Geophysical Research Abstracts, Vol. 9, 08709, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08709

Odin-SMR measurements of water isotopologues in the stratosphere: An update

P. Eriksson (1), J. Urban (1), **M. Ekström** (1), Y. Kasai (2) and D.P. Murtagh (1)

(1) Department of Radio and Space Science, Chalmers University of Technology, Sweden (patrick.eriksson@chalmers.se) (2) National Institute of Information and Communications Technology, Tokyo, Japan

Water vapour is a key constituent of the stratosphere. For example, it is the main source for HO_x radicals, contributes to the cooling by longwave emission and is critical for the formation of polar stratospheric clouds. In addition, there exist indications on that the stratosphere has become more humid over a time period of 50 years, with possible large consequences for ozone depletion and climate change. Observations of the ratio between the most abundant water vapour isotopologue (H2O) and other less abundant ones (HDO, H2O-18, H2O-17 . . .) can help to understand these issues, but relevant measurement data sets are of limited size, especially for global studies.

The Odin-SMR observation bands cover transitions of the four most abundant water vapour isotopologues, though not simultaneously. The "water isotope" observation mode is scheduled for roughly one day per week, where H2O and H2O-18 are measured every second orbit using a band around 488.9 GHz. A rapid re-tuning to 490.4 GHz is made for intervening orbits, to also observe HDO and some ozone isotopologues. A second receiver measures (during all "isotope" orbits) a strong transition at 556.9 GHz, which enables H2O retrievals between about 40 and 100 km. Finally, H2O-17 is measured at roughly monthly intervals in a band around 552.0 GHz.

The most interesting data on water vapour isotopologues are obtained through the 488 and 490 GHz bands. The analysis of data from these bands has so far been hampered for several reasons. Two important problems have now been resolved. Firstly, two bugs in the level 0 to 1 processing have been found (specific for these bands) and resolved. Secondly, an improved characterisation of the sideband filtering has been established. This was achieved by a combination of careful analysis of atmospheric spectra and dedicated measurements using astronomical sources. These improvements have extended the available data set considerable, and decreased the systematic retrieval error significantly. The new results are presented and compared to both measurement and model data sets, and the implication of the results with respect to physical processes is discussed.