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Data Set Description:

PI:	Dr. Gerald Nedoluha
Instrument:	22 GHz ground-based microwave instruments
Site(s):	Lauder, New Zealand
	Mauna Loa, Hawaii
	Table Mountain, California
Measurement Quantities:	Water vapor profile

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Reference Articles:

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Instrument Description:

The instrument is a microwave spectrometer observing atmospheric thermal emission at 22 GHz from the ground. It consists of a cryogenic heterodyne receiver and multi-channel spectrometer, and records the spectral lineshape of a water vapor rotational transition every 20 minutes at about 20 degrees elevation. Observations continue 24 hours a day whenever weather permits. A water vapor mixing ratio profile as a function of altitude is retrieved from each of the spectra obtained. Averages of the spectral data every 24 hours are supplied to the NDACC database. The original instrumentation consisted of a cryogenic heterodyne receiver and multi-channel filterbank spectrometer. While there have been many incremental updates to the systems, the main change in the new systems which were introduced between 2008 and 2011 was the transitions to room temperature receivers and FFT spectrometers (Gomez et al., 2012).

Algorithm Description:

An water vapor mixing ratio profile (ppmv) from 40-80 km is retrieved for every 24 hours using an optimal estimation retrieval method. We have attempted to include only those days on which the retrievals are judged to be most reliable, thus a number of days on which measurements were taken have not been included.

Expected Precision/Accuracy of Instrument:

Both the precision and accuracy are ~7% for most of the data. The total measurement error (assuming the terms add in quadrature) is therefore ~10%.

The measurement error is somewhat smaller for more recent measurements, and somewhat larger for the earliest measurements.

The 1992 Table Mountain measurements show smaller mixing ratios than subsequent measurements and have a calibration uncertainty of ~10%.

WVMS2 measurements from 1994 to the present, and all WVMS3 measurements are made with an additional set of 50 kHz filters, and therefore should have better high altitude retrievals

Instrument History:

Measurements are available from Lauder, New Zealand, from 1992-present. The original WVMS1 instrument was replaced with WVMS7 2011.

Measurements are available from Mauna Loa, Hawaii, from 1996-present. The original WVMS3 instrument was replaced with WVMS6 in 2010.

Measurements are available from Table Mountain, California, with WVMS2 from 1993-1997, and with the WVMS4 since 2008.

The major changes in instrumentation are described in Gomez et al., 2012.