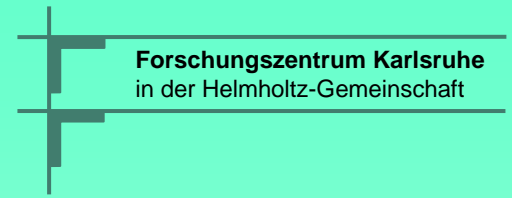




Institutet för rymdfysik  
Swedish Institute of Space Physics



Universität Karlsruhe (TH)



Forschungszentrum Karlsruhe  
in der Helmholtz-Gemeinschaft

# Microwave Observations of the Atmosphere at Kiruna, Sweden

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<sup>1</sup>Institut für Meteorologie und Klimaforschung, Forschungszentrum Karlsruhe und Universität Karlsruhe

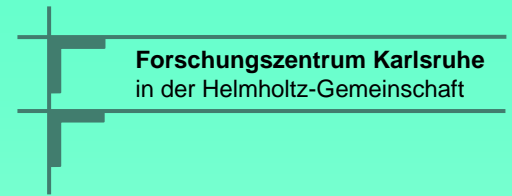
<sup>2</sup>Institutet för rymdfysik, IRF, Kiruna



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## Outline

- the microwave instrument at IRF Kiruna
- ozone measurements
- tropospheric water vapour columns
- outlook



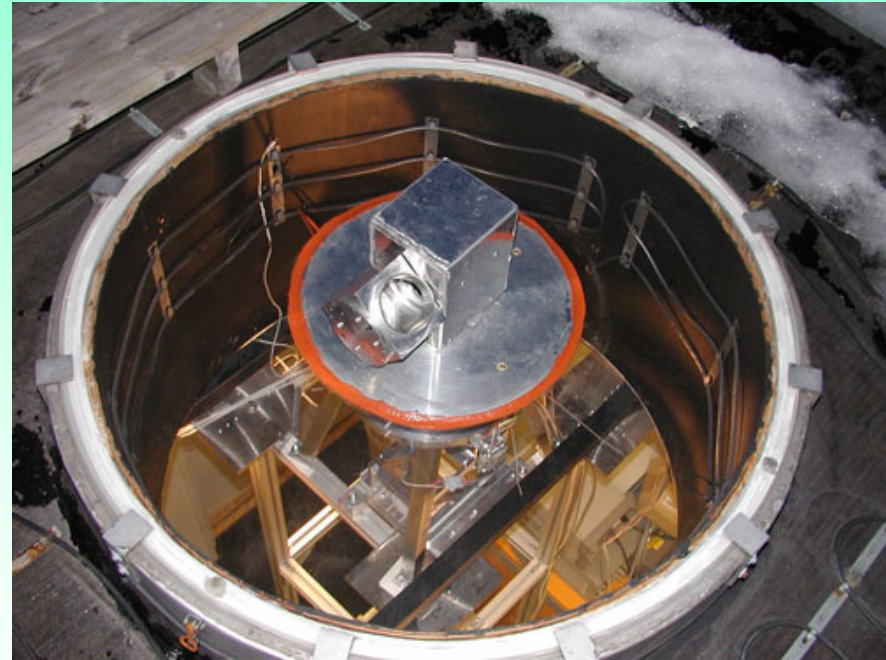
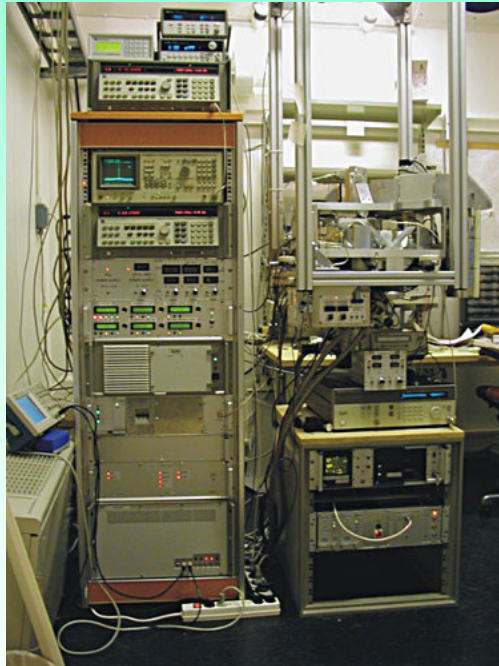
# Geographical Location of Kiruna



