

# The Ground-Based Millimeter Wave Radiometer MIRA2

Gerhard Kopp, Jochen Groß, Gerd Hochschild, and Rüdiger Lehm

Institute of Meteorology and Climate Research  
Forschungszentrum und Universität Karlsruhe, Germany

- instrument description
- campaigns, validation
- the **M**érida **A**tmospheric **R**esearch **S**tation (MARS)

## Description of MIRA2

### System Characteristics

IF:	2,1 GHz +/- 500 MHz
Receiver Noise Temperature (SSB):	750 K
Mixer:	Whisker contacted Shottky Diode Mixer
Physical Mixer Temperature:	30 K

### Quasioptics

Beam Waist Radius ( $w_0$ ):	10 mm
Apertures:	$2 \cdot w_0$
Diplexer:	Fabry-Pérot
Single Sideband Filter:	Martin Pupplett

### Acousto Optical Spectrometer (AOS)

Number of Channels:	2048
Bandwidth:	1 GHz
Frequency Resolution:	1.2 MHz



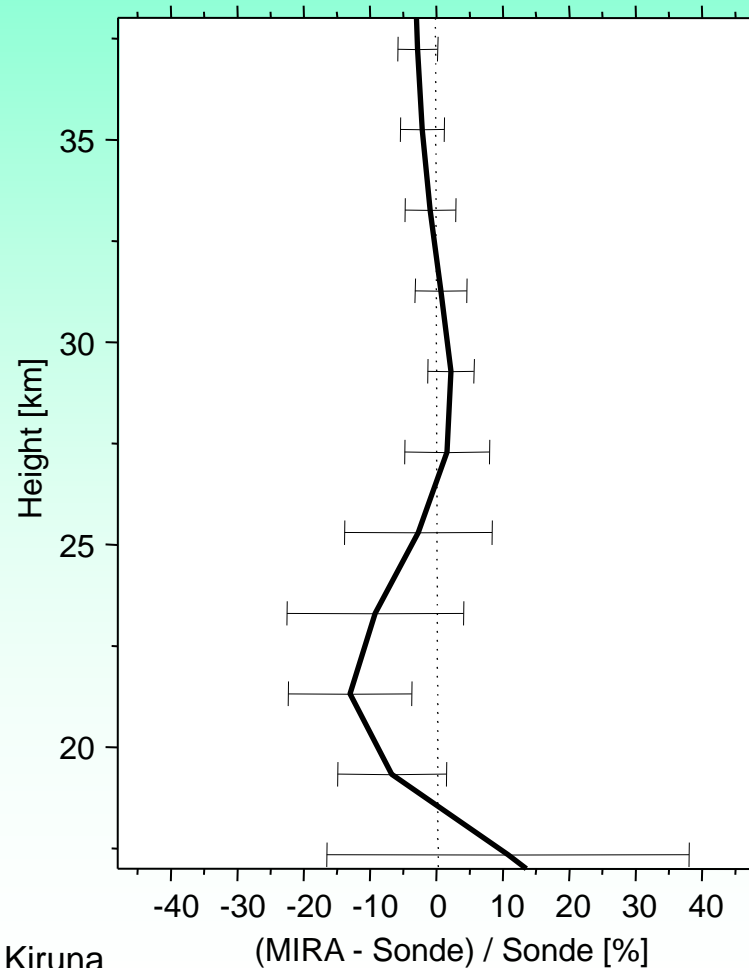
## Former Campaigns

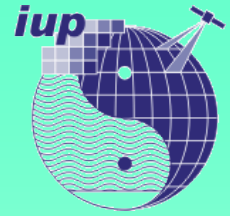
- February – April 1996: Kiruna (67.84°N, 20.41°E, 425 m ASL, Sweden)
- March/April 1997: Ny-Ålesund (78.9°N, 11.9°E, 9 m ASL, Swalbard)
- January – April 1998: Kiruna (Sweden)
- February – March 1999: Kiruna (Sweden)
- Nov. 1999 - March 2000: Kiruna (Sweden, THESEO 2000)
- Dec. 2000 - March 2001: Kiruna (Sweden)
- February - July 2003: Zugspitze (47.4°N, 11°E, 2650 m ASL, Germany)

