Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2017-33-RC2, 2017

Atmospheric Measurement Techniques Discussions
Open Access
EGU

Interactive comment on "Satellite based high resolution mapping of rainfall over Southern Africa" *by* Hanna Meyer et al.

Anonymous Referee #2

Received and published: 5 March 2017

Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-33, 2017 Satellite based high resolution mapping of rainfall over Southern Africa By Hanna Meyer, Johannes Drönner, and Thomas Nauss

Anonymous Referee #2

The paper describes a method for estimating hourly rainfall over Southern Africa, based on a neural network approach, using MSG SEVIRI observations for the estimation and rain gauges data as ground truth. The results are compared to those obtained from IMERG of the Global Precipitation Measurement mission. The paper is interesting because it addresses an important and complex issue, as is the estimate of the surface precipitation in a region (the African continent) with sparse rain gauge and radar networks. I would like to recommend that this paper could be published after major/minor

Printer-friendly version

Discussion paper

revisions to address the following comments.

Major revisions: 1 – The description of some important aspects of the study is often done in a concise, not sufficiently complete and precise way to allow a direct and complete understanding. This fact is partly due to the use of some too general references (e.g. a conference (P2 L6 : IPWG, 2016) or books (P6, L13 : Venables and Ripley, 2002) or (P6, L17 : Kuhn and Johnson, 2013)), where more precise/accurate references (the paper in the conference or the section/pages in the books) would facilitate the understanding of the specific topics. In part it is due to the use of references that seem irrelevant/inconsistent with the text (P5, L8-9 : xxl technology .... OpenCL acceleration (see https://github.com/umr-dbs/xxl)). In part it is due to the use of specialized terms generally difficult to understand/interpret (P6, L15 : stratified 10-fold cross-validation). More attention to the aspects mentioned and a clearer description of the different topics would make it easier to read the text and would better highlight the most innovative aspects of the study.

2- Since the neural network is a key point in the study, more clarification on its design and its architecture would be appropriate. The references to texts (e.g. P6, L17 : Kuhn and Johnson, 2013) or packages (P6, L13 : "nnet" package (Venables and Ripley, 2002); P6, L14 : "caret" package Wing et al (2016)) do not lead to a direct understanding of the actual network used. The following points should be clarified: i) How the network input variables were selected (P5, L30 and P6, L1-2). The reference P6, L1 : Meyer et al. (submitted) is not available. ii) What is the network architecture (number of hidden levels and perceptrons) and how it has been designed. The text P6, l6-17 : The number of hidden units were tuned for each value ...., is not clear in this regard. iii) What is the training procedure used in the study. Section 2.3.3 does not appear clear on this subject both for the language and the references provided (see point 1 above) and because the cited paper Meyer et al. 2016 does not provide more details about this procedure (apart from the threshold tuning methodology).

3 - The use of rain gauges as ground truth requires checks on the data quality. In the

paper some aspects of this issue should be developed, e.g check on no-data or no-rain, consistency between data from different networks. Is the retrieval quality depending on the rain gauges density?

4 – Figures 3 and 4 show the box plots concerning the POD, FAR, PDF, HSS, RMSE and rho evaluated considering the whole set of data; It would be more effective to evaluate these indexes considering different ranges of precipitation values (e.g. 0-25 mm, 25-50 mm etc).

Minor revisions:

1 – The section 2.2.2 should be modified by introducing a short description of the ability of the Seviri channels to provide information on the state of the atmosphere and the ground. This is important to clarify the choices that led to the selection of the neural network inputs.

2 – The performance of the retrieval technique (P8, L5-6) shown in fig. 5 (P11) could be presented in a more complete way by inserting in the four panels the corresponding RMSE and mean bias values. In the figure the colour bar (data point density) should be added.

3 – The reference to Smith et al. 2007 (P7, L9) can be updated with: Hou, A. Y., Kakar, R. K., Neeck, S., Azarbarzin, A. A., Kummerow, C. D., Kojima, M., Oki, R., Nakamura, K., and Iguchi, T.: The global precipitation measurement mission, B. Am. Meteorol. Soc., 95, 701-722, doi:10.1175/BAMS-D-13-00164.1, 2014.

4 – P6, L3 Please explain the criteria that has allowed to split the database into day and night.

5 – The paper contains a few typos that need to be corrected.

Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/amt-2017-33/amt-2017-33-RC2-

supplement.pdf

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-33, 2017.

Printer-friendly version

Discussion paper