Additional MAS/GRAS informations

The MAS Follow-on concept and the addition of GRAS

The Millimeter-wave Atmospheric Sounder (MAS) a remote sensing experiment has been successfully flown with three NASA Space shuttle missions. G. K. Hartmann has been the Principal Investigator (PI) of the **M**illimeter Wave **A**tmospheric **S**ounder (**MAS**) experiment, which as a joint enterprise of Germany, Switzerland, and the USA and has been flown as core payload of the NASA ATLAS (Atmospheric Laboratory for Applications and Science) Space Shuttle Missions (ATLAS-1 (1992), ATLAS-2 (1993), ATLAS-3 (1994); Millimeter-wave radiation emitted by the atmosphere in the height range between 10 km and 100 km has been measured at 61, 62, 63, 183, 184, and 204 GHz. MAS yields information about the altitude profile of temperature (T), and pressure (P) as well as for water vapour, ozone, and chlorine monoxide in the stratosphere, and mesosphere, in the latitude range between 72 degree northern and southern latitude for an orbit inclination of the Shuttle of 57 degrees. Chlorinemonoxid plays the major role in the catalytic, anthropogenic ozone destruction in the stratosphere. The MLS experiment – similar to MAS – however, on the UARS satellite, and MAS were the first that could measure chlorine monoxid globally from space and thus contributed very essentially to the investigation of the polar stratospheric ozone holes. Now the water vapour results reach almost equal importance.

The MAS-GRAS sensor combination

A realistic simulation study investigating joint retrieval based on both MAS data and GRAS (GPS/GLONASS Receiver for Atmospheric Sounding) radio occultation data has been performed by MPAe, IGAM (Graz) and IFe (Bremen). It showed that this allows to achieve very favourable accuracy of temperature profiles of the Earth's atmosphere, i.e. this method – combined with a so called assimilation of model based data - presents hitherto the most efficient data validation. Thus a combination of a MAS Follow-on experiment – i.e., a modified MAS with second generation radiometers, electronics, and a star sensor – together with a GRAS receiver on the EXPRESS Pallet of the International Space Station (ISS) is highly recommended. This would allow to obtain not only more accurate temperature and water vapour profiles but also provide simultaneously liquid water data below 17 km. All these quantities are very important for climatological research.