## Comparison of Ozone Profiles as Measured by MIRA2 at Kiruna in Winter 2000 with Sonde Measurements

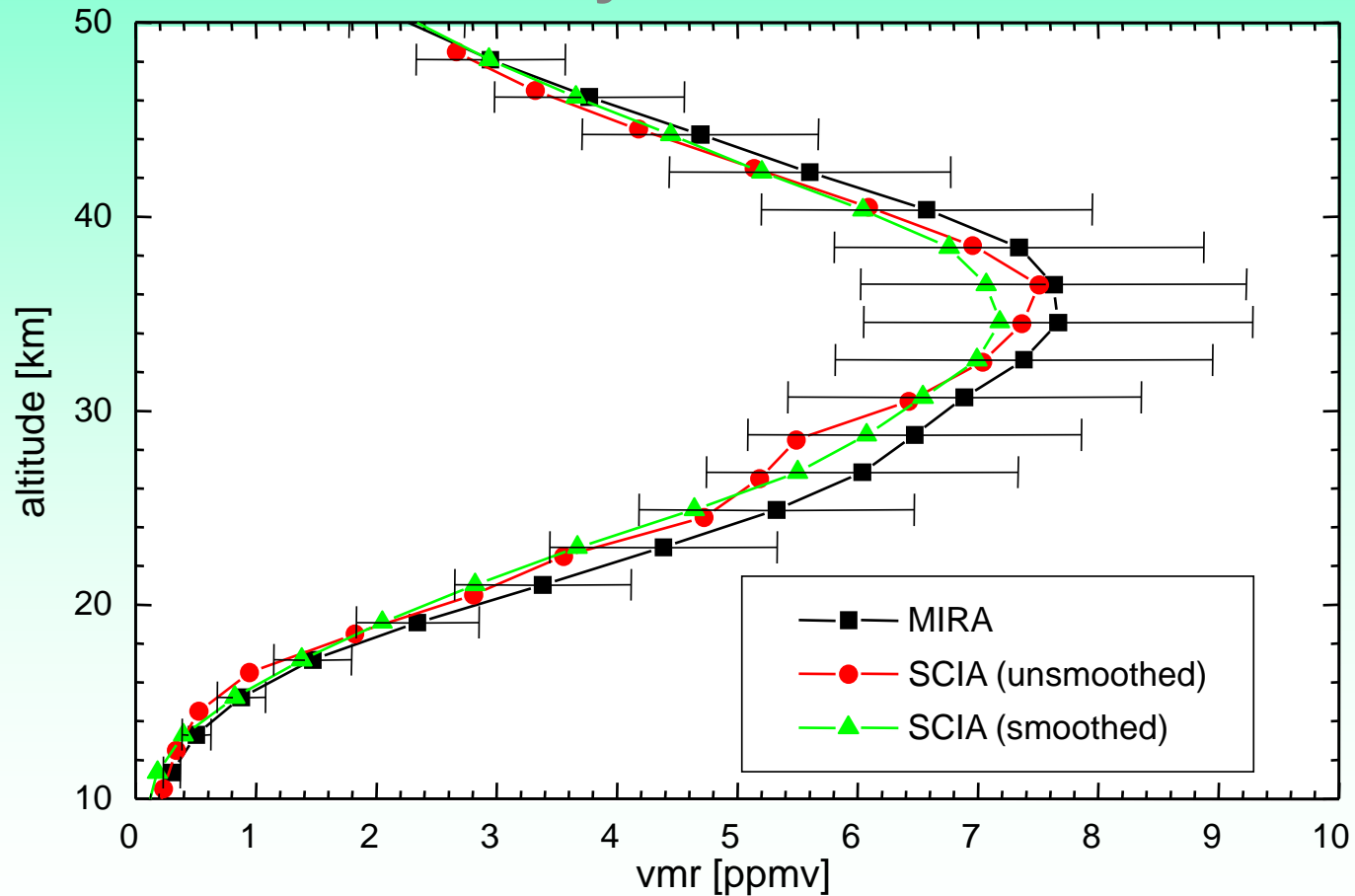
- **Nine coincident measurements between 22 January and 17 March 2000**

