

Microwave Observations of the Atmosphere at Merida, Venezuela

G. Hochschild¹, E. Diez y Riega², S. Golchert³, J. Gross¹,
P. Hoffmann², G. Kopp¹, K. Künzi³, J. Notholt³

¹Institut für Meteorologie und Klimaforschung,
Forschungszentrum Karlsruhe und Universität Karlsruhe

²Universidad de los Andes, Merida, Venezuela

³Institut für Umweltphysik, Universität Bremen

Outline:

- The station on Pico Espejo
- MW radiometer and results
- H₂O radiometer development
- Extension of the Merida station

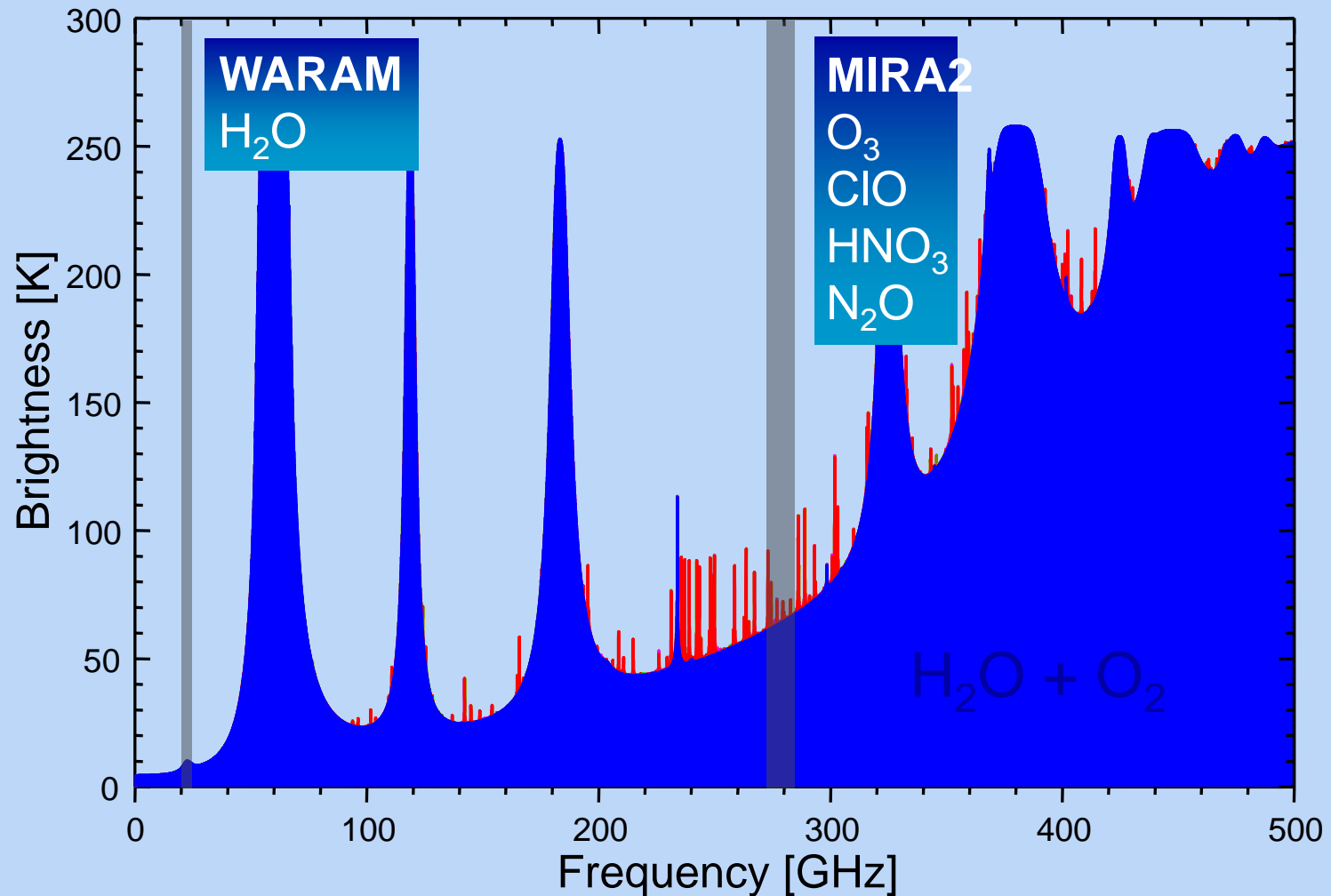
Geographical Location of Mérida



Microwave Radiometers deployed on Pico Espejo

- MIRA2: 268 – 280 GHz; 800 K
 - ClO, O₃, HNO₃, N₂O
 - 1996 – 2001 Kiruna and Ny Alesund
 - 2003 Zugspitze
 - Since 2004 in long-term operation
- WARAM2: 22,235 ± 0,5 GHz; 400 K (IUP)
 - H₂O vap. in the stratosphere
 - 2003 Zugspitze
 - Operational since 2004

