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## TROPOMI observations of total column water vapor

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We present the total column water vapor (TCWV) retrieval for the TROPOspheric Monitoring Instrument (TROPOMI) observations in the blue band. The retrieval was first developed to retrieve TCWV from Global Ozone Monitoring Experience 2 (GOME-2). We have modified the settings of the retrieval to adapt it for TROPOMI observations. The TROPOMI TCWV retrieval algorithm consists of two major steps. The first step is the retrieval of water vapor slant columns by applying the differential optical absorption spectroscopy (DOAS) technique to TROPOMI observations in the blue band. The retrieved water vapor slant columns are then converted to vertical columns using air mass factors (AMFs). An iterative optimization has been developed to dynamically find the optimal a priori water vapor profile for AMF calculation. The dynamic search algorithm makes use of the fact that the vertical distribution of water vapor is strongly correlated to the total column amount. This makes the algorithm better suited for climate studies compared to typical satellite retrievals with static a priori or vertical profile information from the chemistry transport model (CTM). Details of the TCWV retrieval are presented. The TCWV retrieval algorithm is applied to TROPOMI observations. The results are validated by comparing to Ozone Monitoring Instrument (OMI), GOME-2 and Special Sensor Microwave Imager Sounder (SSMIS) satellite observations. TCWV derived from TROPOMI observations agree well with the other data sets with Pearson correlation coefficient (R) ranging from 0.94 to 0.99. The correlation is slight better during winter time of the northern hemisphere. Small discrepancies are found among TROPOMI, OMI, GOME-2 and SSMIS observations. The discrepancies are mainly due to differences in measurement time and cloud filtering. More detailed validation against ground based sun-photometer observations are presented separately in this session\*.

\*see the respective abstract by Katerina Garane.