Geosci. Model Dev. Discuss., 8, C1259–C1263, 2015
www.geosci-model-dev-discuss.net/8/C1259/2015/

Geoscientific Model Development Discussions

Interactive comment on "S^{4}CAST v2.0: sea surface temperature based statistical seasonal forecast model" *by* R. Suárez-Moreno and B. Rodríguez-Fonseca

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Received and published: 29 June 2015

First of all, thank you very much to the anonymous referee for starting this interactive discussion with this constructive criticism. Here we reply to the comments agreeing with some of them and trying to justify those in which we have a different interpretation. The responses have been carried out by reproducing the referee comments. Supplement reproduce the same content.

1) Aim of paper: It is not quite clear what the aim of this article is. It seems that it is introducing and describing the use of the software package "S4CAST v2.0". But much of the introduction, references and analysis is on predicting Sahel rainfall. I feel that

much of this Sahel rainfall discussion is distracting from the main aim of this paper: Introducing a software package for statistical analysis. I think the paper needs to be substantially rewritten to have a clear focus. More space need to be given on how the software is used.

Thank you very much for your comment. Indeed, it is true that there is an excessive reference to Sahelian rainfall predictability, being always motivated by the fact that this phenomenon was the driving factor for developing the S4CAST model. However, although when carefully reading the abstract and introduction, no explicit references to Sahelian rainfall are found until just the end of the introduction (page 3976, line 6), we agree in reducing the number of references. Although some references can be found in relation to West African Monsoon (WAM), there are also others related to some phenomenon influenced by sea surface temperature (SST) worldwide.

Introduction is clearly focused on presenting SST as a source of climate predictability, stationarity in terms of fluctuations in the co-variability patterns between climate variables along a given time period, state-of-the-art dynamical and statistical models and statistical method used in this work. All previous considerations serve to introduce the essence of a MCA-based statistical model that can be executed under different constraints with the aim of predicting any given variable from the information given by the SST.

Subsequently, attending to section 3.1.2 (page 3980) a new reference to Sahelian rainfall appears in order to easily introduce the way in which input parameters are selected. But, again, and according to the referee comments, there is no problem in focusing this section differently, eliminating the example raised from the Sahelian rainfall and using

We are also fully agree with the fact that the case study developed for Sahelian rainfall could be too long and overemphasized, so that we propose a summary of this part, simplifying the case study and consequently the figures.

In the same way, a new subsection on how the software is used could be added to

facilitate replication of the case study, including additional figures. Nevertheless, a text file has been included together with the model code (see code availability section).

2) "stationarity": The authors emphasis "non-stationarity" a lot. They argue that they have illustrated "non-stationarity" (in section 3.2.1 and later). I dont see how they have shown that something is non-stationary and how they have statistically test for stationarity. Running mean correlations over a 21 year period, will by construction go up and down. How can you define a stationary period in this? And how do you know if two periods have different statistical properties (they are not stationary between the two periods)? This needs to be presented much clear, as it appears to be one of the main issues of the article.

Thank you for this interesting question. We clarify that what you call “something” refers to a pattern of co-variability between two climate variables: SST taking as predictor and any predictand field linked to SST (previous studies are required). From previous considerations, stationarity is defined in a simpler way. Any given variable which evolution does not depend of time, and it keeps constant with time can be considered stationary. Thus, we speak about stationarity when such a pattern of covariability keeps invariant within a time period and therefore will be non-stationary when showing changes. Running correlations has been widely used to determine the stationarity of the relationships between time series or climate indices (e.g., Camberlin et al., 2001; Rimbu et al 2003, Van Oldenborgh and Burgers 2005). To assess its significance it requires additional analysis as could be bootstrap methods (Gershunov et al, 2001). In our case, we have checked the significance of the stationarity using a Montecarlo test which is very similar than a bootstrap method, accepting in this way that the correlations are not obtained by chance.

This simple method of moving correlations between two timeseries is supported by other analysis done from the model outputs as regression maps, correlation maps or skill-score maps and time series using correlation coefficients and root mean squared error (rmse) which are very useful for comparing them with other studies that have

been developed in the same field of study.

Authors are willing to include a better explanation as well as extending the description of the method done in section (3.2.1).

References:

Camberlin, P., Janicot, S., & Poccard, I. (2001). Seasonality and atmospheric dynamics of the teleconnection between African rainfall and tropical sea-surface temperature: Atlantic vs. ENSO.ÂăInternational Journal of Climatology,Âă21(8), 973-1005.

Gershunov et al. 2001: Low-frequency modulation of the ENSO-Indian monsoon rainfall relationship: Signal or noise? J. Climate, 14(11), 2486-2492.

Rimbu, N., Lohmann, G., Felis, T., & Pätzold, J. (2003). Shift in ENSO teleconnections recorded by a northern Red Sea coral.ÂăJournal of Climate,16(9), 1414-1422.

Van Oldenborgh, G. J., & Burgers, G. (2005). Searching for decadal variations in ENSO precipitation teleconnections.ÂăGeophysical Research Letters,Âă32(15).

3) Version 1 of "S4CAST v2.0": The authors state that this software package is version 2 of "S4CAST", but it is not clear where version 1.0 has been published. It seems version 1.0 has not been published in peer review? Then it would not be available for most readers? So whatever information maybe provided in version 1 would need to be provided here too.

As we made a donation of a previous preliminary version to the UCAD university in the framework of the VR: 101/11 project from the VIII UCM Call for Cooperation and Development projects, we have called it version 2.0, but this is something that can be, for sure, changed to 1.0 or even without a version number. This is a matter of marketing.

4) Introduction of the software: I think it would be very helpful if the example discussed is also provided as a MATLAB-script, which explains how this is done and how the

software is used.

If required, a subsection could be included to illustrate how the user is promted to enter the input parameters.

Minor comments have been also taken into account. Necessary changes and clarifications will be made when finishing interactive discussion.

Please also note the supplement to this comment:
http://www.geosci-model-dev-discuss.net/8/C1259/2015/gmdd-8-C1259-2015-supplement.pdf

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Interactive comment on Geosci. Model Dev. Discuss., 8, 3971, 2015.