The Spectral Range 0-500 GHz as Seen From Ground



Estación Alejandro de Humboldt de Investigación Ambiental de Mérida

Pico Espejo, 8.58°N, 71.15°W, 4765 m asl

Pico Bolivar

Weather station

GPS

DOAS

Ozone monitor



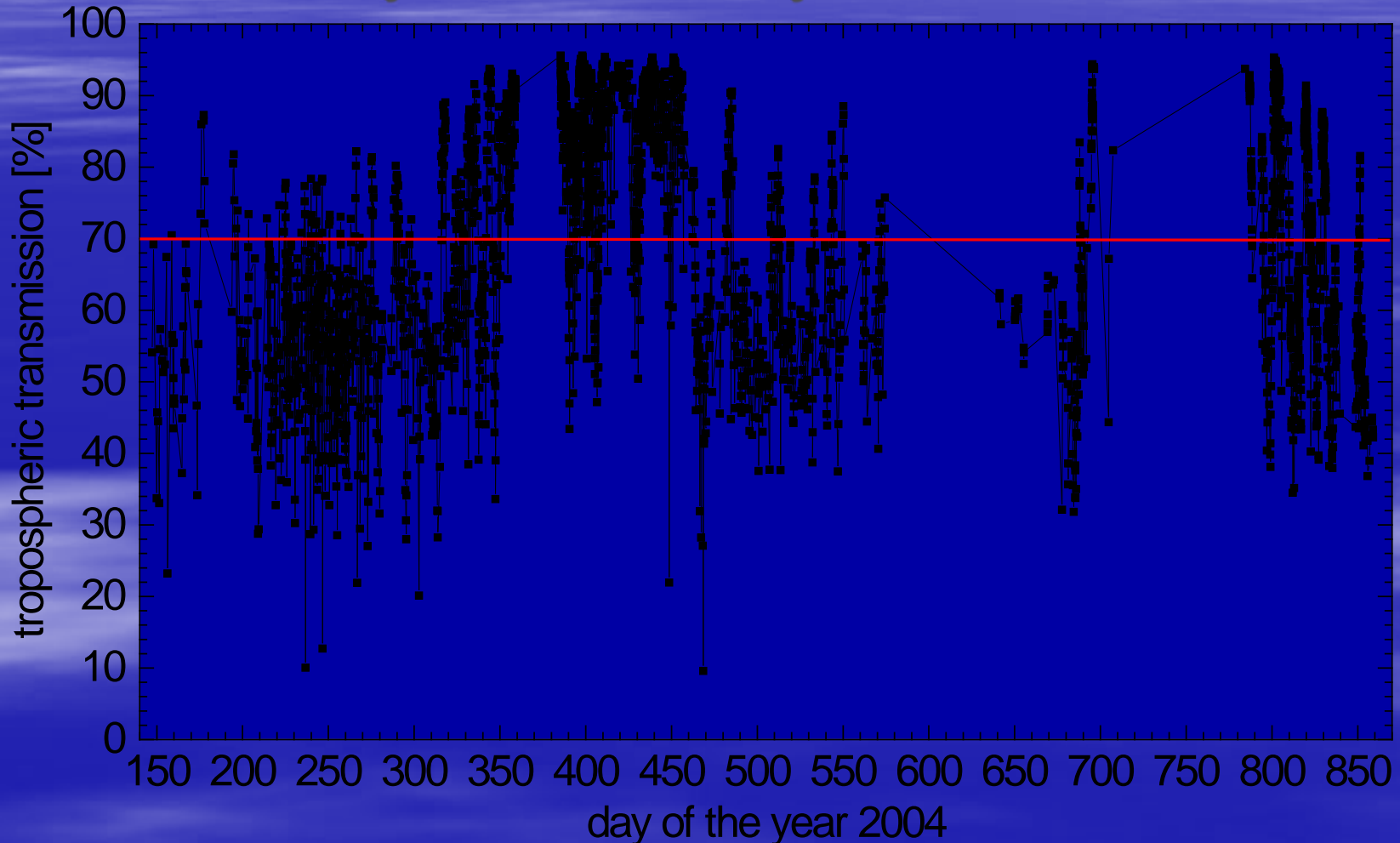
The MARS building at Pico Espejo



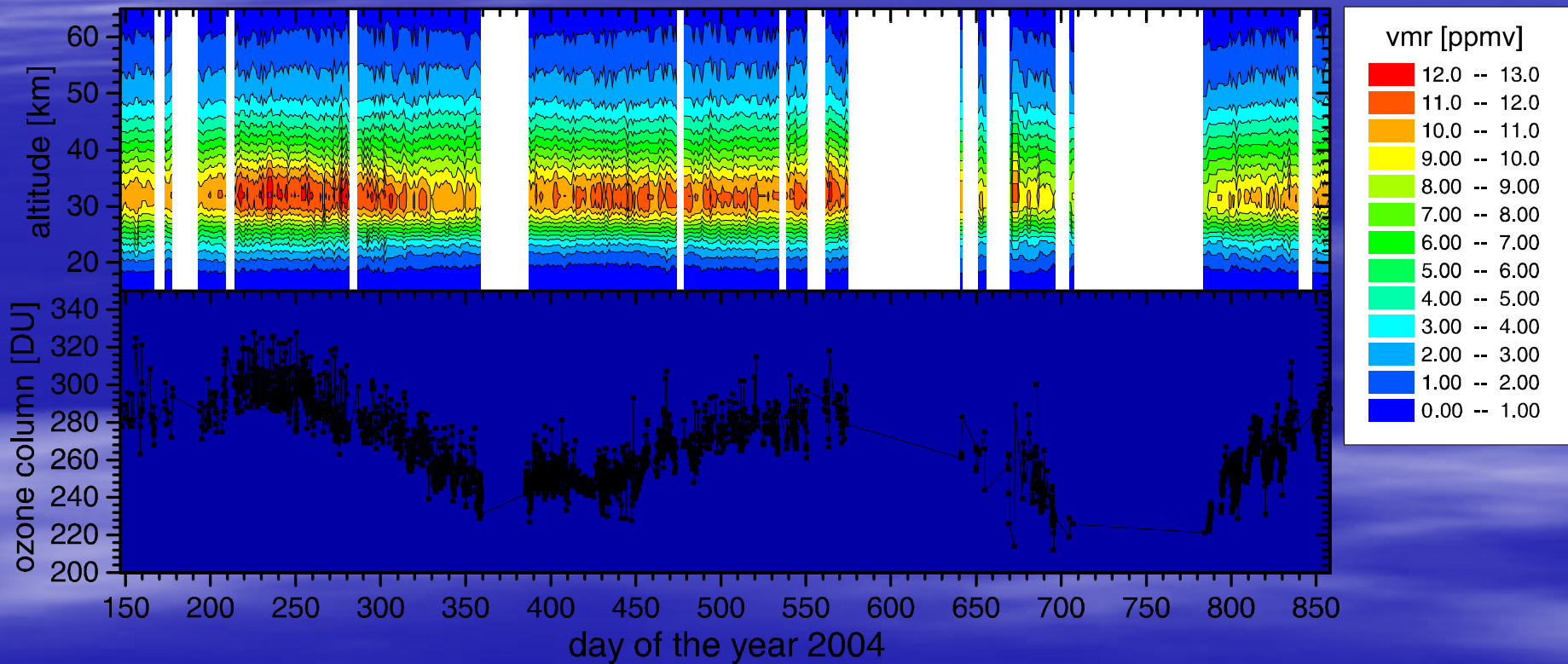
The MIRA2 Radiometer inside the MARS Building



