Atmos. Meas. Tech. Discuss., 6, C1689–C1690, 2013
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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "A new microwave spectrometer for ground-based observations of water vapour" *by* K. Hallgren et al.

**Anonymous Referee #2**

Received and published: 21 July 2013

Comments on "A new microwave spectrometer for ground-based observations of water vapour" by Hallgren et al.

The paper describes a new and exciting 22 GHz radiometer system for monitoring stratospheric and mesospheric water vapour. The novel design consist of two parts:

1; Cooling of both the horn antenna and the first stages of the frontend, which reduces the receiver temperature to about 15 K

2; Integrated and simultaneous observations of two perpendicular polarizations of the sky radiation. The two output spectra are combined to form a less noisy averaged spectrum



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These two new design solutions together makes it possible to retrieve vertical profiles of water vapour with higher temporal resolution than can be achieved with other ground-based 22 GHz instruments today.

Referee 1's opinion is that the paper has to be rewritten and resubmitted since the instrument already is partly described in AMT by Straub et al., 2009 and since the instrument and the retrieval process are too generally described.

Even if the instrument already is mentioned in the comparison paper by Straub et al I see a clear need of a detailed instrument description but I agree with Referee 1 that important details are omitted. A detailed instrument description would be very important for the microwave community to encourage them to try this interesting concept and to go further.

I don't think that the paper has to be rewritten and resubmitted but the paper need more details such as:

A comparison table with existing NDACC 22 GHz instruments. It is important to give the system temperatures for the different instruments (Tsys = Trec + Tsky) and the observation time needed for a certain noise level in the used spectra.

Detailed description of the cryo windows for horn and loads and sizes of mirrors

A table with the spectroscopic parameters used in the retrieval process

Explain, with a sentence or two, the used Lomb periodogram method

More details about the OEM retrieval process (see Referee 1)

Finally I recommend to either skip or expand the section about Backus-Gilbert

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Interactive comment on Atmos. Meas. Tech. Discuss., 6, 4677, 2013.