



Distributions of δD observations from IASI/MetOp across the globe and intercomparison with other instruments/measurements

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The Infrared Atmospheric Sounding Interferometer (IASI) onboard MetOp, through its observations of the water isotopologues, has great potential to support research on hydrological processes responsible for the moistening/drying of the atmosphere. The instrumental characteristics of the spectrometer (low radiometric noise and good spectral resolution) combined with its high sampling (global coverage twice a day) make it particularly suitable for providing numerous observations of the isotopologues ratio (δD) of water vapour in the troposphere.

Retrieving isotopologues ratios at the required accuracy is, however, a challenging task. To get meaningful results, the retrieval needs to be well constrained. This can be achieved, with the optimal estimation method, by using an a priori probability density function containing correlation information between HDO and H₂O. In this presentation, first, we will show that the measurements are mainly sensitive to δD in the troposphere between 3 and 6 km. We will illustrate the capabilities of IASI to provide δD observations at high spatio-temporal resolution with some distributions across the globe and we will discuss their added values to constrain hydrological processes. Second, we will document how IASI observations compare to other remote sounding observations of δD in the troposphere. Comparisons of IASI observations with the TES sounder and with three ground-based NDACC FTIR (Izaña, Kalsruhe and Kiruna, data generated within the project MUSICa) will be presented. The differences between the instruments as well as the methodology to compare them will be exposed. We will show that the different instruments agree within their own uncertainties and vertical sensitivities, asserting the use of IASI δD observations for scientific purposes.