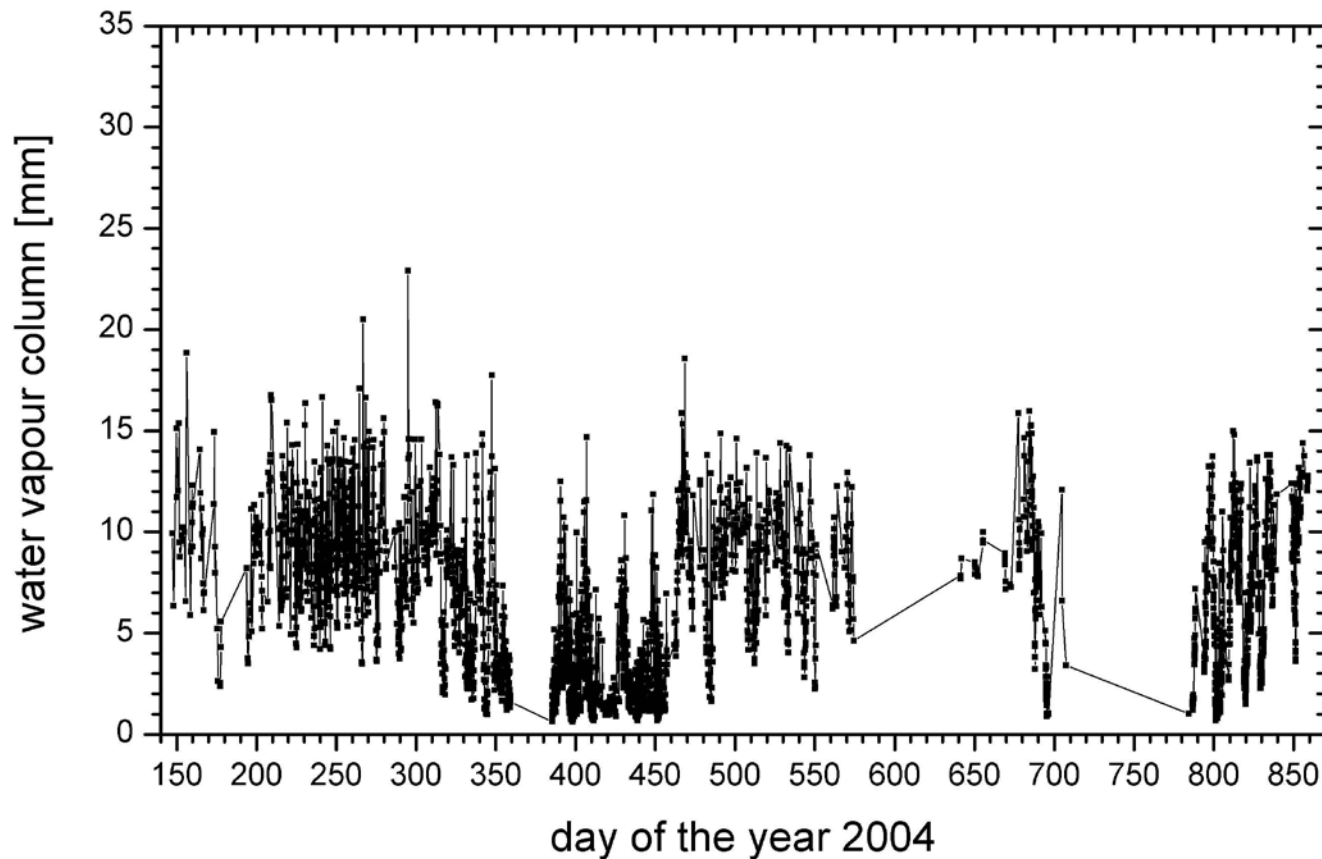
Tropospheric Transmission Between 31 March 2004 and 08 May 2006 measured by MIRA 2 at Mérida



