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## High-precision isotope measurements of $\text{H}_2^{16}\text{O}$ , $\text{H}_2^{17}\text{O}$ , $\text{H}_2^{18}\text{O}$ , and the $\Delta^{17}\text{O}$ -anomaly of water vapor in the southern lowermost stratosphere

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**Abstract.** We report the first high-precision measurements of  $\delta^{18}\text{O}$  and  $\Delta^{17}\text{O}$  at high southern latitudes that can resolve changes in the isotopic composition of water vapor in the lowermost stratosphere and upper troposphere. A strong increase of  $\delta^{18}\text{O}$  with decreasing mixing ratio above the tropopause is evident in the data. Since also the water vapor mixing ratio decreases above the tropopause, the effect seen in the isotope data can be explained by mixing of moist air from the tropopause with dry stratospheric air. However, the source of this dry stratospheric air is not known; both fast transport from the extratropical tropopause or mixing with air from the dehydrated polar vortex are likely. The magnitude of the  $\Delta^{17}\text{O}$ -anomaly (departure from mass-dependent fractionation (MDF)) was below 2 per mil for each datapoint, and a zero anomaly in lower level stratospheric water vapor is possible. Various transport histories for the stratospheric data are discussed based on the mixing ratio and isotope data.

▣ [Final Revised Paper](#) (PDF, 318 KB) ▣ [Discussion Paper](#) (ACPD)

**Citation:** Franz, P. and Röckmann, T.: High-precision isotope measurements of  $\text{H}_2^{16}\text{O}$ ,  $\text{H}_2^{17}\text{O}$ ,  $\text{H}_2^{18}\text{O}$ , and the  $\Delta^{17}\text{O}$ -anomaly of water vapor in the southern lowermost stratosphere, Atmos. Chem. Phys., 5, 2949-2959, 2005. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)

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