**Sonde profiles smoothed to MIRA resolution**

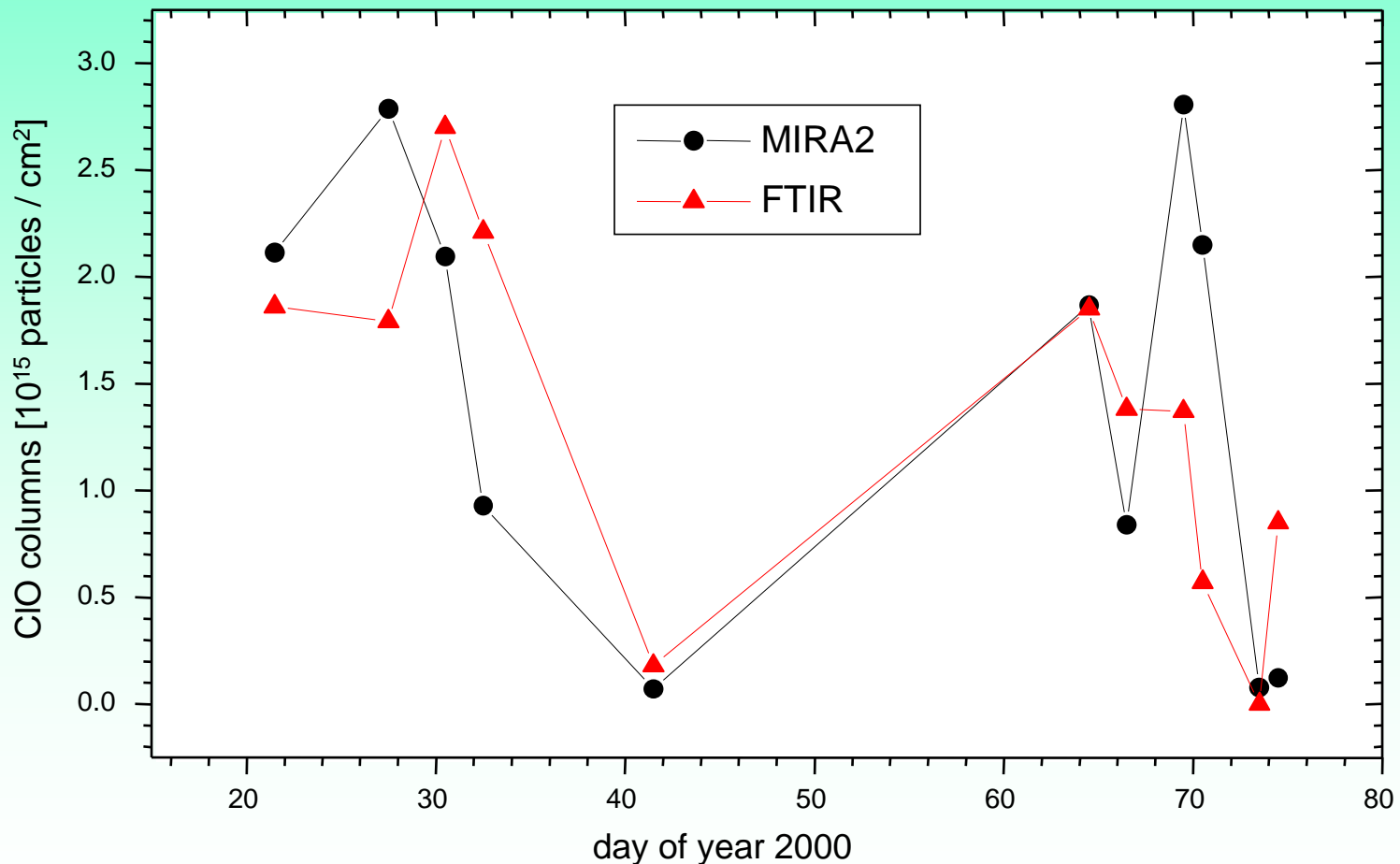




# Ozone of 10 March 2003 over the Zugspitze as measured by SCIAMACHY and MIRA

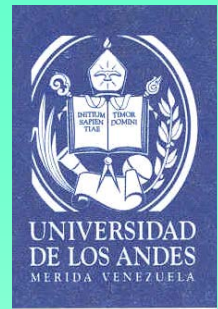


# Comparison of ClO Column abundances as measured by FTIR and MIRA2 at Kiruna in 2000



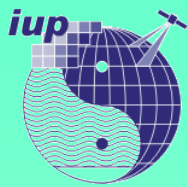


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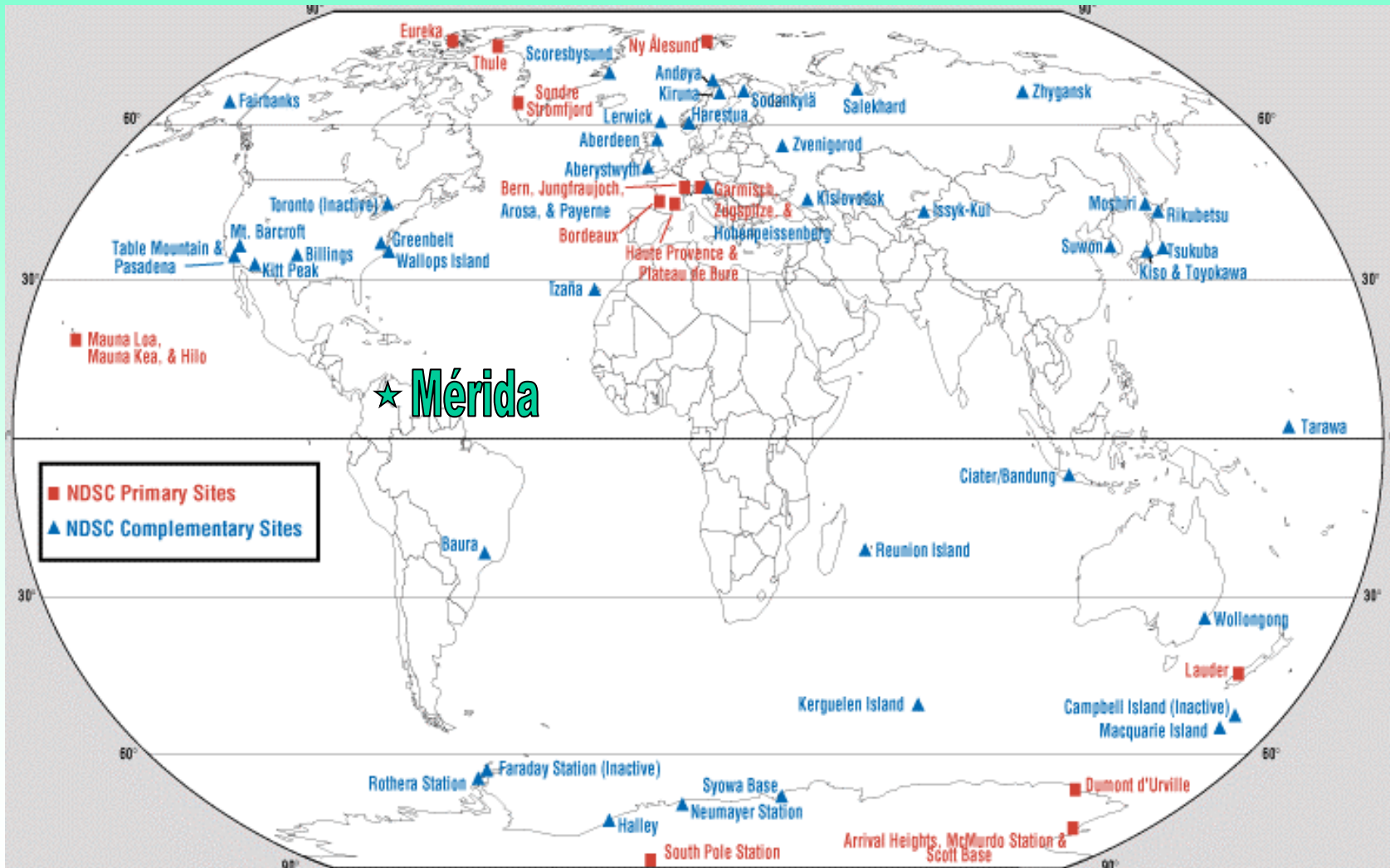
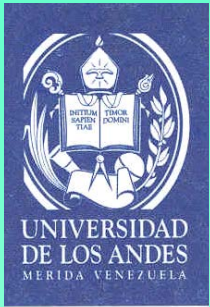


# Mérida Atmospheric Research Station (MARS)

8°N, 71°W, 4765 m asl



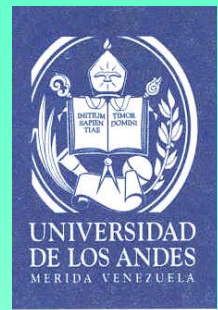
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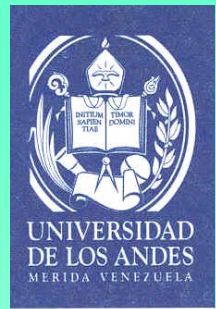


## Situation in April 2001





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## Situation 28/03/2004





## Station facilities provided by the Forschungszentrum Karlsruhe

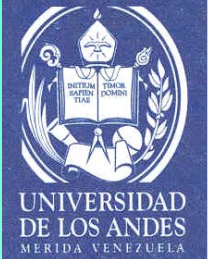


- New mains power connection
- Mains at 220 V
- WLAN connection
- UPS
- Improved insulation and heating
- Webcam