Ozone Between 27 May 2004 and 08 May 2006 as Measured by MIRA 2 at Mérida

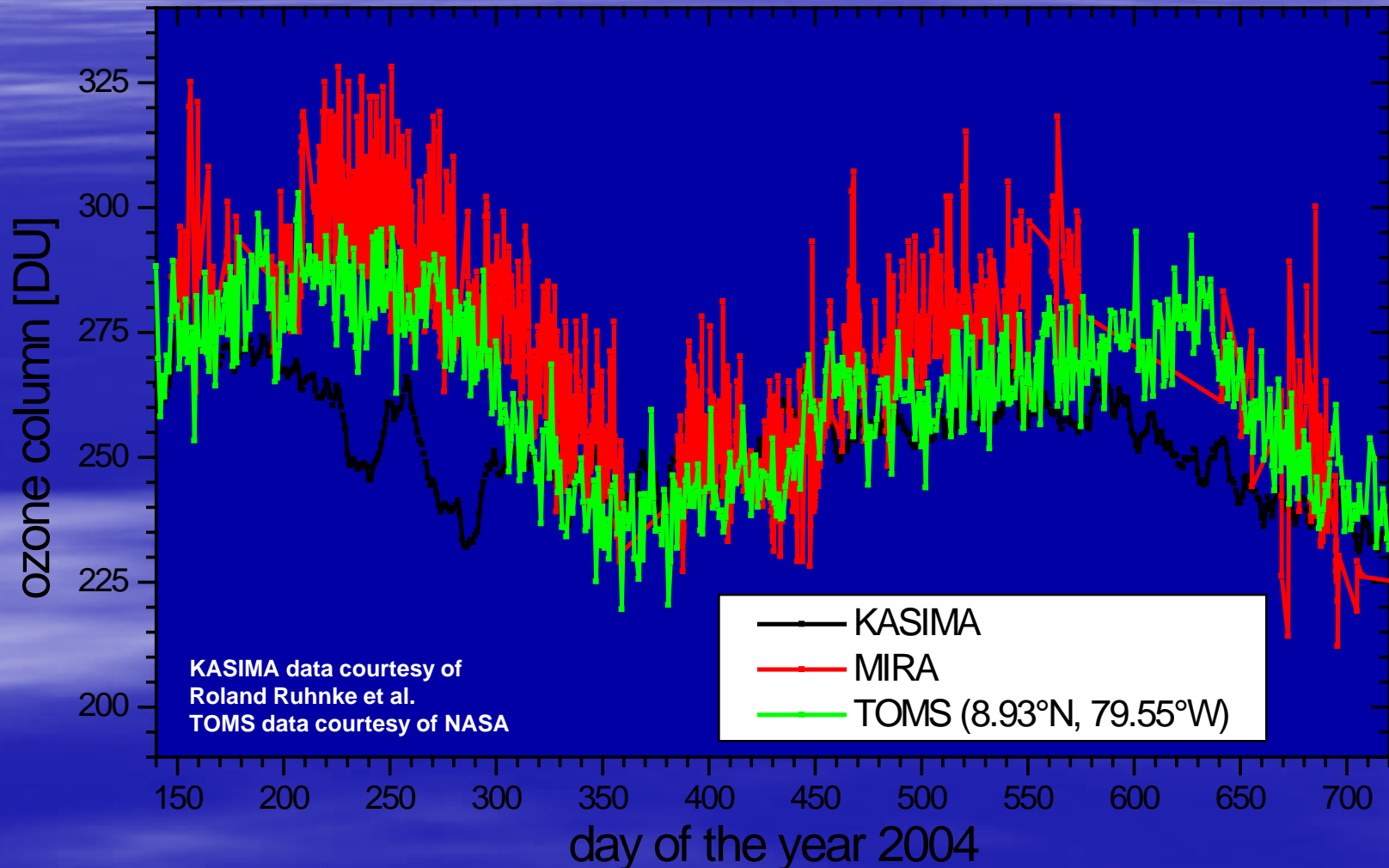


Water Vapor Columns at Merida estimated from MIRA2 measurements between 31 March 2004 and 08 May 2006

