Atmos. Meas. Tech. Discuss., 7, C3939–C3941, 2014
www.atmos-meas-tech-discuss.net/7/C3939/2014/

Atmospheric Measurement Techniques Discussions

Interactive comment on "A relative humidity profile retrieval from Megha-Tropiques observations without explicit thermodynamical constraints" *by* R. G. Sivira et al.

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Received and published: 25 November 2014

First we would like to thank the reviewer for his remarks on the work presented in the manuscript. Indeed, most of the comments will help to clarify the technical aspects of the analysis.

We take the opportunity of the AMTD format to initiate the discussion on the major comments. We are willing to perform the rewritting that are suggested, but we will do that once we have received the comments of the 2nd referee. The minor comments will be addressed in the revision. We will also make a careful correction of the English-

related mistakes.

1) Title : we are willing to keep the title of the manuscript as is, since we really believe that one of the goal of this work is to perform a retrieval without the use of a priori information in the method. Following the suggestion, we will add some sentences in the introduction and in the conclusion to support this.

2) References to other studies: 2 types of work are mentionned by the Referee.

- The 1st type are UTH retrievals that we do not wish to mention because, as underlined by the Referee, these are not profiles and thus difficult to compare. By the way, the first UTH retrieval was performed by J. Schmetz and O. Turpeinen in 1988 for METEOSAT 6.3microns observations. B. Soden and C. Bretherton "popularized" it with their application to GOES measurements (if we may use this word).

- The 2nd type are indeed profiles and we admit that we didn't know the work of W. Blackell et al. Their retrieval technique use both infra-red (AIRS) and microwave (AMSU) observations and it seems from the 2 rerefences that no a priori is introduced in the operational use, except the surface pressure. We are here restricted to microwave BTs and do not use IR radiances, but we will mention the Blackwell et al work in order to really cover the existing approaches.

3) Indian team's work : Indeed, the indian teams have published work on retrieval of RH profiles from SAPHIR measurements, and we agree that we should have mentionned their work:

- Gohil et al (2013) restricted their evaluation to synthetic data and thus the comparisons can be performed between their work and our table 2.

- Mathur et al (2014) use external information of the integrated water vapor from NCEP, which is a strong difference of method and makes the comparison difficult. Despite this, we will discuss their result.

4) The details of the statistical method in the Introduction : We understand the comment

but we would like to keep the paragraph as is. Indeed, to our opinion one of the important part of the work is to compare these three statistical approaches for a specific goal, namely the estimation of RH profiles.

5) Neural networks : As detailed in Section 3.3, the Multi-Layer Perceptron (MLP) belongs to the family of neural networks. Neural networks are widely used for remote sensing applications (as noted by the Referee for the Blackwell et al work on AIRS/AMU data) and we didn't think it was necessary to recall their structure. In the Section 3, dedicated to the description of the 3 methods, we chose to focus on the way the methods are optimized. However, if Referee #1 still thinks that a short recall on neural networks structure is important, then we will make one.

6) LS-SVM in the conclusion : We agree with the Referee. The statement that is underlined in the comment ("the novelty lies in the implementation of LS-SVM") can be confusing. In fact, we think that the two important results are :

- LS-SVM is a promissing method for remote sensing applications ;

- Estimates of RH profiles using Megha-Tropiques observations only, and no other source of constraint, can be performed with good statistical behavior comparable to those obtained from more complex methods. These will be more emphasized in the revision.

7) Continental cases : Following the comment, we will write a dedicated section on the continental/cloud-free cases.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 8983, 2014.