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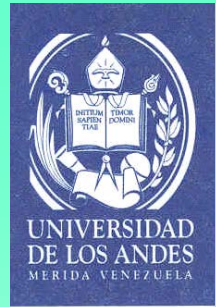


## Northern front of the MARS building





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# The Webcam on Pico Espejo





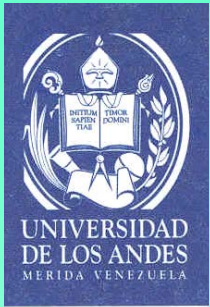
## Meteorological station

- Ultrasonic Wind Obs.
- Speed and direction
- Precipitation
- Air temperature
- Air pressure
- Global Positioning System for precipitable water vapor columns



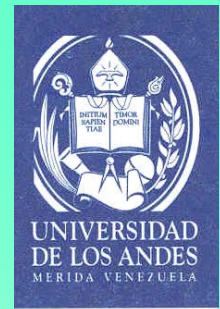


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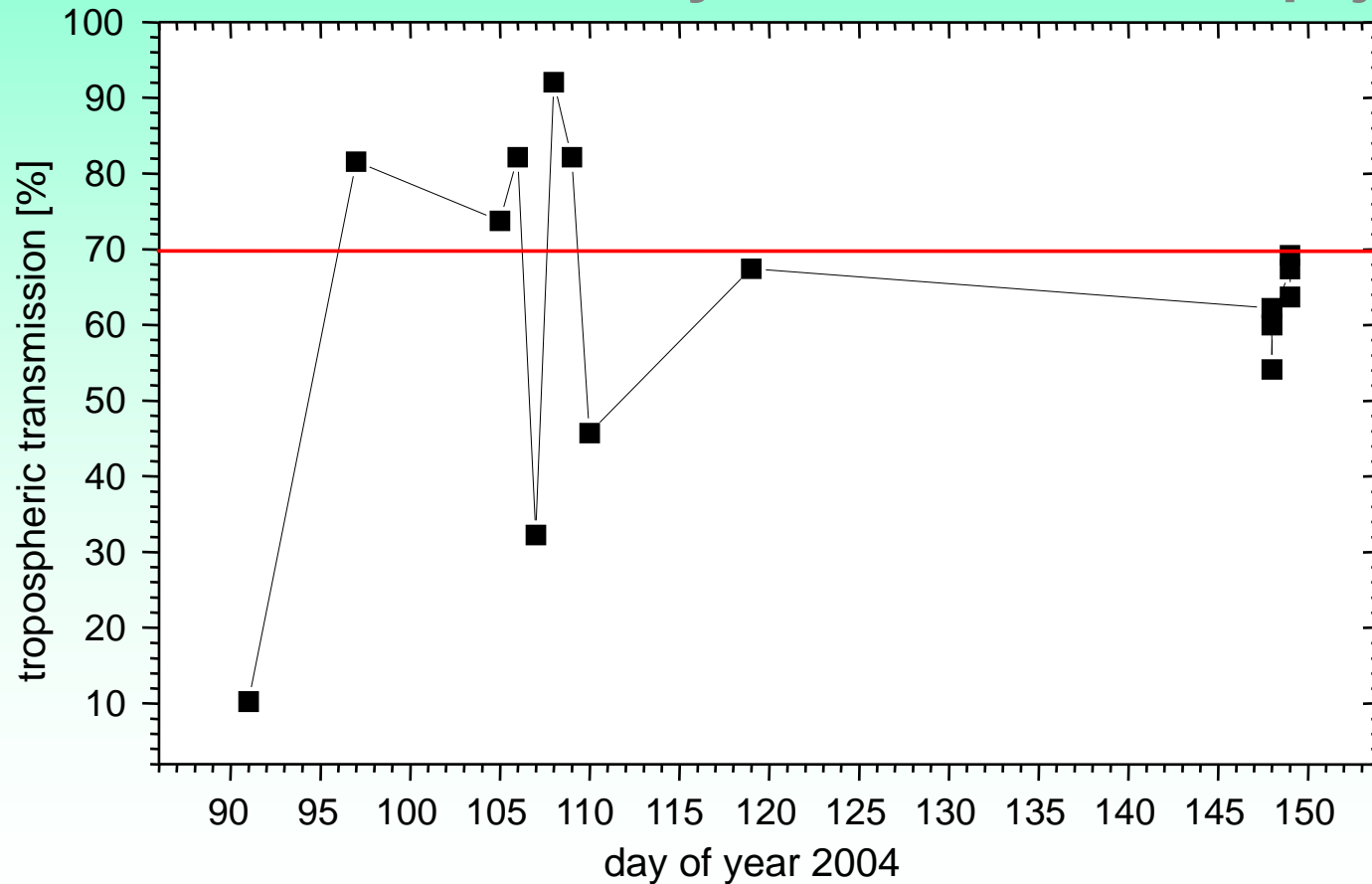