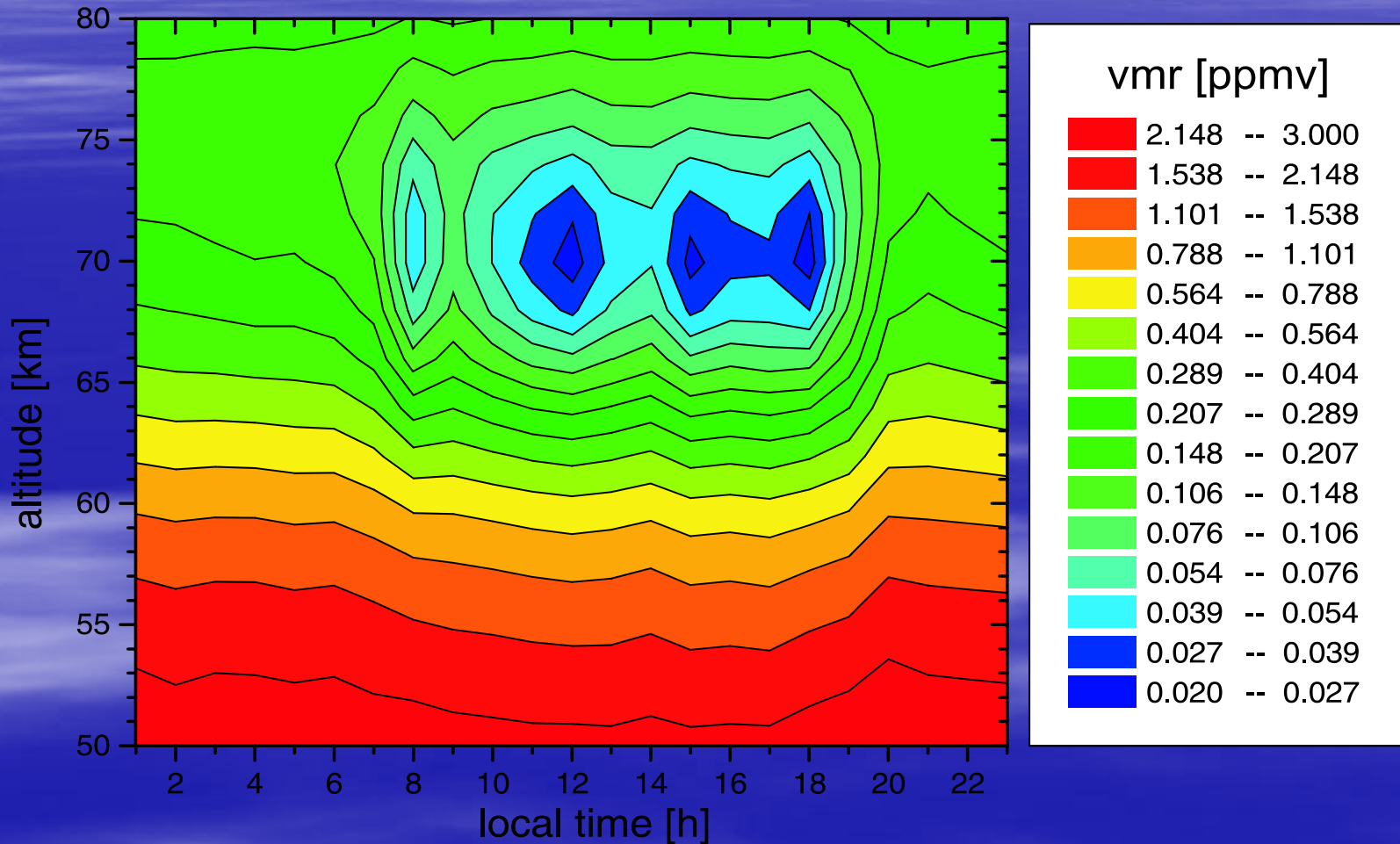




Ozone Column Densities over Mérida in 2004 and 2005 as modelled by KASIMA and measured by MIRA and TOMS



