Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-5-RC3, 2018

Geoscientific Model Development Discussions

Interactive comment on "A new tool for model assessment in the frequency domain – Spectral Taylor Diagram : application to a global ocean general circulation model with tides" *by* Mabel Costa Calim et al.

Anonymous Referee #1

Received and published: 14 May 2018

The author's response fails to satisfactorily address the main issue raised in my review: the claim that the distance from a test point to the reference point on the diagram is a measure of the centered RMS error is unsupported and likely wrong. Consider a simple example of two test points, one perfectly correlated with observations (R=1) and the second perfectly uncorrelated with observations (R=-1). If the power is the same for both and equal to the observed power, both test points will coincide with the reference point. We know, however, that the point with R=-1 has a large centered RMS error, whereas the point with R=1 has 0 RMS error. This proves that the distance from

the reference point cannot generally be regarded as a measure of the RMS error.

The relationship underlying the Taylor diagram is based on the definitions of standard deviation, correlation, and centered RMS error. If there is a similar basis for the spectral Taylor diagram, it has not been explained clearly.

Also, the claim (in the author's response) that "From Taylor Diagram it's not possible to isolate frequency or band of frequencies and compared them in terms of amplitude, power and phase" is wrong. Any time-series can be filtered to isolate a frequency or range of frequencies. This can be done for both the observed and simulated time-series and then the Taylor diagram statistics can be calculated on the filtered data. This provides spectrally dependent information that includes information about phase, which is important for tides and other periodic phenomena. I don't think the spectral Taylor diagram would clearly reveal problems with the phasing of the tides, whereas the original diagram (applied to a spectrally filtered time-series) would.

I would point out that another reviewer also had problems understanding what relationship is being used to construct the spectral Taylor diagram. That reviewer said: "The reader would appreciate more mathematical detail regarding how you can just replace the correlation by the spectral coherence and replace the standard deviation of the time series with the standard deviation of the power. The way that you have defined the root-mean-square error is according to the law of cosines using the information from the spectral coherence and standard deviation of the power. It is unclear to the reader whether the resulting root-mean-square error is what you want to minimize." In particular you might consider a case of poor coherence, in which case the minimum distance to the reference point would be achieved by a model with small standard deviation (relative to the observed).

There are a number of additional problems with the manuscript, but there would seem to be no compelling reason to enumerate them until the fundamental issue raised here is adequately addressed.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2018-5, 2018.