## MIRA2 in the MARS building

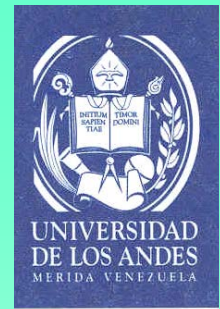




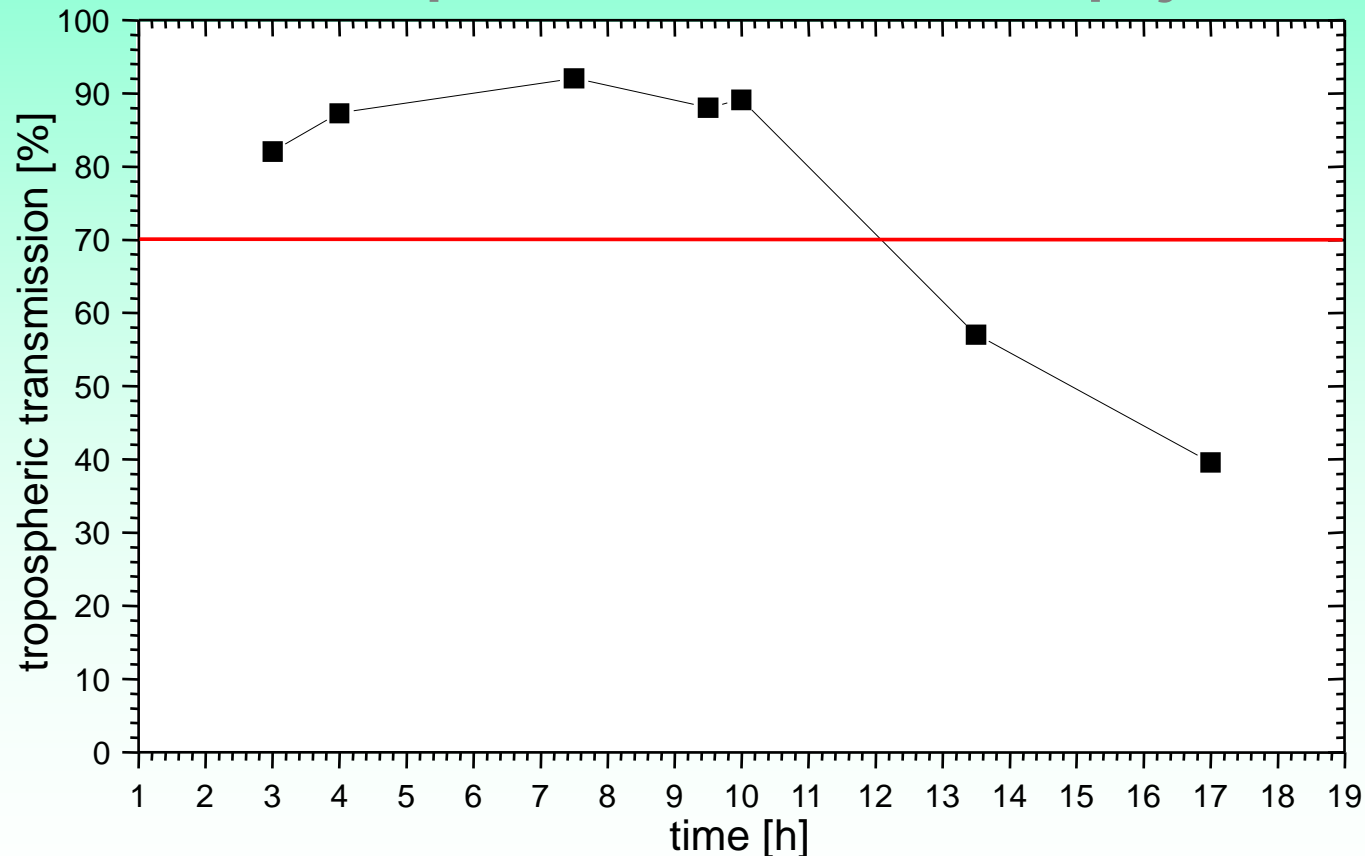
## Tropospheric Transmission between 31 March and 28 May 2004 over Pico Espejo





