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Earth System Dynamics
Discussions

Interactive comment on "Large scale atmospheric forcing and topographic modification of precipitation rates over High Asia – a neural network based approach" *by* L. Gerlitz et al.

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As requested by the authors I clarify two of my statements below. Furthermore, I would like to ask for clarification about two major points I raised in my first review which need further explanations by the authors. Both are still related to the calibration/validation strategy.

My first comments:
The calibration period starts in 1989, but ERA-Interim starts in 1979. Why? the considerable database of 157 stations is not used at it's full potential if the calibration

is done for 11 years only. (...)
Author's response:
(...) The utilization of the whole time series might lead to over fitting of the meteorological predictor variables.
My response:
For my understanding, over-fitting occurs when to much freedom is given to a model, as shown in Fig. 5. Adding the years 1979-1989 to the training set, while still using 2001-2011 for validation should not produce over-fitting but rather improve the training. Can you clarify why you think that longer training will introduce over-fit?

My first comments:
the 18 stations used for validation are not truly independent, since they are also used to tune the degrees of freedom of the ANN (Fig. 5). As discussed by e.g. Elsner and Schmertmann (1994), it is crucial to define a truly independent data sample for validation, that have not been used for either training or tuning of the model.
Author's response:
The 18 validation records were used to validate the models, but not for the tuning of any model internal parameter. We implemented several neural network models and evaluated their predictive performance for the independent data set. Afterwards we utilized the "best" model for further investigations.
My response:
Unfortunately, this step of "using independent stations to choose the best model for further investigation" is *exactly* the pitfall which is described in Elsner and Schmertmann (1994). To use their own words: (P622) "The message is particularly relevant for more sophisticated algorithms associated with neural networks (...). Suppose a decision as to how many hidden layers to include in the network architecture is made by considering out-of-sample performance of the network. Then, as the previous example demonstrated, this decision is part of the algorithm and must also be cross-

validated. Failure to perform such an outer cross validation will lead to unrealistically high estimates of forecast skill for the neural network."
The choice of model architecture (in this case, 8 neurons) has been made with these 18 stations. Nothing proves that another sample of stations wouldn't lead to another choice for N. From my point of view, the performance of the model with external (unseen) data still needs to be assessed.

I don't know how these two points can be compatible with the concern expressed by the authors about the running time of their model. In all cases, a clarification about these two points is strongly recommended.

Clarifications asked by the authors:

Authors' question: *0.044 indicates 4,4that this could be an error?*
Response: I overlooked this, my mistake

Authors' question: *Fig5? The "border" in the map shows the abrupt precipitation decrease at higher elevations and is actually not a result of the color scheme. The maps by Bookhagen and Burbank (2006) indicate similar results.*
Response: my point was really related to the color-scale. The transition from brown to blue in the colormap creates arbitrary perceived contours which do not reflect discrete transitions in the data. The continuous blue line in South / South-East Tibet - Sichuan (July, but also visible in Winter) still looks unrealistic to me (see arrows in Fig. 1 below).

Best regards, Fabien Maussion

Interactive comment on Earth Syst. Dynam. Discuss., 5, 1275, 2014.

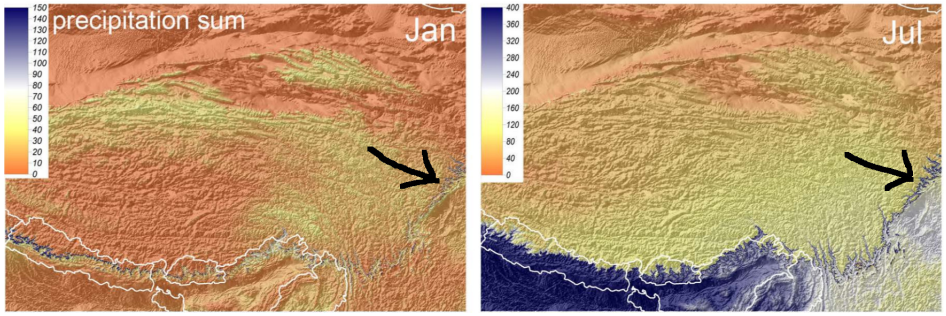

Fig. 1.