# The Kiruna Microwave Radiometer KIMRA at IRF Kiruna (67.84°N, 20.41°E, 425 m), Sweden

**KIMRA (195-224 GHz)**

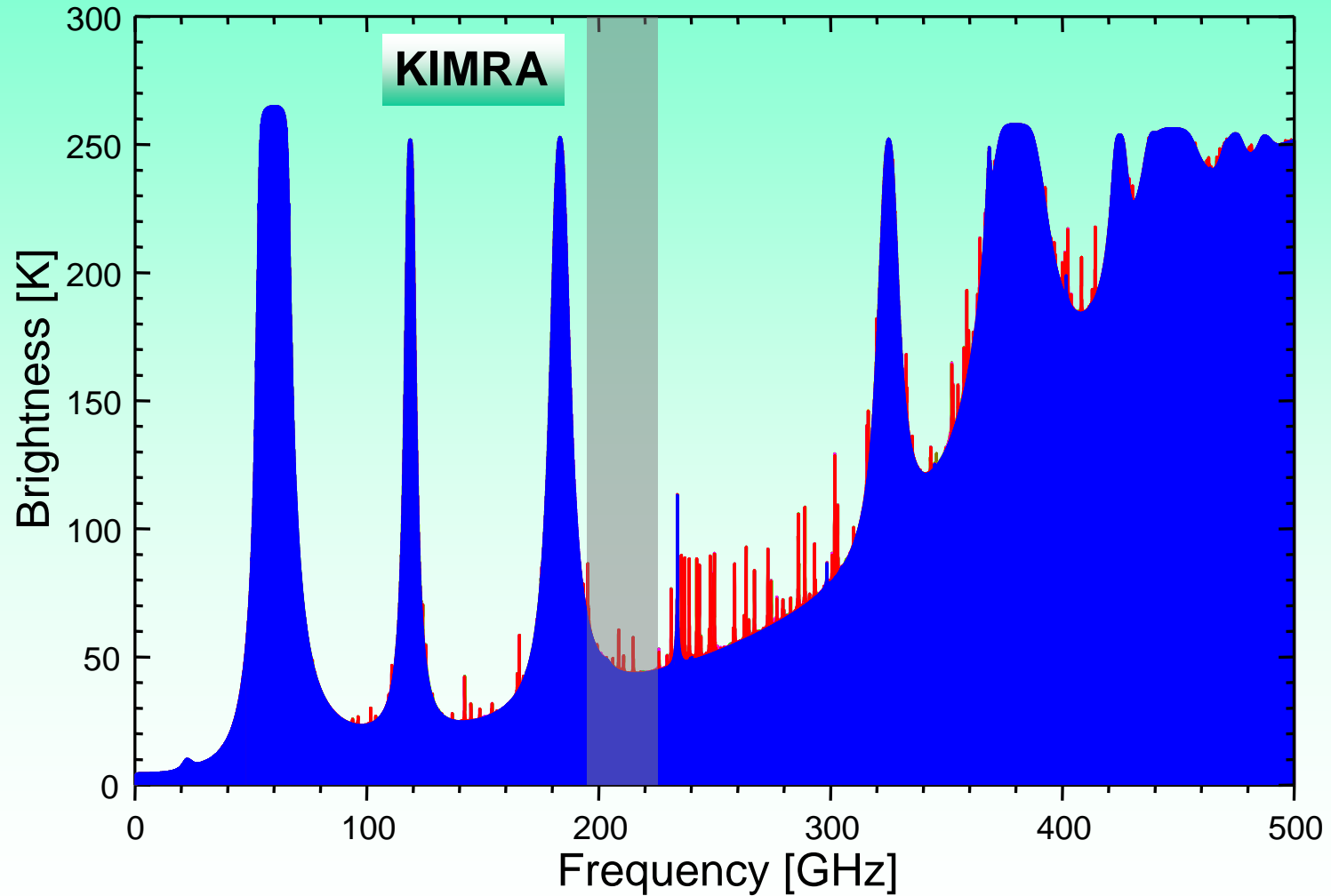
**The Periscope of KIMRA**



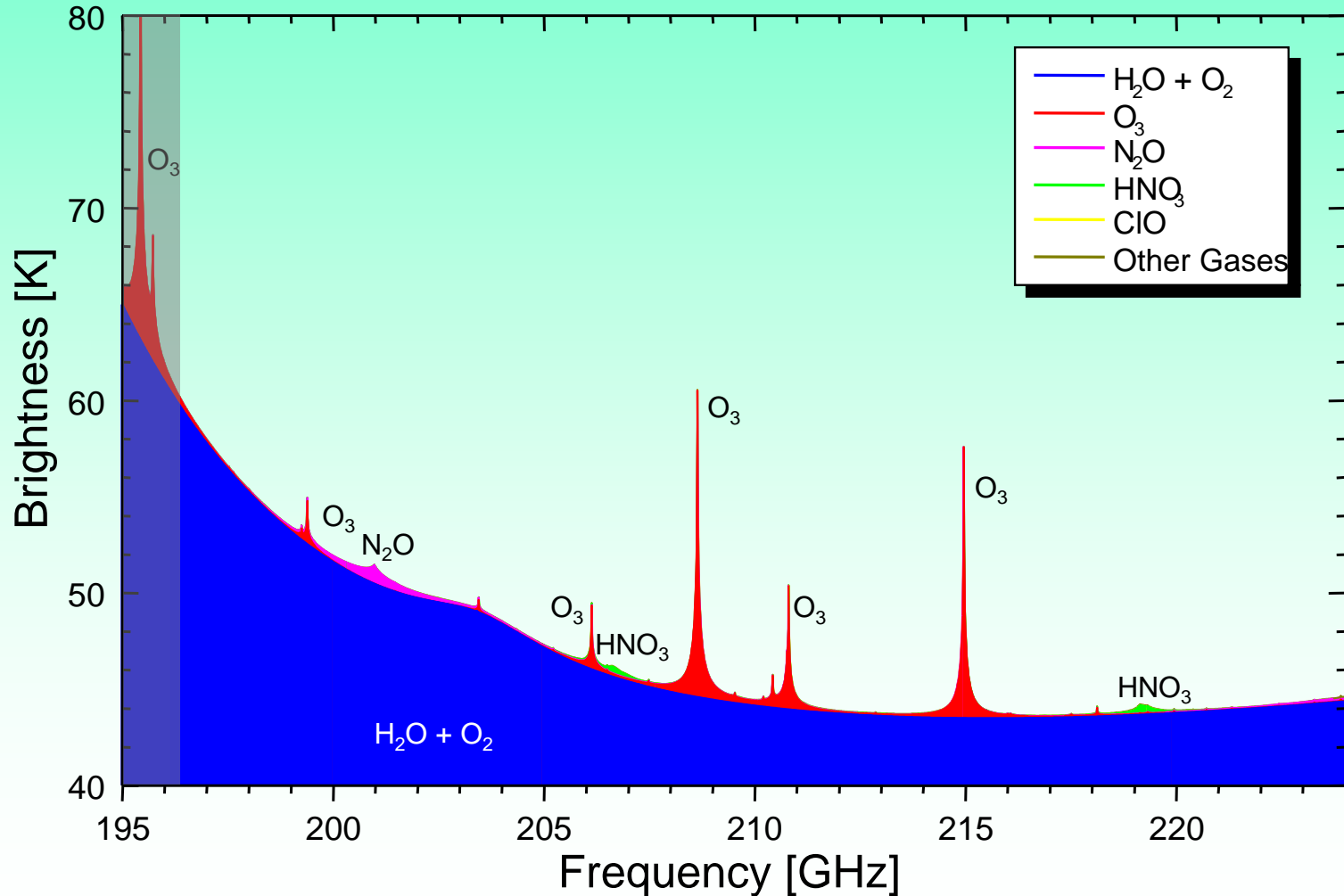
trace Gases:  $O_3$ , (also  $N_2O$ ,  $ClO$ ,  $HNO_3$  covered by the instrument)

