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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global fire activity patterns (1996–2006) and climatic influence: ananalysis using the World Fire Atlas" *by* Y. Le Page et al.

Y. Le Page et al.

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We thank Ilse Aben for her helpful comments. As our reply required the use of a Figure, which was not possible to include in the document, it is provided through an internet link. We recommend using Mozilla Firefox as we noted that Internet Explorer may experience some problems to properly display the Figure.

C: *I find the description on clusters (end of section 3.3) and the cluster analysis (section 4.2) unclear. Particularly I am not 100% clear on what is exactly shown in Figure 9. Is this now only showing the anomalies in temporal behavior of fires for different clusters or actually showing the temporal behavior itself for the different clusters ? I presume the idea with the clusters is that you look at regions with similar temporal behavior ? It*

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would be helpful if you can just state what the clusters actually represent.

R: The time series shown in Figure 9 are depicting the temporal anomalies for clusters 1 to 8. Those are an average of anomalies from each grid cell belonging to the cluster, i.e. averaging is done on anomalies. We thought better to do it this way, rather than computing anomalies from the total averaged cluster time series, to avoid focusing on the cluster grid cells with the highest fire incidence (similar to our reasoning leading to standardization of data for EOFs).

In the paper, section 4.2: Figure 8 shows the resulting clusters map, while Fig. 9 illustrates the corresponding fire variability patterns depicted, and the average fire seasonal cycle. Time series of precipitation data anomalies from the CMAP Precipitation data, provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, (http://www.cdc.noaa.gov/) are also shown for each cluster, to illustrate the role of precipitation as a fire determinant.

Was replaced by: Figure 8 shows the resulting clusters map. Fig. 9 illustrates the corresponding fire variability patterns depicted, computed for each cluster as an average of its grid cells deseasonalised anomalies, both over the ten years (time series) and for the seasonal cycle. Time series of precipitation data anomalies from the CMAP Precipitation data, provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, (http://www.cdc.noaa.gov/) are also shown for each cluster, to illustrate the role of precipitation as a fire determinant.

C: *Figure 6: what does this now mean ? Maybe this figure can be skipped, or at least it is unclear to me what crucial information this figure gives.*

R: This figure is shown as a support of the decision to keep 8 clusters. The y-axis is an indication of the distance between the centroids of each cluster (in the 9 dimensions space defined by the 9 retained Principal Components). As an example Clusters 4 and 19 (x-axis, with linkage distance threshold of 0.3) are very close, indicating that they have similar coordinates on the 9 dimensions (Fig. 6.:

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http://docs.google.com/TeamPresent?docid=dgtrfhtm_7fqpzg3g5&skipauth=true).

As stated in the paper, there are various techniques available for determining the number of clusters. However how many clusters one has to retain does also depend on what are the interests of the user, in terms of precision, scale, "granularity". In our case (Fig. 6.), we clearly didn't want to produce a map of 40 clusters (blue line) because the short distance between centroids indicates that many of the retained clusters would lack a robust geographical/climatic support. On the other hand, if we only retain 4 clusters (red line), characterized by large distance among the few retained centroids, each cluster would merge different large-scale fire anomalies with considerably different temporal patterns and driving factors. Therefore, there is a critical need for a balanced decision, where too many or too few retained clusters may jeopardize the rest of the analysis. It should be noticed that the most stable part of the cluster analysis (with minor changes) corresponds to linkage distances within the range 0.6 to 1. Therefore, our final choice should be concentrated in that region of the graphic (corresponding to either 8 or 9 clusters). At this stage an expert based decision is usually required. We thus produced two maps of 8 and 9 clusters, , followed by a clearly subjective interpretation (interpretability and clarity of the results) to finally retain the 8 clusters map. If 9 clusters had been chosen, former cluster 6 was split, as shown in Figure 1, but the resulting map and temporal patterns were not informative enough to be kept.

C: *Section 4.2 first sentence: should 'spatio-temporal' not just be 'temporal' as you already say you cluster areas ?*

R: The spatial term doesn't make sense here. It has been removed.

C: *Section 5.2 p.15 line 15: the sentence 'Agricultural ...'; is not correct.*

R: The indicated location in the paper doesn't contain this sentence. However this comment may be about the sentence in Section 5.2, page 16, line 21 ? We are not sure whether the comment is about the construction or the content of the sentence. In case the content is concerned, we here give more details about the fires it applies to:

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Interactive Comment

"Agricultural fires that got out of control were responsible for large areas of destroyed tropical forests" Replaced by: "Agricultural fires escalating out of control were responsible for large areas of destroyed tropical forests"

It concerns the Mexican part of Cluster 2, which exhibits positive fire anomalies in early 1998. Various reports have indicated that a significant part of the ignitions originated from farmers, who traditionally use fires to clear land. More details on fires origin, timing and the affected ecosystems can be found in various references, including Galindo et al. (2003) and Rodríguez Trejo and Pyne (1999). In this last reference, the author state:

"Traditional burning - fundamental to Mexican agriculture and pastoralism - soon escalated out of control. Complicating factors included drug traffickers in some areas and rebellion in Chiapas" They also indicate that an estimated 47% of the 1998 fires where caused by agro-pastoral activities, and 26% of the affected landscape was forested.

Further information can be also found in a report of the Mexican National Commission for the Knowledge and Use of Biodiversity (Conabio, report available at http://www.conabio.gob.mx/conocimiento/puntos_calor/doctos/incendios.html).

References:

Galindo, I., López-Pérez, P. and Evangelista-Salazar, M.: Real-time AVHRR forest fire detection in Mexico (1998-2000), International Journal of Remote Sensing, 24:1, 9-22, 2003.

Rodríguez Trejo, D. A., Pyne S. J.: Mexican Fires of 1998, International Forest Fire News, 20, 61-63, available at: http://www.fire.uni-freiburg.de/iffn/country/mx/mx_3.htm, 1999.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17299, 2007.