S1: Solar irradiance data

Figure S1 presents the pyranometer measurements of diffuse, global, and direct solar irradiance recorded in Thessaloniki on 6 May 2024 and 21 June 2023. The data from the 6th of May are characterized by stable clear-sky conditions and this day was selected for the definition of the reference spectrum applied in the DOAS analysis. Data from the 21st of June, corresponding to the summer solstice and maximum solar elevation, was used to estimate the ozone SCD of the reference spectrum through the Langley plot method (Sect. 3.4).

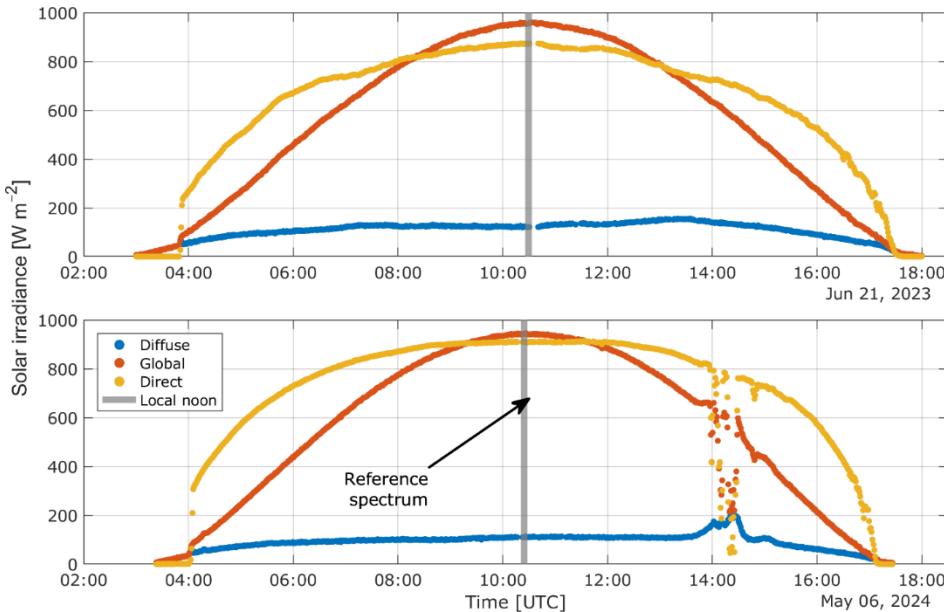
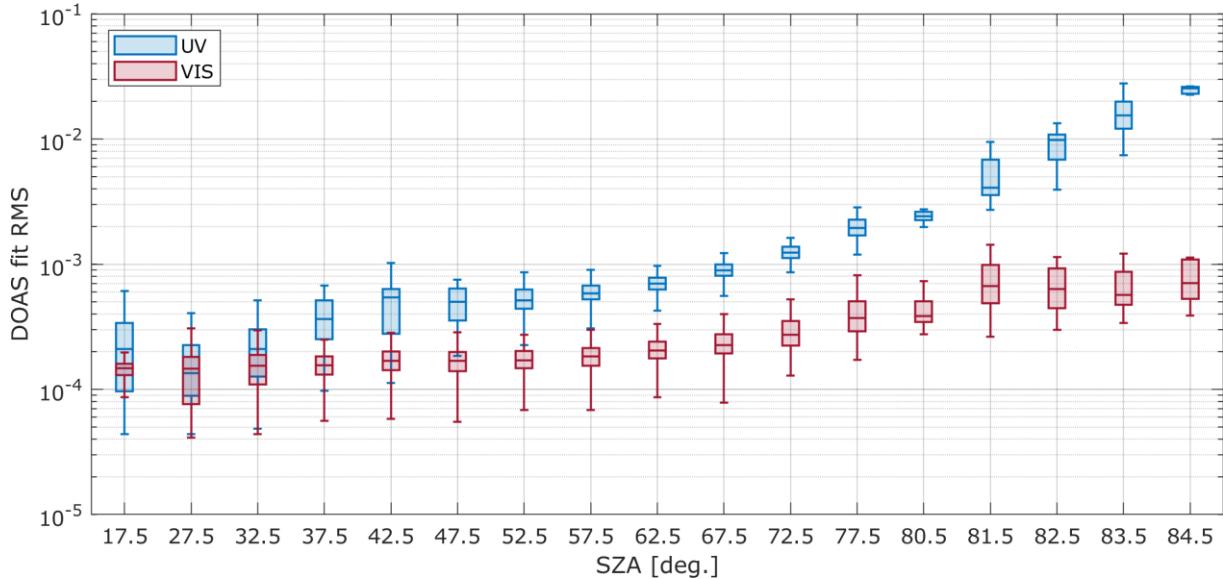