begin of the measurements: spring 2002

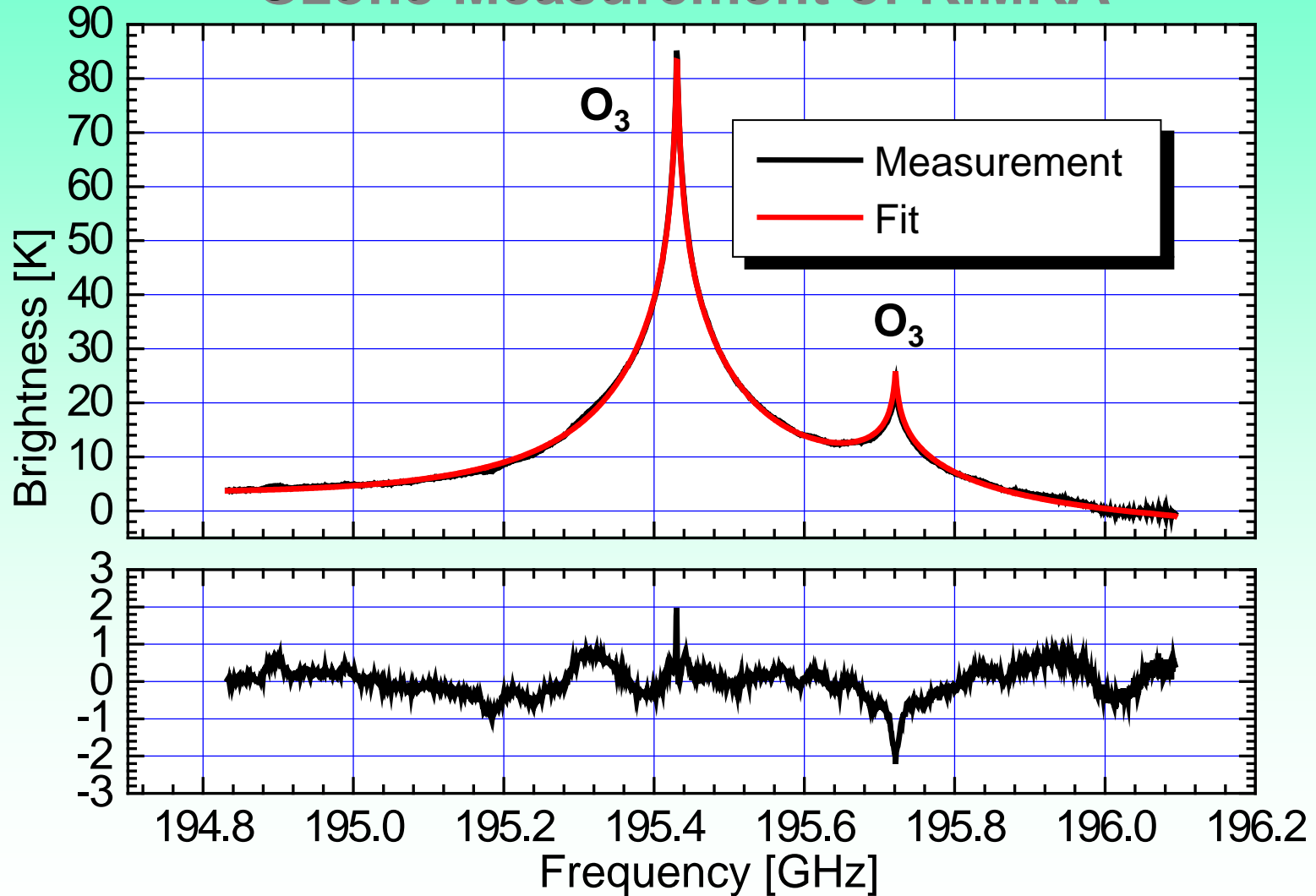
# The Spectral Range 0-500 GHz as Seen From Ground

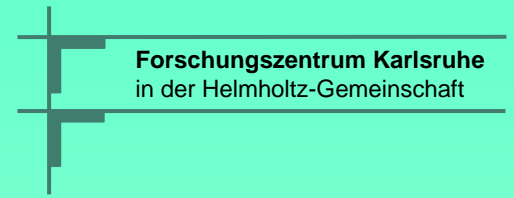
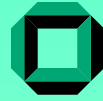


# The Spectral Range 195-224 GHz as Seen From Ground

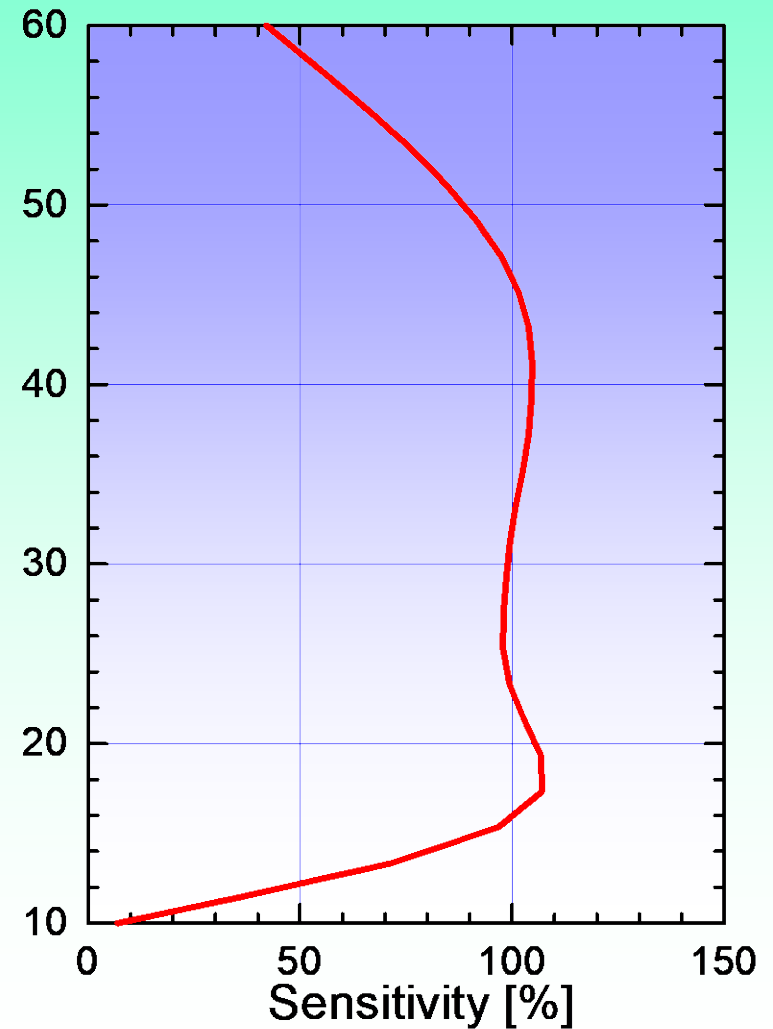
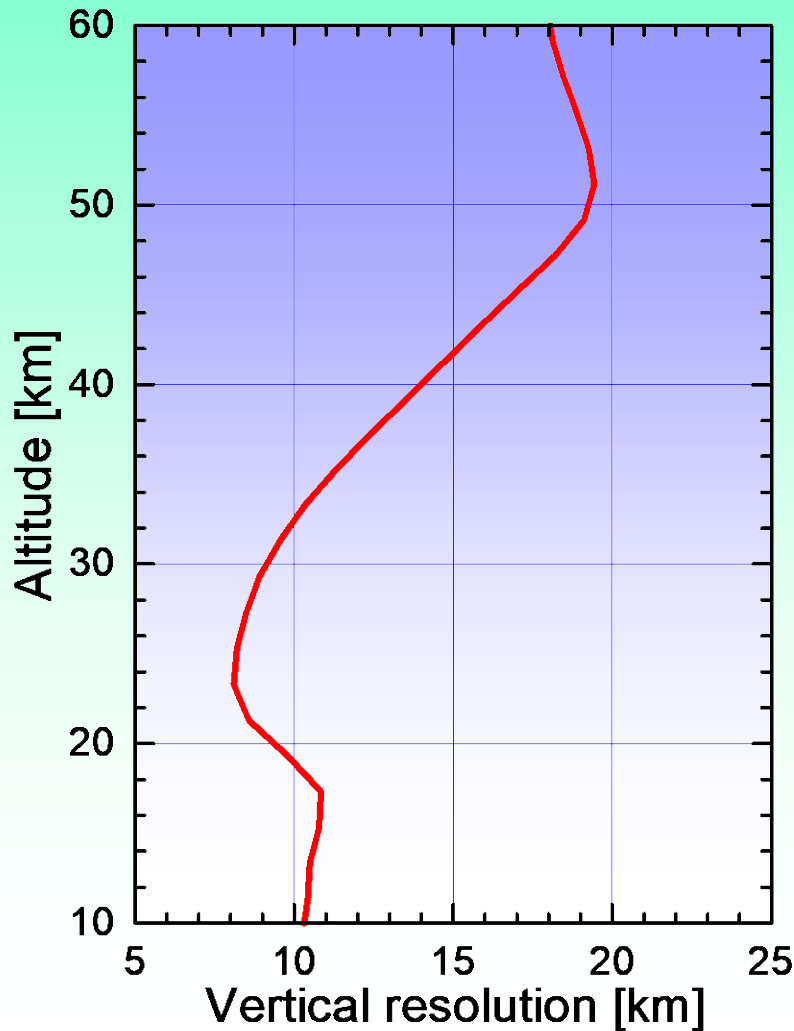


