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Data series of total columns of H_2O measured from the ground and from space at Observatoire de Haute-Provence in France (44° N)

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Water vapour is an atmospheric constituent having a determinant effect on the climate and on the weather. It presents the two third of the greenhouse gases, and is mostly located in the troposphere. It is the key element of the hydrological cycle, conditioned by exchanges between its three phases in the atmosphere, the ocean and the continents, and also directed by the transport of energy between the surface and the atmosphere, by evaporation and condensation.
However, because of its large temporal and spatial variability, the measure of this component is a demanding task. For this reason, many different techniques have been developed to estimate water vapour in the atmosphere. Also, the accuracy of the measurements changes from one instrument to another as the mode of observation, the period of observation, the condition of measurement, and the retrieval method are different between them. Note that these instruments were not specialised initially to water vapour measurements and the extraction of H_2O was not the principle objective. This paper compares measurements of total vertical column density (VCD) of water vapour, i.e. the amount of water vapour in a vertical atmospheric column, obtained above Observatoire de Haute-Provence (OHP), south of France (5°42′E, +43°55′N) from five different instruments. This work compares results from two ground based and three satellite instruments: the SAOZ (système d'analyse par observation zénithale) an automated UV-VIS spectrometer; Elodie, a cross-dispersed echelle spectrograph and its 1.92 m telescope; SCIAMACHY, a scanning imaging absorption spectrometer for atmospheric cartography; GOME, a nadir scanning ultraviolet and visible spectrometer for global monitoring of atmospheric ozone; and GOME2, a second generation of GOME.