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First validation results of the new TROPOMI/S5P Total Column Water Vapor product using AERONET ground-based measurements

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The very important role of water vapor on the greenhouse effect makes it a species that needs to be continuously and globally monitored, as well as thoroughly studied. The TROPOMI/S5P Total Column Water Vapor (TCWV) is a new product retrieved from the blue wavelength band (435 –455nm), using an algorithm that was originally developed for GOME-2. The algorithm is based on the DOAS technic and is separately presented in this session*.

The TROPOMI/S5P TCWV product is available for the time period May 2018 to August 2020, almost 2.5 years. For the validation purposes of this work, the co-located precipitable water Level 2.0 (quality-assured) measurements from the NASA AERONET (AErosol RObotic NETwork) were used. The network uses CIMEL sunphotometers located at about 1300 stations globally to monitor precipitable water, among other products. The two datasets, satellite and ground-based, were co-located and the percentage differences of the comparisons were calculated and statistically analyzed. The correlation coefficient of the two products is found to be 0.9 and the mean bias of the relative percentage differences is of the order of 2% for the mid-latitudes and the tropics but increases close to the poles. The effect of various influence quantities, such as air mass factor, solar zenith angle, clouds and albedo are also studied.

*see the respective abstract by Ka Lok Chan (EGU21-2673)