## Ozone Measurement of KIMRA





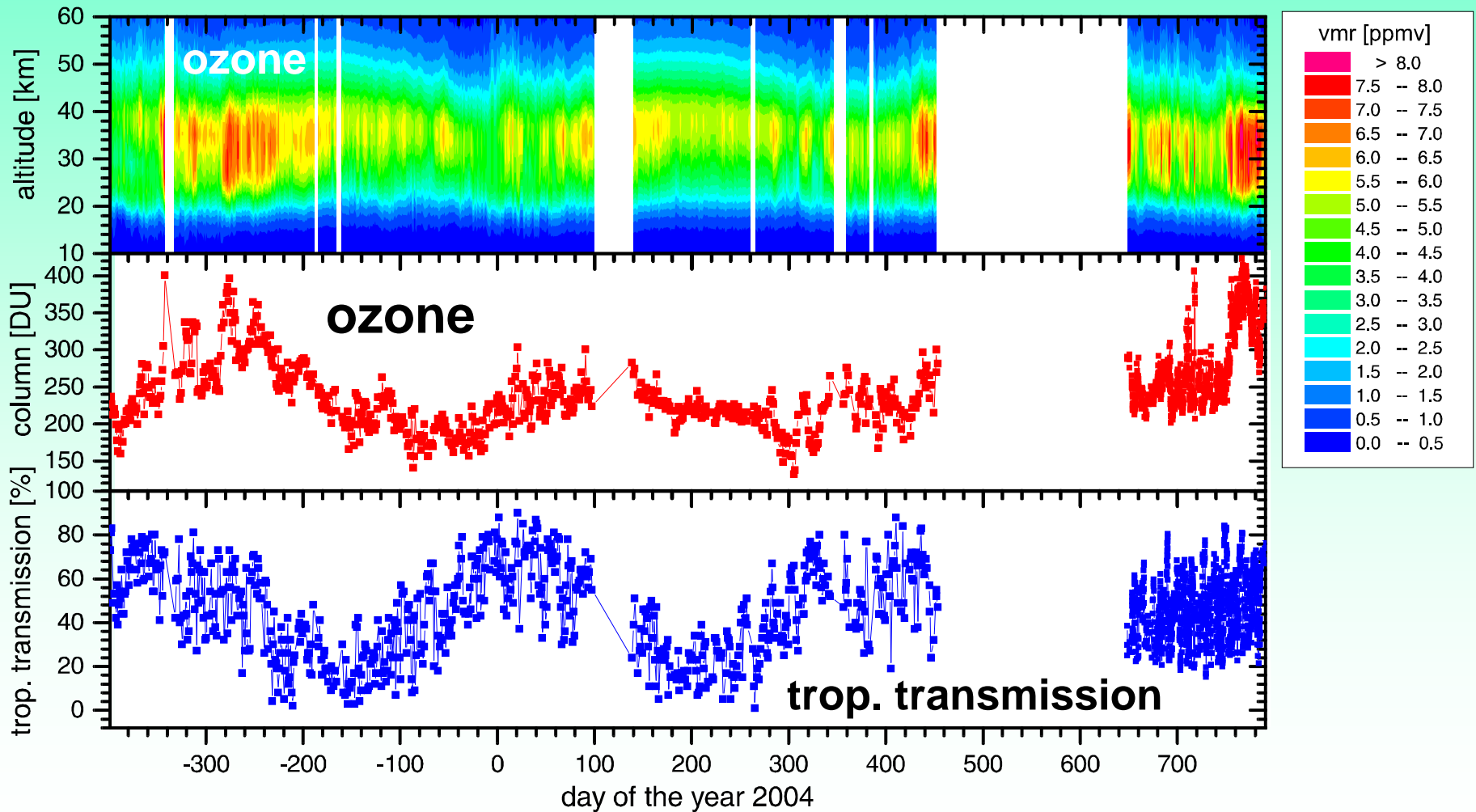
## Vertical Resolution and Sensitivity of the Retrieved Profiles

