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Interactive comment on "Multivariable Integrated Evaluation of Model Performance with the Vector Field Evaluation Diagram" *by* Zhongfeng Xu et al.

Anonymous Referee #2

This paper is closely related to an earlier paper published by the authors in GMD (doi:10.5194/gmd-9-4365-2016), but in this new paper I believe there is a fatal flaw in that the "vectors" considered are constructed from components representing individual fields which are in general not independent. The fields produced by climate models (and indeed the fields observed in the physical world) are rarely truly independent. Consider, for example, the trivial case of temperature field at 900 hPa and the temperature field at 850 hPa. These fields would be very similar (with second one being slightly cooler than the first), and since they are not independent, they are unsuitable for use as components of a vector. Similarly there are relationships between specific humidity and temperature that yield high correlations between them. Thus, the "vectors" defined in this paper are based on dimensions that are not independent (i.e., not

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orthogonal).

If I am correct that orthogonality of the vector components is a requirement, then the paper rests on unsound mathematics and should be rejected.

If I am wrong, then the paper should be considered, but I'm not sure it adds much to what was already published in the earlier paper where the vector components were based on spatial direction (rather than variable). Isn't the present paper an obvious extension of the earlier paper (simply an application to a different vector, one based on dimensions defined by variables rather than spatial dimensions)?