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Atmospheric Measurement Techniques Discussions

Interactive comment on "Research on Retrieval of Atmospheric Temperature and Humidity Profiles from combined Ground-based Microwave Radiometer and Cloud Radar Observations" *by* Yunfei Che et al.

Anonymous Referee #1

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The paper presents a method to retrieve temperature and relative humidity profiles by using microwave radiometer, cloud radar and radiosonde data. In order to retrieve the atmospheric parameter, a neural network approach is used. The topic is of high interest for the scientific community and fits well the scope of the journal.

Nonetheless, I cannot recommend the paper in its current form for publication on AMT. I identify some general problems, which are discussed in the following.

First, the background knowledge and state of the art description is very poor, which leads to an imprecise contextualization of the work. If the authors claim to present an

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improved method for the retrieval of thermodynamic profiles, they should also provide a more extensive overview of the different methodologies applied so far.

In addition, there is in general a strong lack of references. Continuously, the authors state affirmations but no source is cited. For example: page 2, line 5; page 3, line 5; page 7, line 25-26; page 7, line 18, etc.

Moreover, the scientific methodology is often neither clear nor precise. Strong assumptions and/or simplifications are performed, e.g. the calculation of the liquid water content from relative humidity, the cloudy/clear detection and cloud geometry estimation from relative humidity, etc. Those simplifications are not completely justified and/or discussed.

Also, there is important information missing in the description of the algorithm and instrumentation used in the retrieval. An example of this is section 3.2, which aims to provide an explanation of the neural network method applied. Here, a description of "what is indeed a neural network algorithm" or references to another source explaining it are missing. Because of that, many points remain incomplete, e.g.: what is a layer, why using 3 layers, what is a hidden layer or why using a tansig transfer function. Another example is the reduced description of the instrument used in the study. I would encourage the authors to work also on this part and cite useful references like Rose et al. 2004, which provides a complete and detailed description of the HATPRO instrument.

Finally, I personally would expect the use of the language to be more accurate: non-scientific opinions are used frequently. For example, in line 16 in page 6: I would not say they are the most popular methods. Other methods, e.g. iterative methods such as optimal estimation, are widely used in the scientific community. Indeed papers using the later are cited by the authors in the introduction.

For the reasons discussed above, I think that the paper is not mature enough to be published in its current form and thus I recommend its rejection.

References: Rose, T., S. Crewell, U. Löhnert, and C. Simmer, 2005: A network suitable microwave radiometer for operational monitoring of the cloudy atmosphere. Atmos. Res., 75, 183–200, doi:10.1016/ j.atmosres.2004.12.005.

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