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# Intercomparing Isotopic Water Vapour Measurements to determine spatial and temporal representativity

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The atmospheric stable isotope composition of water vapour provides valuable insights into the atmospheric hydrological cycle. The composition is determined by the source of water vapour to the atmosphere, condensation and post-condensation processes, and mixing. In this study, we investigate the characteristics of co-located measurements of water vapour isotopes. Currently, at a tropical site in Darwin, Australia, we obtain surface in situ $H_2O$, $H_2{}^{18}O$ and HDO measurements, along with solar absorption data allowing retrieval of column amounts of these gases. A similar solar absorption FTS is located in the sub-tropics at Wollongong, Australia, approximately 30km away from a instrument obtaining surface in situ measurements. We investigate these time series for a number of properties. We first look at whether the surface datasets are useful in determining the accuracy of column measurements most sensitive to the surface (e.g. surface retrievals, SCIAMACHY and GOSAT satellites retrievals). The relationship between the column measurements and surface isotopic values is assessed under a range of atmospheric conditions, with the aim to determine the representativity of satellite-based column measurements of surface processes. The influence of spatial separation between surface and column data is investigated, and finally how the combination of a co-located column and surface datasets can help constrain modeling studies, and lead to better understanding of physical processes.