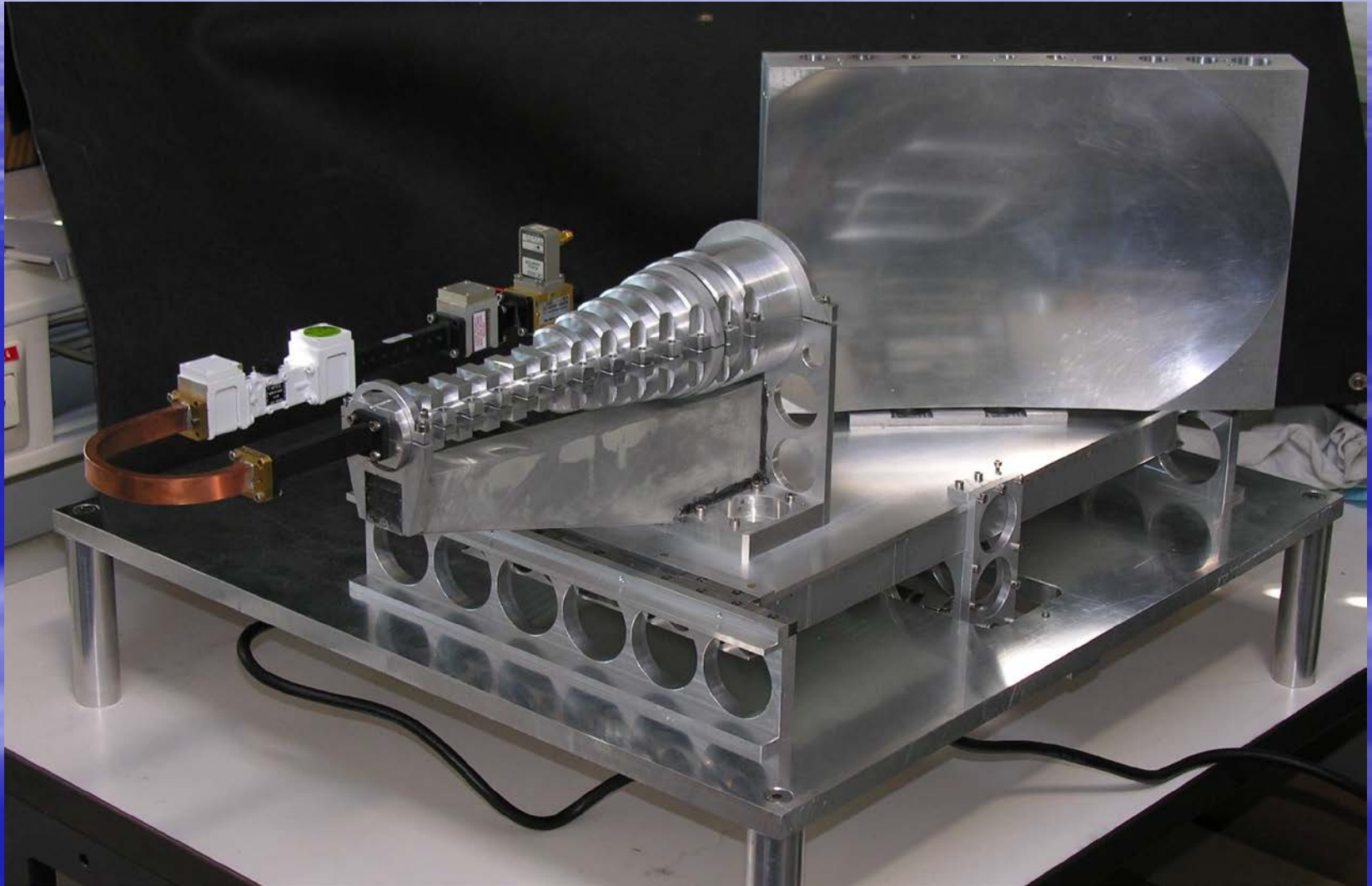
Diurnal Variation of Ozone in the Mesosphere on 26 January 2005 as Measured by MIRA 2



H₂O Radiometer Development

- MIRA5W: 22.235 ± 0.5 GHz
- Future alternative for WARAM
 - H₂O vap. in stratosphere and mesosphere
 - 250 K HEMT at 293 K
 - Cold load cooled by refrigerator
 - Dewar restrictions demand a Q.O.Beam design
 - Spectra resolved by a digital FFT analyzer
 - under construction
 - Test operation at Kiruna or Zugspitze
 - Validation ???
 - Hope for input from this workshop

MIRA5W: Hardware



Future extension of the Merida-Station

- FTIR (Uni Bremen, AWI)
- Mobile Aerosol Raman Lidar MARL (AWI)
- Sun-Photometer (AWI)
- UV-A and -B Radiometer (AWI)
- Biometer (UV-Dosimeter) (AWI)
- Weather station (AWI)
- Telemetry for Sondes
 - Equipment based at Paramaribo, Suriname (5°N, 55°W) since 9/2004
 - Instruments installed in 3 containers
 - Import clearance still pending

Lago Maracaibo

Merida

Llamo del Hato x

Pico Espejo x

Sierra Nevada di Merida



Centro de Investigaciones de Astronomía „Francisco J. Duarte" (CIDA)

Pico Espejo

AWI



Observatorio Nacional Llamo del Hato, 8,79°N, 70,88°W, 3600m asl

Projects and Collaborations

■ Present:

- PEP (*Pole-Equator-Pole*)– Virtual Institute
Helmholtz Association of German Research Centres
- CAWSES (*Climate and Weather of the Sun-Earth System*)
DFG Priority Programme

■ Future:

- NDACC
Tropical station
- GAW