

Comparison of Total Ozone Column and UVI retrieved from Brewer, PANDORA and OMI at Athens, Greece during 2018-2021

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Athens, Greece is a coastal city of 3.7 million habitants at eastern Mediterranean. PANDORA and BREWER instruments are operating in the city at different stations 5km apart. BREWER with serial number 001 (BREWER 001) measurements in Athens started in July 2003. The spectrophotometer is installed on the roof of Biomedical Research Foundation of the Academy of Athens. Total Ozone Column (TOC) data are retrieved using a set of direct sun measurements at UV wavelengths using the differential absorption method. The accuracy in Brewer measurements is of the order of 1% (~ 3 DU). PANDORA with serial number 119 (PANDORA 119) is installed at National Observatory's Actinometric station at Thissio, Athens since 2018 and is part of the PANDONIA network. In order to retrieve TOC, a spectral fitting algorithm uses reference absorption cross-section for each atmospheric absorber and removes aerosol and Rayleigh scattering effect.

We have made comparisons of TOC retrievals between the instruments for the operational period of PANDORA. Comparison of the retrievals has been performed for measurements at solar zenith angle (SZA) less than 75°. Synchronous data are used in ± 10 minutes around PANDORA retrievals, when are flagged as high quality. A total of 3 years of synchronous data are available and used to assess the quality of the retrievals. The comparison showed an R^2 of 0.91 with a mean relative difference of 2.8%. 79% of the retrievals were within ± 4 DU range. When SZA is higher than 50°, the differences are higher. An estimation of the differences in respect to SZA has been made and linear relation has been exported. Also, the seasonality of the errors has been inspected.

Additional comparisons have been made with TOC data from the OMIs on board the Aura satellite for the same period. We have considered OMI TOC as collocated when overpass is inside a 60 minute window and in less than 40km distance. Comparison with Brewer collocated data has revealed mean difference of 3.2% (11.2 DU). PANDORA TOC retrievals seem to have mean difference of 0.8% (2.8 DU). Repeatedly OMI TOC seem to overestimate during June and July compared to both ground based instruments. Finally we are going to present the propagation of uncertainty in the UV Index, considering the different datasets of TOC.

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