected for a range of AMF values (0.2–0.4). The variability due to different AMFs is presented as vertical bars, while the dots correspond to the original SO$_2$ column. Magenta (dark grey) and blue (light grey) dots correspond to OMI and OMPS PBL products, respectively, under clear sky (cloudy) conditions.

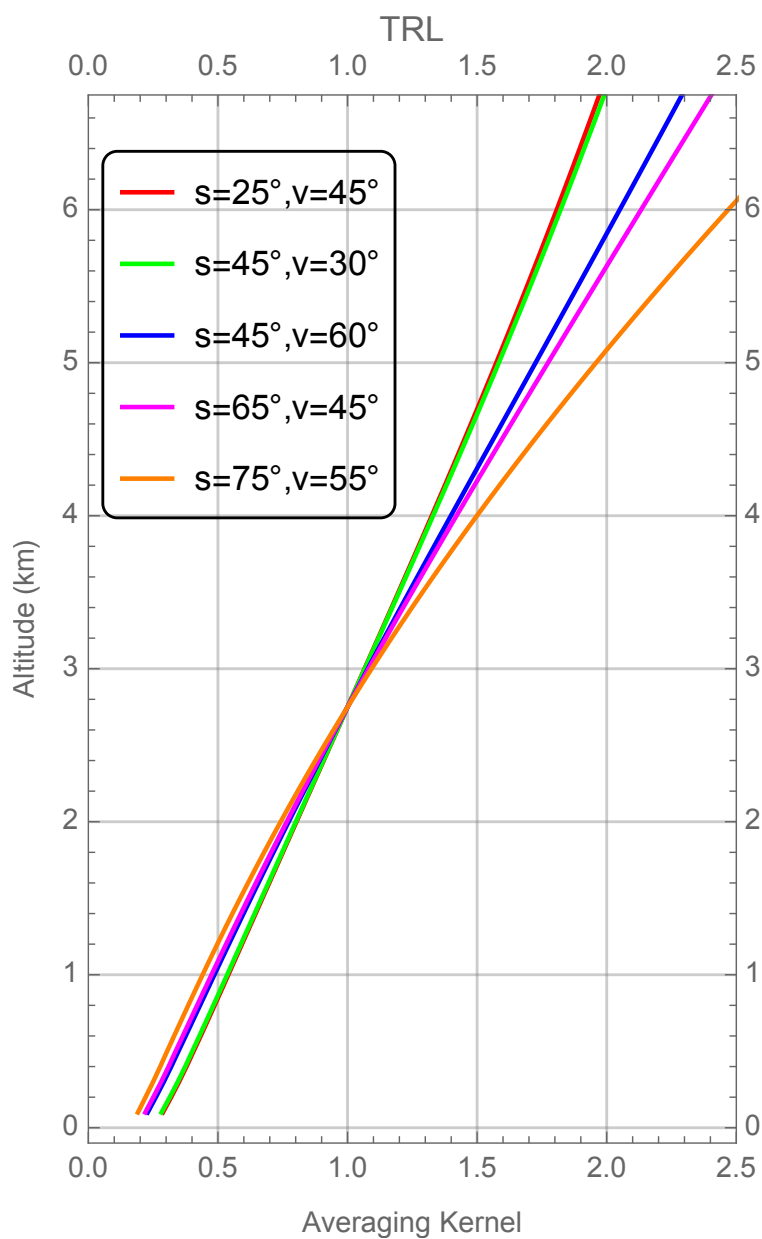**Figure S6.** Example of averaging kernel for LF TRL product for different values of solar (s) and viewing (v) zenith angle.