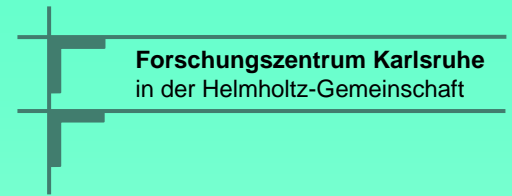




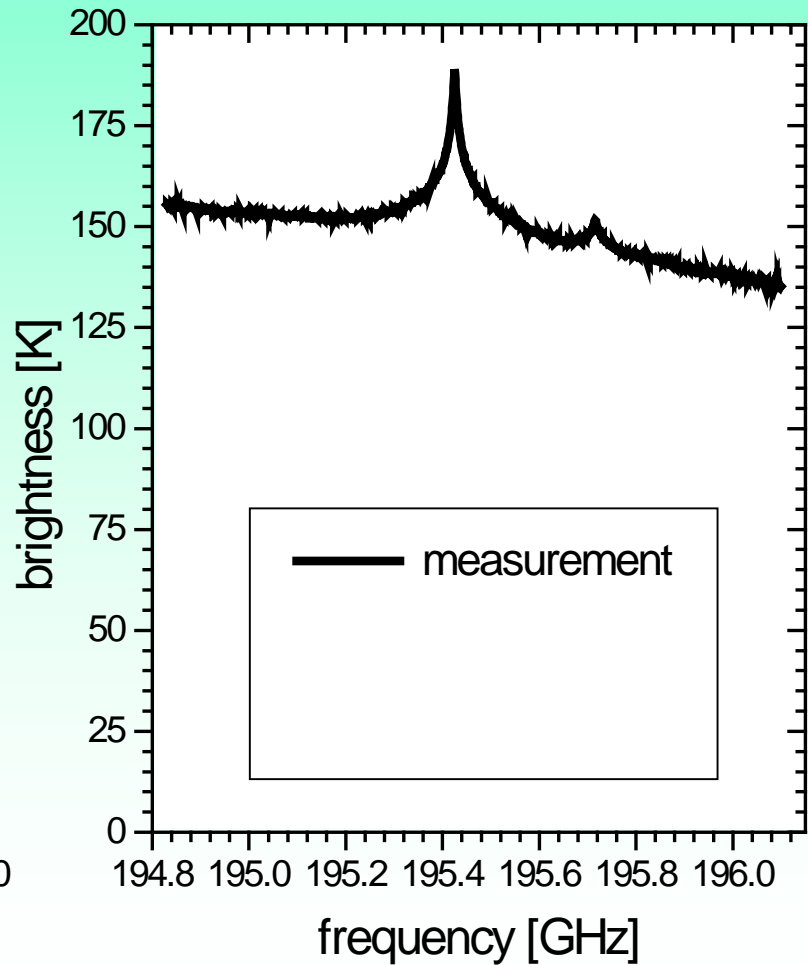
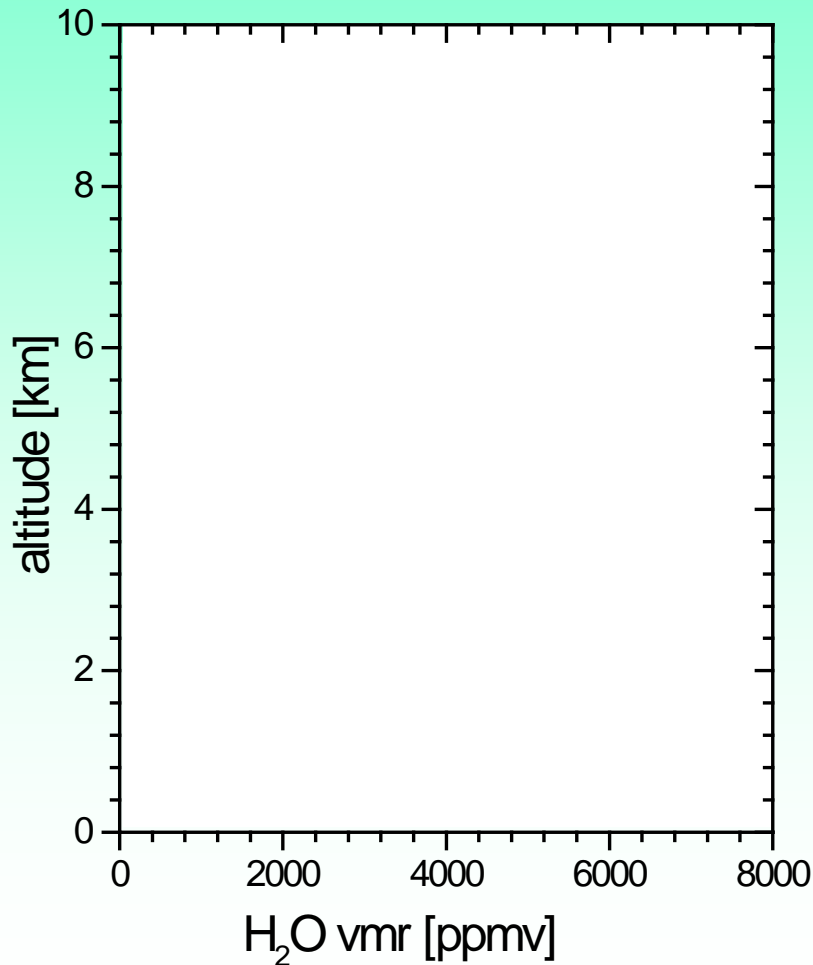


# Measurement Results of KIMRA at IRF Kiruna between 28 November 2002 and 30 March 2006

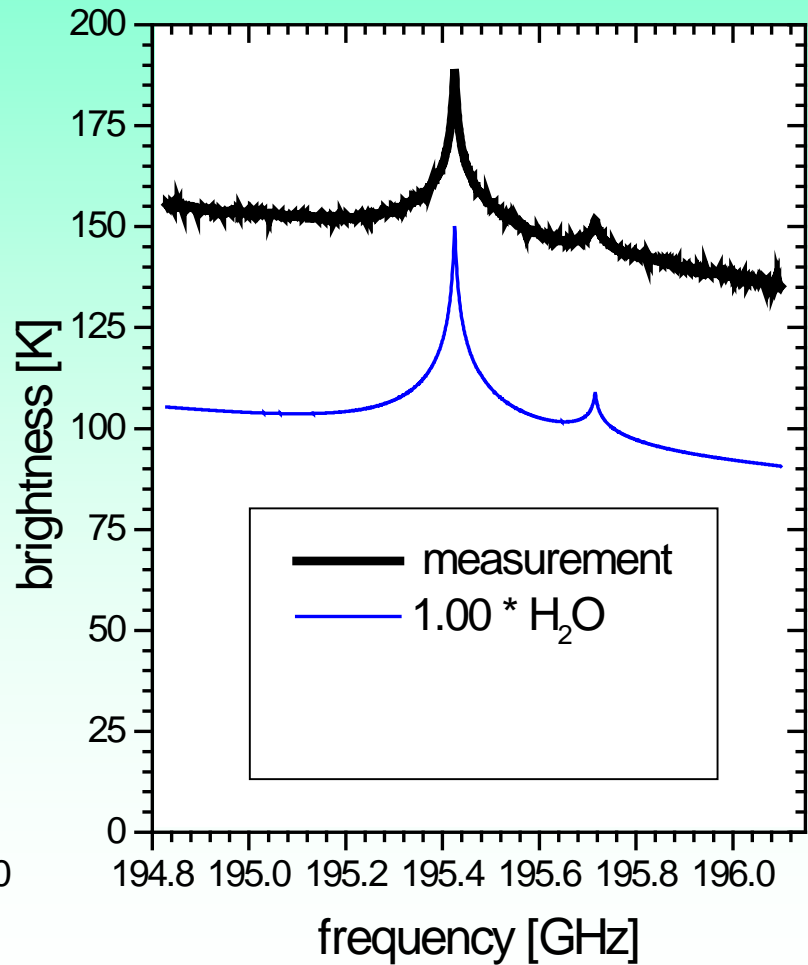
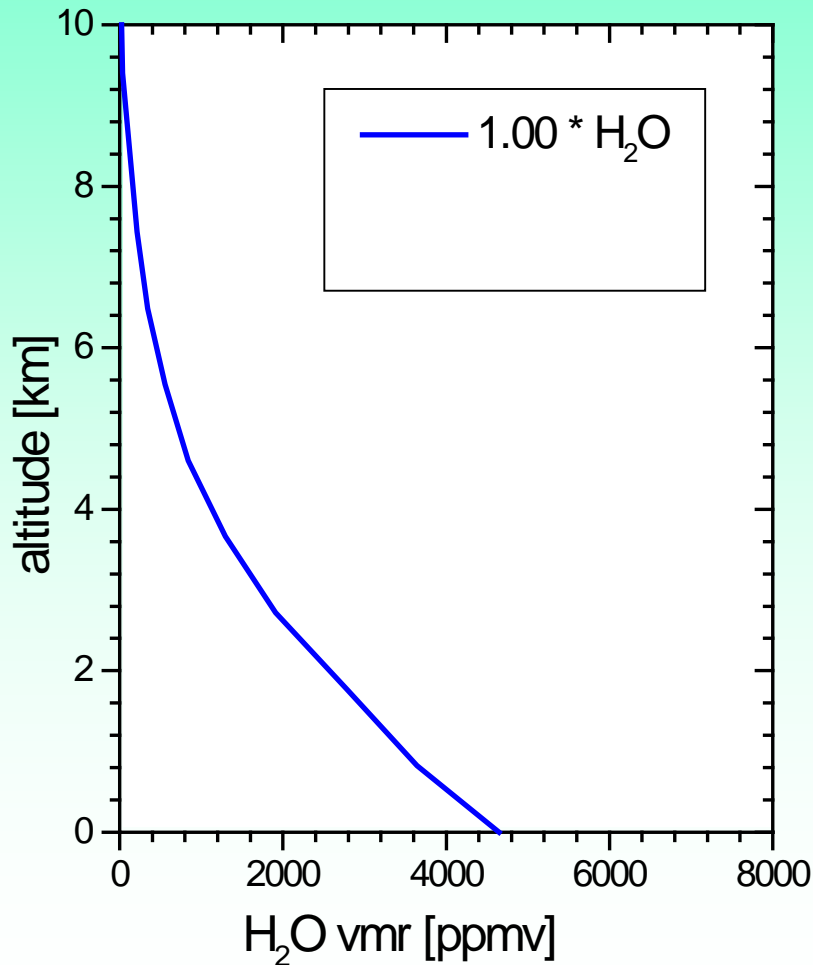




