Interactive comment on "AtmoSwing: Analog Technique Model for Statistical Weather forecastING and downscalING" *by* Pascal Horton

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Thanks to the reviewer for his thoughtful and detailed comments. All technical corrections were addressed and will not be discussed here.

Comment 1:

page 2 line 30-33: The literature cited here is very old. Are analogue methods still used for the cited purposes? If this is the case, please replace with more recent literature, if not, I think this paragraph could be omitted. If you decide to keep it, please marque as historical use.

Reply: This literature has been updated.

Comment 2:

page 3 line 1-5: Please mention the predictands evaluated in the mentioned project.

Reply: This has been added (for daily precipitation).

Comment 3:

page 5 line 18: "This preselection is now often implemented as a moving selection..." Please add a reference.

Reply: Some references were added.

Comment 4:

page 5 line 28 and page 19 line 13-14: I don't understand the hours UTC here. Especially 24h UTC, that would be rather 00h UTC. What is the reasoning behind taking values at a specific time of day? Does the choice depend on the longitude? Or are those hours meant to be forecast lead-times or time ranges? In this case "UTC" doesn't make any sense. Please clarify.

Reply: The following sentence was added in parenthesis to explain the selection of hours: ''reference time of the predictors as they are usually available at a 6-hrly temporal resolution or higher". 24h UTC means here at 00h UTC but the next day. The reason being that daily precipitation is usually measured between 6h UTC and 6h UTC the next day, and so the centre of the accumulation period is 18h UTC. A couple of predictors at 12h UTC and 24h UTC is then centred on the accumulation period.

Comment 5:

page 6 line 10: You state that the moisture index MI "does not represent an actual physical quantity, but expresses the water content and the degree of saturation". To me the water content and the degree of saturation are physical quantities. Please clarify.

Reply: This sentence has been removed.

Comment 6:

page 6 line 21: What does "close in distance but too dissimilar in pattern" mean? Doesn't a distance in PCA space measure dissimilarity in the contribution of different patterns?

Reply: This sentence has been removed as it is out of the scope of the paper anyway.

Comment 7:

page 6 line 26: Similarly, "an analogy of the atmospheric circulation instead of a Euclidean distance" is not clear to me.

Reply: The sentence has been changed to: '' S1 allows for a comparison of the gradients and thus an analogy of the atmospheric circulation instead of considering the actual values at the grid points".

Comment 8:

page 6 line 27: Isn't the RMSE the same as the Euclidean distance in this case?

Reply: Yes. The sentence is now: ''For other predictors, classic criteria representing Euclidean distances between grid point values are used: . . .".

Comment 9:

page 7 line 16-25: The term "temporal extrapolation" is confusing in this paragraph. It makes me think of techniques like kinematic extrapolation which are used for example in a nowcasting context. I understood that in the first part of the paragraph you talk about analogy of temporal trajectories and their limitations. In the second part NWP forecasts are used on the synoptic scale, but they are based on the numerical resolution of dynamic equations and not extrapolation. Please revise.

Reply: The paragraph has been edited and is now: '' In one of the very first uses in

operational forecasting, radiosonde observations were used as predictors to predict precipitation for the next two days. However, because of the chaotic nature of the atmosphere, two analog situations quickly diverge over time (Lorenz, 1969). Thus, the AM has strong limitations regarding the analogy of temporal trajectories (Bontron, 2004). Given the superior capability of numerical models for simulating the dynamic evolution of the atmosphere, their outputs are now used as predictors for the coming days. . . ."

Comment 10:

page 7 line 22: You mention precipitation and temperature as examples for predictands that are difficult to simulate for numerical models. I'm not sure that temperature is a very good example here, given the performance of modern weather forecast models. What do you think? Under which circumstances and for which temporal scales an analogue forecast of temperature typically performs better than a numerical model?

Reply: That was not intentional, but the result of consecutive editions. The sentence has been changed to ''. . . with a local predictand, especially precipitation, which is more difficult to simulate for numerical models."

Comment 11:

page 12 line 23: "Different authors" which ones?

Reply: They are actually listed at the end of the sentence: (Djerboua, 2001; Bontron, 2004; Marty, 2010)

Comment 12:

page 16 line 25: I think it would be useful to specify which kinds of objective functions are minimized and which ones are maximized. For example error functions are minimized and skill scores are maximized.

Reply: Thanks for the suggestion. This has been added.

Comment 13:

page 18: At some point I got a bit lost between "calibration periods", "optimisation periods", "archive periods" and "validation periods". Please define calibration period vs. optimisation period. In which cases within sample skill is measured, and in which cases out of sample skill is measured? Is the archive length always the same? In line 29: "The contrary is expected for the later period" please explain why.

Reply: This section will be rephrased for clarity.

Comment 14:

page 19 line 10: Why is this expected? Please specify.

Reply: The sentence will be rephrased.

Comment 15:

figure 4: This figure is unclear to me. Especially the meaning of the connections with different line types, arrows and points. I didn't look at the code, so the figure might be useful in the software documentation or user manual, but I don't see the purpose of this figure within the paper.

Reply: The figure has been removed.

Comment 16:

figure 5: What are the numbers in the circles? Please add the information in the caption.

Reply: The caption will be completed.

Comment 17:

figure 7 and 8: Incomplete caption. What are the crosses?

Reply: The caption will be completed.

Comment 18:

figure 9 caption: What does "optimised directly" mean?

Reply: "directly" has been removed.

Comment 19:

figure 11, 12 and 13: The axis annotations, legends and crosses are very small. Please increase their size.

Reply: This will be done.