Volcanic SO₂ Layer Height by S5P/TROPOMI; validation against IASI/MetOp and CALIOP/CALIPSO observations.

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Figure S 1. SO₂ load [D.U.] for two example days of the Raikoke 2019 eruptive period, the 23^{rd} of June on the left and the 2^{nd} of July on the right. The S5P+I: SO₂ at the top, IASI AOPP in the middle and IASI ULB/LATMOS on the bottom panels.



Figure S 2. Comparisons between spatiotemporally collocated plume heights for the Taal 13.01.2020 eruption. The left panel shows the histogram distribution for the S5P LHs (blue) and the IASI PHs (orange). The right panel shows their absolute differences. (Left) S5P compared to the IASI/AOPP dataset. (Right) S5P compared to the IASI ULB/LATMOS dataset.



Figure S 3. SO₂ Plume Height for the Taal 2020 eruption, on the 13th of January. The S5P+I: SO₂ LH at the top, IASI AOPP in the middle and IASI ULB/LATMOS on the bottom panels.

S5P SO₂ Layer Height [km] | 20200113



Figure S 4. SO₂ Plume Height for two days of the La Soufrière 2021 eruption, the 10^{th} [left column] and the 11^{th} [right column] of April. The S5P+I: SO₂ LH at the top, IASI AOPP in the middle and IASI ULB/LATMOS on the bottom panels.

S5P LH v4.0 vs IASI ULB_LATMOS LaSoufriere





Figure S 5. As per Figure S 2 for the La Soufriere 2021 eruptive days.



Figure S 6. Left. TROPOMI SO₂ layer height in km for the Sinabung volcanic eruption on the 19th of February 2019. The black line indicates the CALIPSO ground track and the coloured circles along the line indicate weighted extinction height product values (in km). Right. Scatter plot for the collocated points, with associated statistical measures.



Figure S 7. Left. TROPOMI SO₂ layer height in km for the Nishinoshima volcanic eruption on the 1st of August 2020. The black line indicates the CALIPSO ground track and the coloured circles along the line indicate weighted extinction height product values (in km). Right. Scatter plot for the collocated points, with associated statistical measures.



Figure S 8. Left. TROPOMI SO₂ layer height in km for the La Soufriere volcanic eruption on the 11^{th} of April 2021. The black line indicates the CALIPSO ground track and the coloured circles along the line indicate weighted extinction height product values (in km). Right. Scatter plot for the collocated points, with associated statistical measures.