



EGUsphere, referee comment RC2
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Comment on egusphere-2022-1372

Anonymous Referee #1

Referee comment on "Near-real-time detection of unexpected atmospheric events using principal component analysis on the Infrared Atmospheric Sounding Interferometer (IASI) radiances" by Adrien Vu Van et al., EGU sphere,
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Review of "Near-real time detection of unexpected atmospheric events using Principal Component Analysis on the IASI radiances" by Adrien Vu Van et al.

The manuscript describes a PCA based method on real time detection and characterization of atmospheric events. For this, they are applying measured data from three IASI satellites. The manuscript is nicely written and offers interesting application of the PCA on detection of extreme events. However, some clarifications are needed, as described below.

Major comment

The methodology description needs to be improved. Even though majority of the methodology is described in previous study, it would be important to provide here necessary details on the method for replicating the analyses with similar data. e.g. PCA could be described more clearly and it is not clear how to you get GMI and GMA from the PC's. This makes it more difficult to follow the results from the case studies.

Specific comments

Abstract: Point out the focus and true novelty of this manuscript in the abstract. Now it sounds more like the introduction

line 117, Antonelli 2004 is not in the list of references. In addition, with Atkinson 2008 and 2010 they are not the original or the best references of methods for defining the optimal number of components

Line 173: Define IASI-PCA-GE more clearly

Section 3.3.: As the explained variance is not really increasing after ~25 components, using 150 PC sounds a bit of overfitting. How did you define the number? How many PC would e.g. Scree test or Kaiser criterion suggest?

Lines 501-506: With this high number of observations in the training set, it is not probable that few outliers would affect drastically to the sensitivity of the method. As already the Atkinson papers pointed out, there has been suspicions that PCA might not be the best method for this type of analysis. Have you considered other possible factorization methods like EFA, NMF or PMF discussed e.g. in Isokääntä et al. 2020 (<https://doi.org/10.5194/amt-13-2995-2020>)?

In addition, have you considered accounting for the geophysical parameter possibly acting as confounding factors in your analysis?

Conclusions: point out that the method can be used as online tool for detecting extreme events, as mentioned in the text earlier.