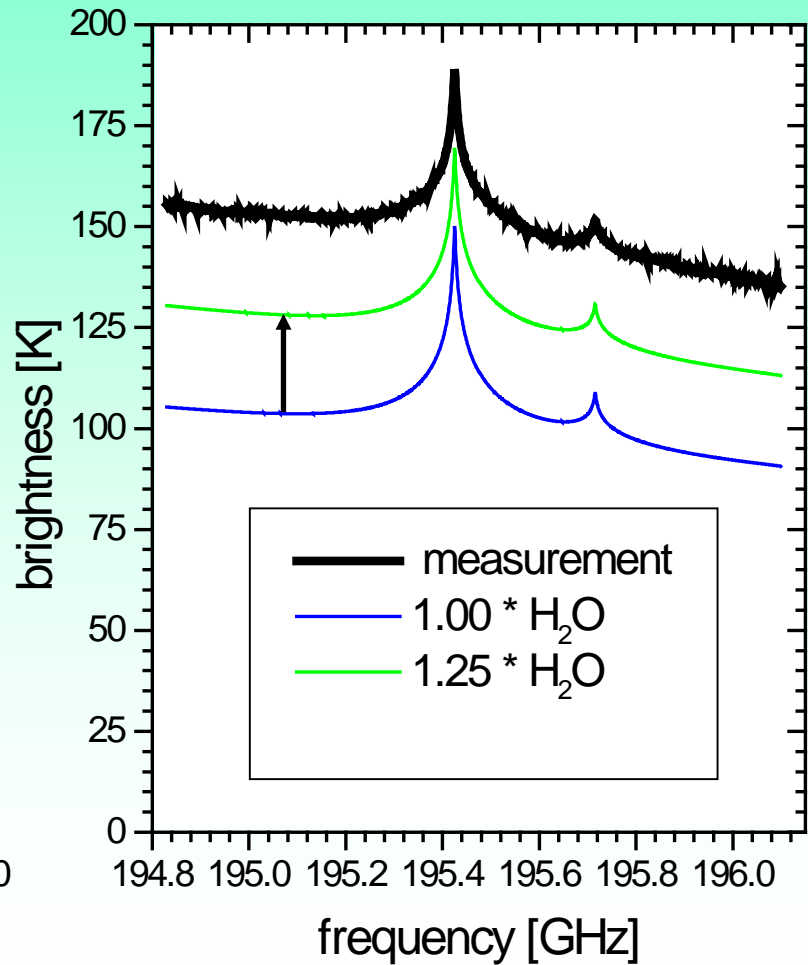
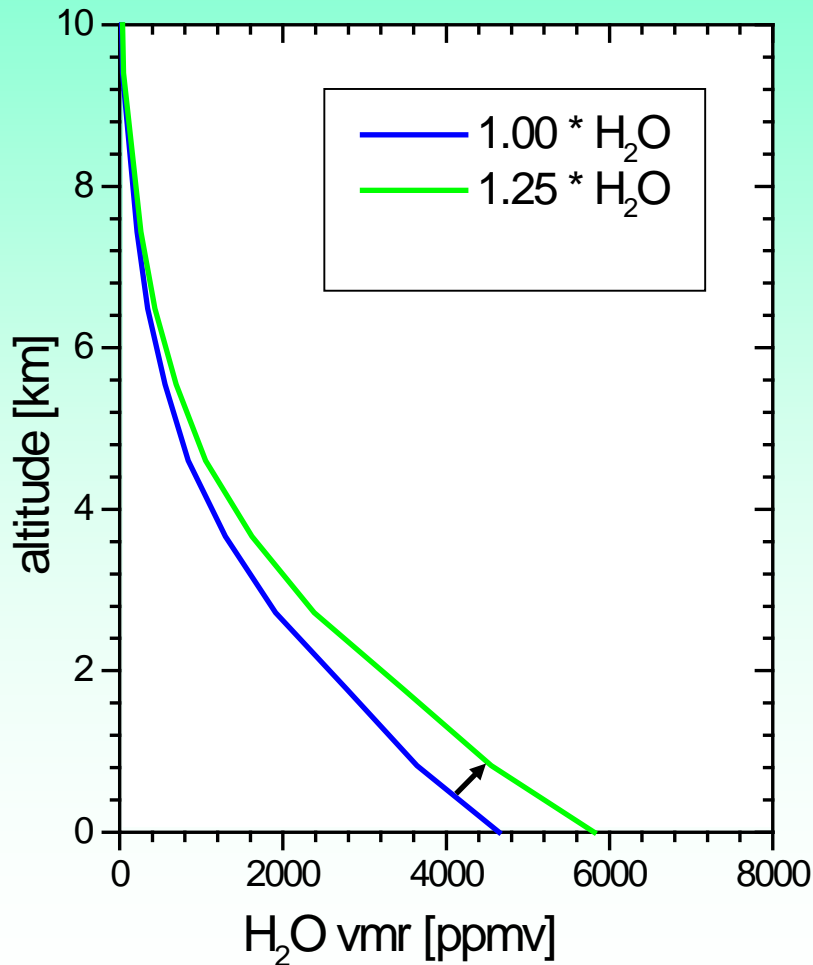
# Retrieval of Tropospheric H<sub>2</sub>O Column Densities from KIMRA Ozone Measurements