Figure S1: Diurnal variability of diffuse (blue), global (orange), and direct (yellow) solar irradiance on 21 June 2023 (top panel) and 6 May 2024 (bottom panel) measured by the pyranometers in Thessaloniki.

10

S2: DOAS fit RMS as a function of SZA

Figure S2 illustrates the dependence of the DOAS fit RMS on SZA for the UV and VIS retrievals. The data are grouped in 5°
SZA bins below 80°, and in 1° bins above 80°. Across all bins, the VIS retrievals show consistently lower RMS values than
the UV, indicating a higher SNR in the visible spectral range. Although both spectral regions show an increase in RMS with
15   increasing SZA, the UV RMS increases more rapidly above approximately 70°, which is indicative of reduced fitting stability
under low solar elevations. In contrast, the VIS RMS remains comparatively stable. It should also be noted that slight
differences between the UV and VIS variability may be influenced by the different temporal coverage of the two datasets (see
Sect. 2.2), resulting in fewer data at certain SZAs.

20   **Figure S2: Dependence of DOAS fit RMS on SZA for the UV and VIS retrievals.**

S3: The wildfire event of Alexandroupolis

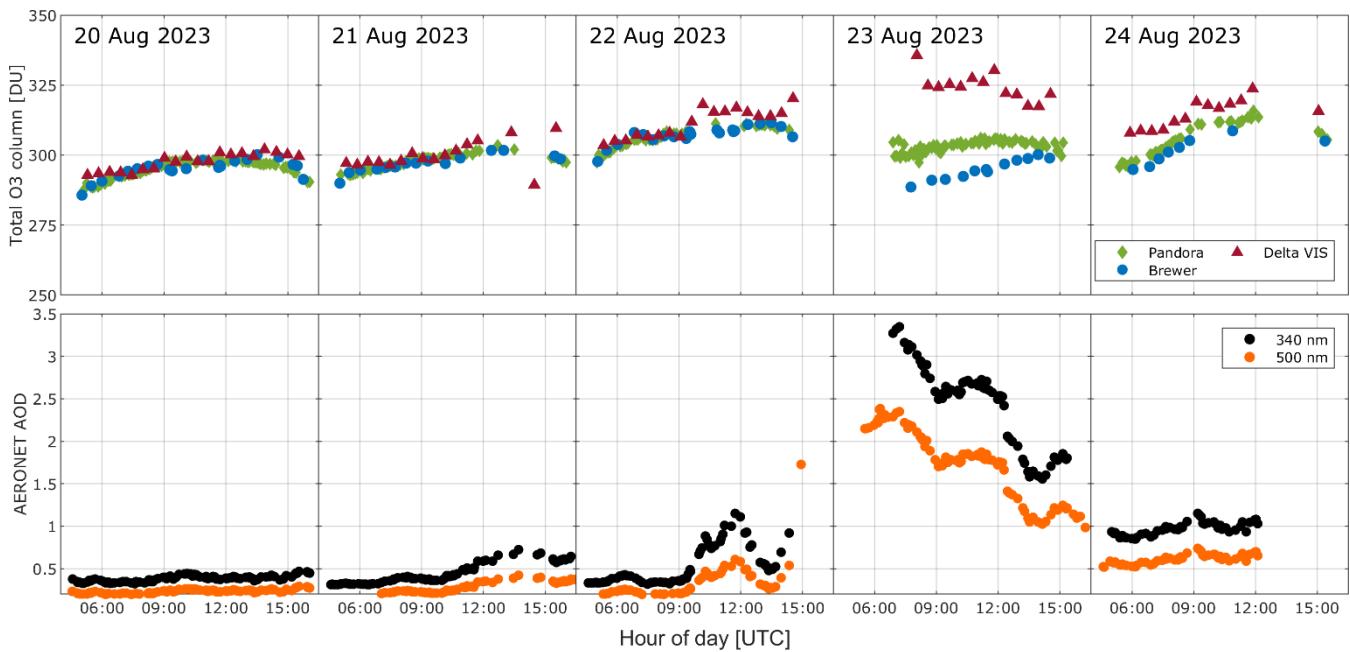



Figure S3: Time series of TOC from Pandora, Brewer, and Delta VIS retrievals (top row) and the respective AOD measurements at 340 and 500 nm (bottom row) during the wildfire event of Alexandroupolis in August 2023.

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S4: Intercomparison of TOC diurnal variability
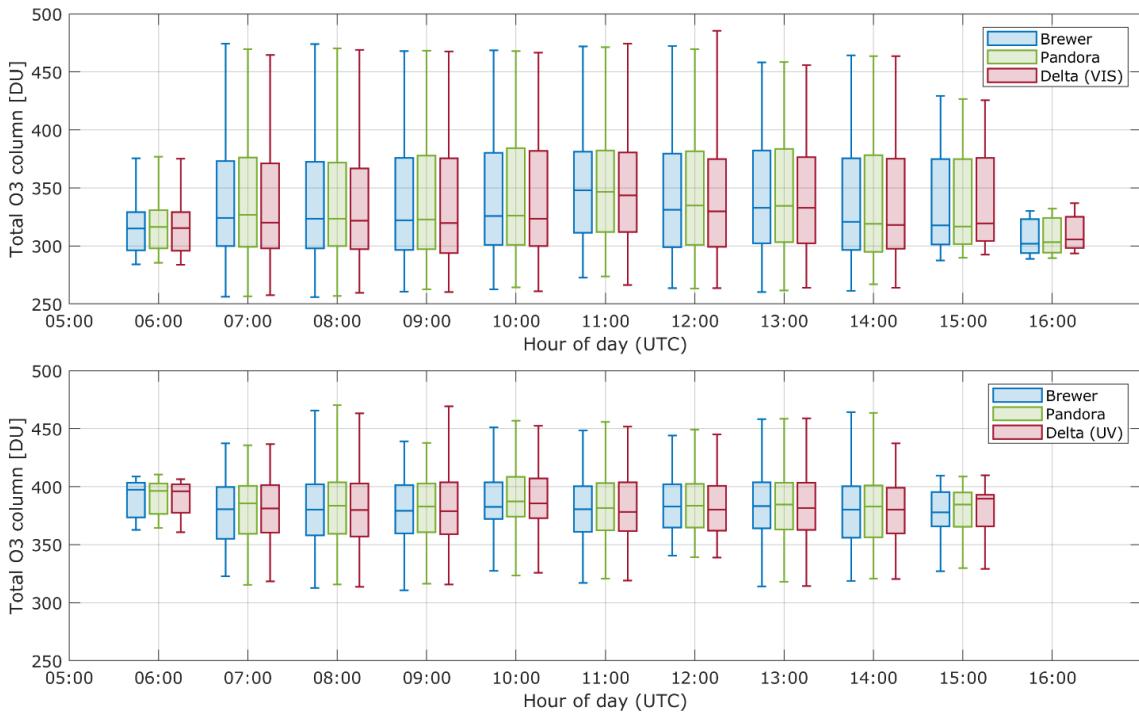
Figure S4: Box-and-whisker plots of the diurnal variability of TOC captured by the Brewer (blue), the Pandora (green) and the Delta (red). The top panel represents collocated measurements of all instruments using Delta VIS data, while the bottom panels using Delta UV data.