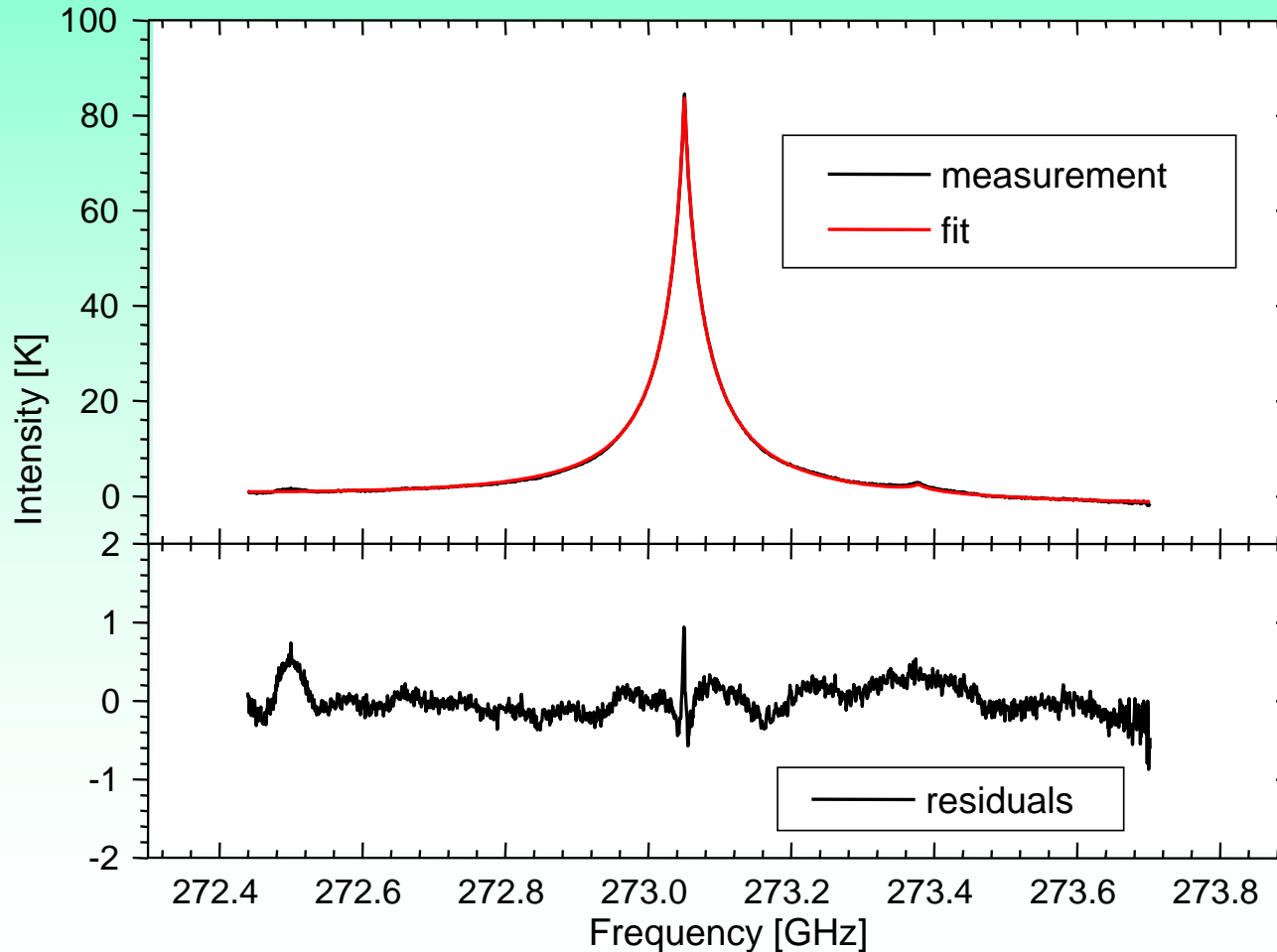


# Tropospheric Transmission on 17 April 2004 over Pico Espejo



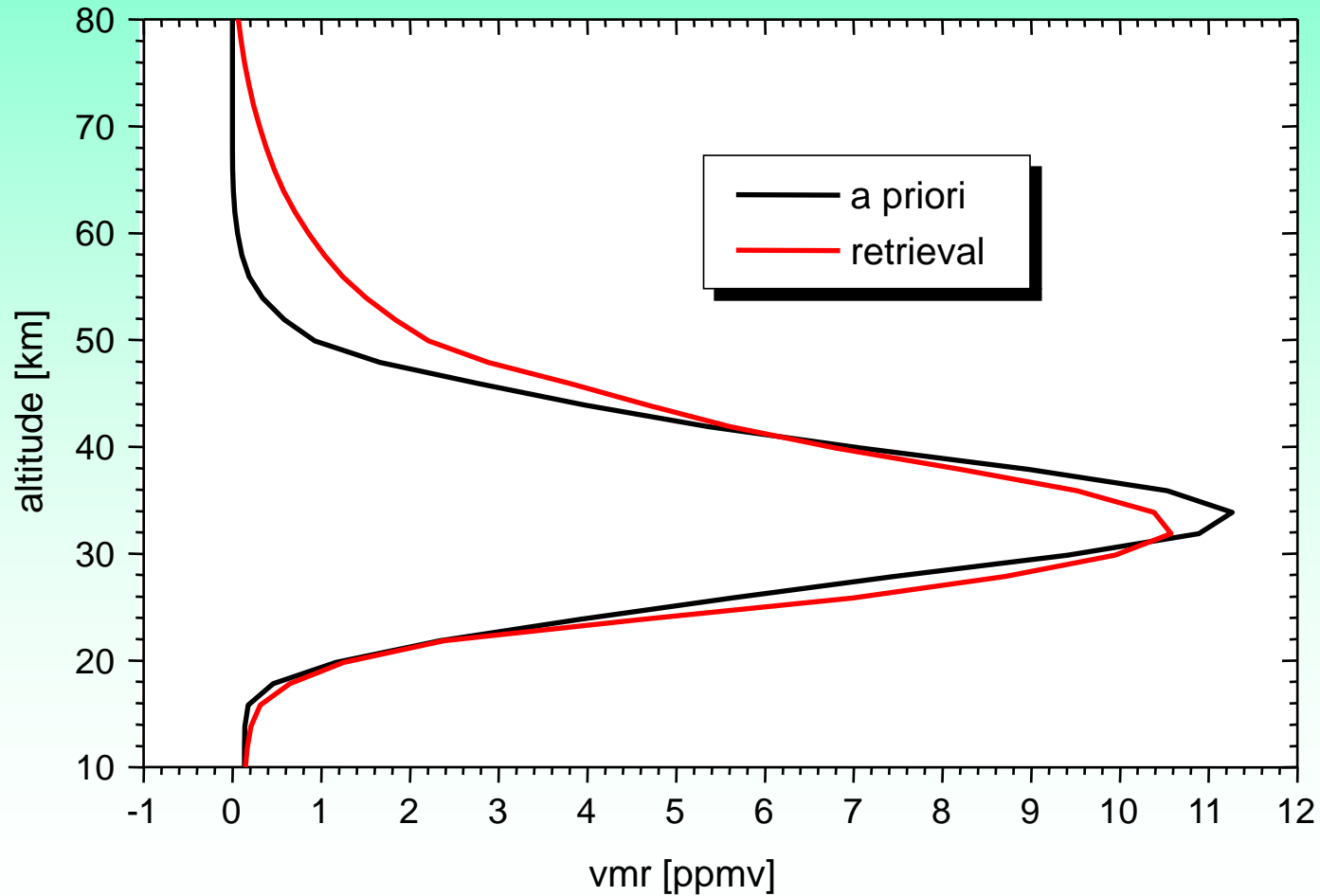


# Ozone Measurement of 28 May 2004 at MARS



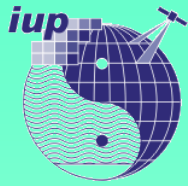


## Ozone Measurement of 28 May 2004 at MARS





The  
**Water vapor**  
**Radiometer for**  
**Atmospheric**  
**Measurements**  
**(WaRAM, 22GHz,**  
**IUP, University of**  
**Bremen) in the**  
**MARS building**



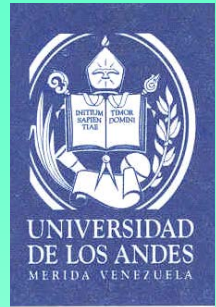
# The DOAS instrument of the IUP, University of Bremen, on Pico Espejo







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## Status of MARS

- **MIRA, WaRAM, DOAS, GPS, and meteorological station are installed**
- **Some minor problems concerning power supply and network connection**
- **First results of MIRA look very promising**