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HDO measurements from space

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Although water is the most important trace species in Earth's atmosphere little is known about processes that transport water from the troposhere to the stratosphere and vice versa. Also the source and sink processes for water in that atmospheric region and above are not yet fully known nor understood. Remote sensing by satellite borne instruments provides us with insights in processes on a global scale. Due to the vast amount of single measurements the quality of the results is sufficient to examine variations of stable isotopes of trace species like water. Because every relevant atmospheric process leaves an isotopic 'fingerprint' it is possible to examine the atmosphere with respect to isotopic variations and get information about the origin of air masses. We present the described method applied to measurements of the satellite borne version of MIPAS and show that the measurements are of sufficient quality to monitor the natural variabilty in stable water isotopes and are good enough to serve as input for model calculations. Possible fields of application are the identification of seasonal signals in the the global water cycle or hydrogen massbalance calculations on a global scale. We conclude that space borne examinations of isotopic variations provide a powerful tool to answer open questions in atmospheric sciences.