



Odin/SMR Observations of Water Vapour and its Isotopes in the Middle Atmosphere

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Water vapour, a strong greenhouse gas, plays an important role for the dynamics of the middle atmosphere. As a reservoir of HO_x , it is also linked to many chemical processes like the natural destruction of ozone.

In order to improve our knowledge of the amount and variability of water in the middle atmosphere, the Sub-Millimetre Radiometer (SMR) on board the Odin satellite, launched in February 2001, observes several thermal emission lines of water vapour in the 486-581 GHz spectral range from the Earth's limb.

A band around 489 GHz is used to study water vapour and its isotopes, on the basis of 4 observation days per month. Vertical profiles of H_2O -16, H_2O -18, and HDO are retrieved between roughly 20 and 70 km in the stratosphere and mesosphere. A strong water vapour line at 557 GHz is simultaneously measured in a second band, providing information in the mesosphere and lower thermosphere between about 40 and 100 km. Measurements of H_2O -17 at 551 GHz in monthly intervals complete the picture of middle atmospheric water vapour provided by Odin. The unique and original measurements of the isotopes HDO, H_2O -18, and H_2O -17 in the 20-70 km altitude range allow to study the isotopic depletion / enrichment of water, potentially supplying information on the origin of stratospheric water vapour: transport of tropospheric air through the tropical tropopause layer (TTL) vs in-situ chemical production by methane oxidation.

Odin is a Swedish-led satellite project funded jointly by Sweden (SNSB), Canada (CSA), Finland (TEKES) and France (CNES).