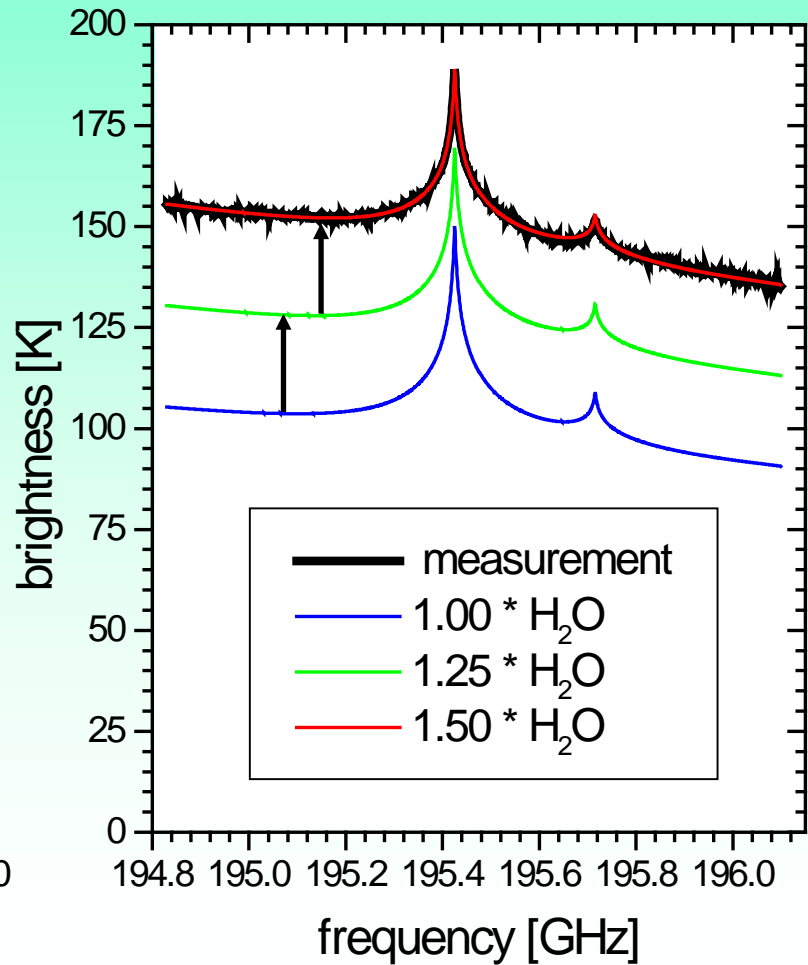
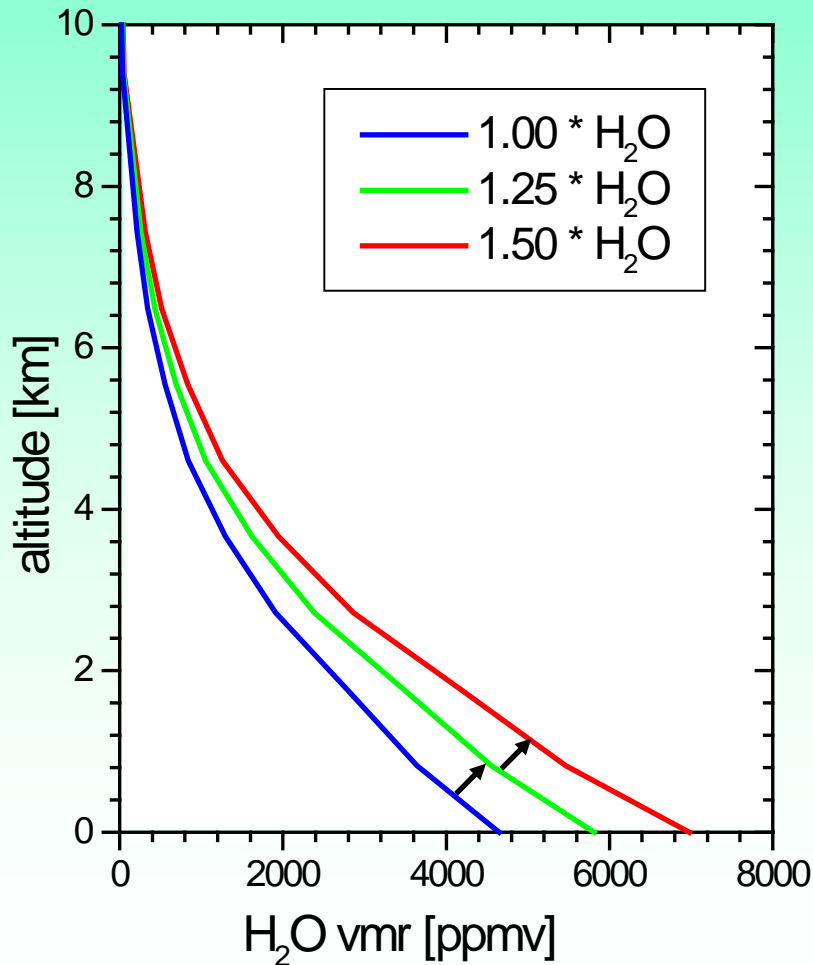
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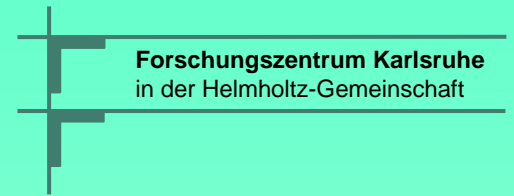


