

Seminar über Microwave Physics and Atmospheric Physics

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Titel: Development and application of microwave radiometers for the study of the stratosphere–mesosphere

The Jilin University research team has experience developing and using microwave radiometry methods to investigate the stratosphere–mesosphere processes, including sudden stratospheric warmings and planetary waves. In collaboration with Chalmers University (Sweden) and the Institute of Radio Astronomy (Ukraine), the microwave radiometer (MWR) RSO3CO-120-1 (Radiometer System for observation O₃ and CO – 120 GHz) was designed, produced, and successfully installed in 2020 in Jilin University. The microwave radiometer is the double-sideband, frequency-switched 110.8/115.3 GHz heterodyne receiver system for simultaneous spectral observations that allow investigating vertical profiles of CO and O₃ atmospheric gases and wind data in the upper stratosphere and mesosphere. The results of the MWR measurements in Changchun show the consistency in retrieved O₃ and CO distribution with satellite data. The RSO3CO-120-1 has been operated for four years to create a database for monitoring the O₃ and CO profiles in the upper stratosphere and mesosphere over northeastern China. We compare the simultaneous measurements by microwave radiometer in Changchun and Aura MLS data of ozone and CO volume mixing ratio altitude profiles. This comparison shows the appropriate correspondence of the results for CO measurements with the maximal discrepancy of ~5 ppmv (15%). The MWR profiles have higher time resolution and allow the study of the ozone and carbon monoxide seasonal and interannual variations in the stratosphere and mesosphere.

Further development in this area of research is associated with the design of new microwave devices to improve the RSO3CO-120-1 parameters: the microwave radiometers with cooling front-end 110.8/115.3 GHz (MWR-120-CFE) and 231.3/230.5 GHz (MWR-230-CFE). The results of the O₃ and the CO molecules altitude profiles measured by the ground-based microwave radiometer in combination with satellite observations and reanalyzed data are also discussed.

Zeit: Friday 26.04.2024, 10:15 Uhr

Ort: Room A97
<https://unibe-ch.zoom.us/j/97081325603?pwd=d0ozME5xOS9pQVNxallLem81VHQyZz09>
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