Observation of stratospherically trace gases by
millimeter wave radiometry in tropical South America

The Station
The Merida Atmospheric Research Station (MARS) is the only tropical
station with almost continuous microwave observations of the atmosphere
since 2004. The location is:

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

This site offers excellent conditions
due to its high altitude with low water
vapor column content and high
transmission of the troposphere, the
accessibility by the world's highest
public cable car and the proximity to
the university. MARS is jointly
operated with the Universidad de los Andes and shared by the universities
of Bremen and Stockholm.

Ozone measurement
Ozone profiles in the altitude range
from 20 to 80 km have been
recorded since 2004 using the
radiometer MIRA2. This instrument
is tunable over the frequency range
of 268 – 280 GHz for observations
of O3, N2O, HNO3 or ClO. The
diagrams illustrate the annual cycle
of the ozone column and often
excellent (i.e. >70%) transmission of
the troposphere. The resulting data
are used for satellite validation
(ENVISAT, ODIN, AURA) and for
the international research networks
(e.g. NDACC).

Water vapor measurement
The new instrument MIRA5 with the
spectral range of 22.235 ± 0.5 GHz
has been designed for long-term
unattended operation. The cold load
is embedded in a dewar and permenantly cooled by a closed-
cycle refrigerator. The dewar
constraints demand a unusually
complex quasioptical system. The
receiver has a noise temperature of
170 K. The spectrum is resolved by
now by ADS with a resolution of 0.7
MHz. The water vapor profile has
been retrieved in the troposphere as
well as in the stratosphere and
mesosphere. A validation campaign
is planned at UFS Schneefernerhaus
during winter 2008/09.

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