# Retrieval of Tropospheric H<sub>2</sub>O Column Densities from KIMRA Ozone Measurements

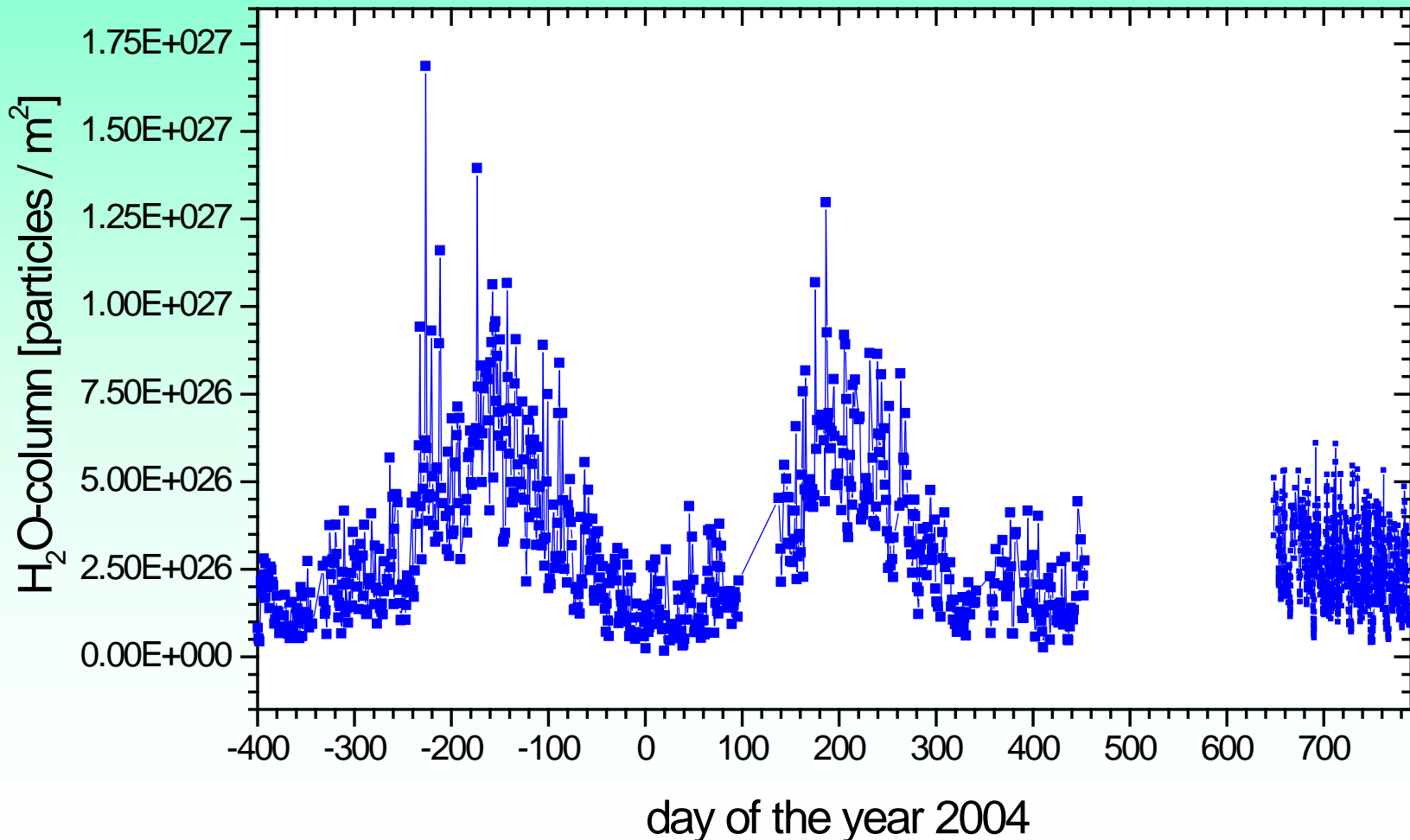


# Retrieval of Tropospheric H<sub>2</sub>O Column Densities from KIMRA Ozone Measurements

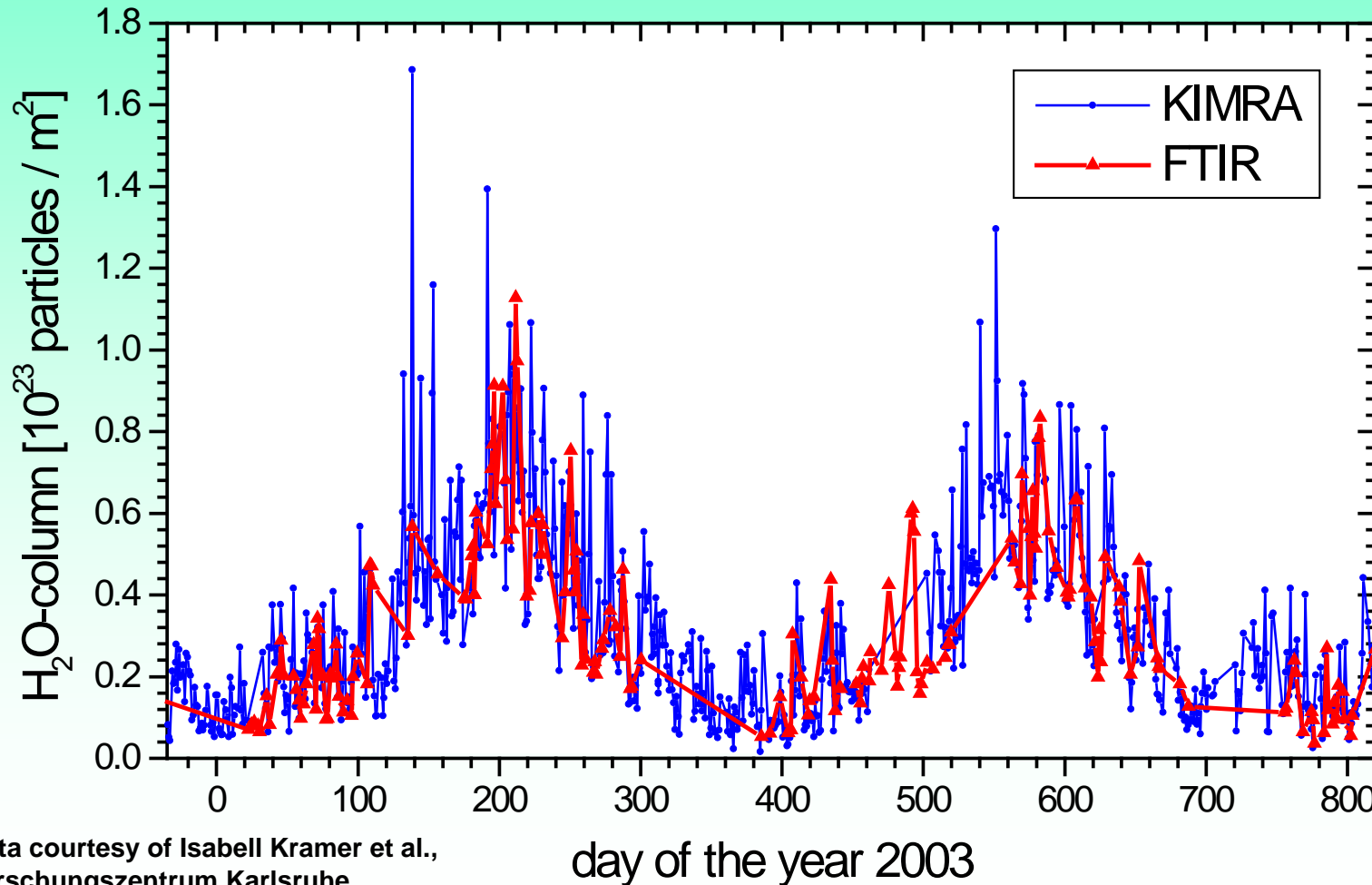




# Tropospheric H<sub>2</sub>O Column Densities as Measured by KIMRA between 28 November 2002 and 30 March 2006

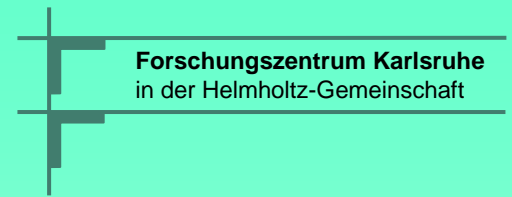


## Comparison of KIMRA and FTIR H<sub>2</sub>O Column Densities as Measured at Kiruna



FTIR-data courtesy of Isabell Kramer et al.,  
IMK, Forschungszentrum Karlsruhe

day of the year 2003



## Outlook

- ozone measurements will be continued
- measurements of other trace gases covered by KIMRA
- enhance spectral resolution by a digital FFT analyzer
- new 22-GHz water vapour radiometer at IRF Kiruna?