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Observations of water vapour and its isotopes in the tropical transition layer (TTL) and the "tropical pipe" by the balloon-borne Michelson Interferometer for Passive Atmospheric Sounding (MIPAS B2).

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Water vapour in the stratosphere is very important because of its role in the radiative budget and the stratospheric chemistry. Understanding the mechanisms of entry of water into the stratosphere and the possible trends is thus of great concern. As the main part of troposphere to stratosphere transport occurs through the tropical tropopause, a strong focus has recently been given to studies of the tropical transition layer (TTL). Different processes of water transport trough the TTL into the lowermost stratosphere have been debated, especially the role of convection. The isotopic composition of water vapor is valuable for studying the transport pathways of water from the troposphere to the stratosphere. However isotopic measurements are difficult and have led to contradictory observations. New observations are needed to provide a consistent picture of the processes controlling water entry into the stratosphere.

Two balloon campaigns were conducted at Teresina (Brazil, 5°S, 42°W) on June, 14^{th} 2005 and June, 6^{th} 2008, at different QBO phases. Several vertical profiles of H_2O, $H_2^{18}O$ and HDO were retrieved from infrared limb emission spectra measured by the Michelson Interferometer for Passive Atmospheric Sounding balloon-borne instrument MIPAS-B2, from 14 to 37 km. These observations give direct information on the tropical stratosphere, where the "tape recorder" effect caused by the annual cycle of water entry in the stratosphere is observed. This effect is also visible in the mean δD profile. TTL observations can also be used to study the water transport to the stratosphere during one season. They show a good consistency with a temperature-controlled transport of water (Rayleigh fractionation) and provide no sign of any significant convective transport.