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MIPAS observations of the ozone isotope effect

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Stratospheric ozone is highly (5-15 %) enriched in the stable isotopes $^{17}\mathrm{O}$ and $^{18}\mathrm{O}$ compared to atmospheric O_2. Moreover, this enrichment does not follow the usual mass dependent fractionation law, but has a so-called mass independent signature where both heavy isotopes are approximately equally enriched. Presented here are satellite observations of the enrichments of the symmetric and asymmetric isotopomers of $^{50}\mathrm{O}_3$, taken with the MIPAS high-resolution ($\Delta\nu = 0.035\ \mathrm{cm}^{-1}$) spectrometer onboard Envisat. These observations extend to altitudes that previous measurements carried out by balloon experiments could not reach, while the global coverage of the data ensures that meaningful seasonal and zonal means can be derived.

The retrieved MIPAS enrichments show satisfactory agreement in both magnitude and vertical trends with balloon observations where available. The satellite observations provide data on isotopic composition up to altitudes of 55 km, well beyond the extent of balloon data. Trends in different latitude bands are also visible. The MIPAS ozone isotope data provide a valuable addition to the in-situ and balloon based remote sensing data on the ozone isotope effect.