

Forschungszentrum Karlsruhe in der Helmholtz - Gemeinschaft

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GROUND-BASED MICROWAVE OBSERVATIONS OF STRATOSPHERIC TRACE GASES AT THE TROPICAL MÉRIDA ATMOSPHERIC RESEARCH STATION (MARS) IN VENEZUELA



View to west: The small house in the vicinity of the cable car station has been used for atmospheric research in the 70's. Now it has been reconstructed for future use as MARS station.

Location:
Pico Espejo,
Andes of
Venezuela,
8,51°N,
71,06°W,
4765m asl.

Utilization:
ENVISAT-
Validation,
NDSC



View to east: The MARS building and the summit station of the cable car in front of Pico Bolivar (5007m), the highest point in Venezuela.

Constituent	Altitude range	Accuracy
O ₃ (MIRA2)	15 – 55 km	0.5 ppm
ClO (MIRA2)	17 – 45 km	0.4 ppb
HNO ₃ (MIRA2)	17 – 45 km	1.0 ppb
N ₂ O (MIRA2)	17 – 45 km	50 ppb
H ₂ O (WARAM2)	20 – 55 km	0.5 ppm

The vertical profiles of the constituents given in the table will be observed at the MARS station by microwave radiometry. Four trace gases will be measured using the tunable system MIRA2 at 268 - 280 GHz, whereas WARAM2 represents an individual receiver frontend centered at 22.6 GHz.

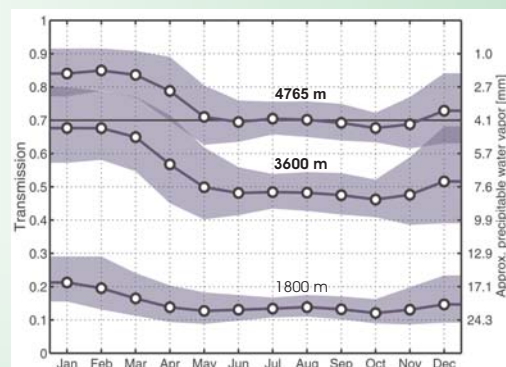


MIRA2 with the Acousto-Optical Spectrometer (AOS) and PC control rack (left)

The joint Venezuelan and German project of a high altitude tropical station for atmospheric research is being established on Pico Espejo in the vicinity of Mérida, Venezuela. The installations will include two ground-based microwave radiometers, which profit by the excellent observing conditions of this site due to its low total column water vapor content. Long-term data suggest, that nearly year-round measurements even at 278 GHz will be feasible. Another advantage is the good accessibility of this high altitude location by the worlds highest cable car.

The Millimeter-wave Radiometer MIRA2 has been developed at the Forschungszentrum Karlsruhe and is well validated and tested during several arctic measurement campaigns since 1996. The Water vapor Radiometer for Atmospheric Measurements WARAM2 developed by the University of Bremen is based on a similar instrument in operation at the arctic primary NDSC station at Ny-Ålesund, Svalbard.

In the first phase the retrieved profiles will be used for validation of the SCIAMACHY instrument aboard ENVISAT. Due to the very favorable conditions offered by this site for ground-based measurements, and the fact that a number of additional sensors will soon be added also in or near Mérida, it is planned to propose Mérida as the first tropical primary NDSC station.



Atmospheric transmission at 278 GHz calculated from 1958 - 1997 NCEP/NCAR data on a 2.5° x 2.5° grid for different altitudes in the region of Merida. A transmission in excess of ~0.7 allows the measurement of weak signatures like ClO.



WARAM2 is sharing AOS and PC control with MIRA2