

Interactive comment on “Exploring spatial-temporal dynamics of fire regime features at mainland Spain” by Adrián Jiménez-Ruano et al.

Anonymous Referee #3

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The manuscript analyses the dynamics of fire regime components, more accurately fire regime elements, as two crucial fire regime metrics are not addressed - fire frequency (see specific comment below) and fire severity – for peninsular Spain. Results generally concur with the findings of previous studies, namely Moreno et al. (2014) for Spain and Turco et al. (2016) for southern Europe. Hence the novelty resides mostly in examining the trends in variables other than number of fires and area burned.

On the methods side I commend the authors on the depth and diversity of the statistical analysis, which I believe has not been seen before in similar studies.

I see improvement opportunities on the Discussion section, which is comparatively weaker. What are the motives behind the trends found? Given the existence of previous analysis of this type one would expect a deeper perception/development of the

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discussion on the driving causes, be it fire weather, land management, or fire management. There are reasons to believe that the major influence is/has been the extraordinary investment (perhaps the highest in the world) that Spain has devoted to fire suppression, see Seijo & Gray (2012). For comparison the authors can check Fernandes et al. (2014), which examined trends in northern Portugal where a shift towards decreasing area burned did not happen in 1980s-1990s, presumably because of unsuccessful/insufficient firefighting efforts.

Another aspect in need of improvement is a joint explanation of the trends, i.e. an attempt to relate trends detected for the different metrics can be made. E.g. in NW Spain, large fires have increased, there are more winter fires, and summer burned area did decrease. It is likely that the fire exclusion policy in place is resulting in less area burned. Because of the repression of fire use to manage land, people will be inclined to use fire in winter (when fire preparedness is low) rather than on summer, but this traditional use of fire will not have an impact on the extent of flammable landscapes, because fires are usually small. Hence a more flammable landscape is developing, explaining the increase in the number of large fires, particularly in years with more extreme fire weather days and/or higher number of extreme fire weather days, a consequence of climate change. This is the type of inference/analysis that would really benefit the ms.

I also advise the authors on doing some discussion regarding the limitations of the trend analysis methods. Because fires are self-limiting the landscape preserves a memory of fire, especially where fires are larger or fire frequency is higher. Thus, what the analysis reveals as decreasing trends may in fact be a consequence of relatively long fire cycles in relation with landscape-level fuel build-up, and this may really impact the results.

References:

Seijo, F., Gray, R., 2012. Pre-industrial anthropogenic fire regimes in transition: the case of Spain and its implications for fire governance in Mediterranean type biomes.

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Hum. Ecol. Rev. 19, 59e69. Fernandes, P.M., Loureiro, C., Guiomar, N., Pezzatti, G.B., Manso, F., Lopes, L. 2014. The dynamics and drivers of fuel and fire in the Portuguese public forest. *J. Environ. Manage.* 146, 373-382.

Specific comments

P1, L24. Replace “conversely”: it has the opposite meaning of what you are trying to convey. P2, L36. Vegetation type and structure, as variation in fire behaviour is high within a given vegetation type. P2, L41. “improve”, not “improving”. P2, L41. Rephrase. “How wildfire works” is quite subjective in its meaning. P2, L50. remains. P2, L68. This sentence lacks a 2nd part: “Since most studies focus mainly on analysing ‘generic’ fire (number of fires and burned area).” P2, L88-95, L96-98. Too much detail here on the methods used. Delete or reduce substantially. P3, L103. Environmental can be understood as incorporating some of the climatic and topographic features. Replace by land cover, or vegetation, or fuel. P3, L109. I don’t think ash (*Fraxinus*) is a relevant land cover type. This region also has a quite important component of forest plantations such as *Pinus radiata* and eucalypts. P4, L114-115. Add other important oak (*Q. suber*) and pine (*P. nigra*, *pinaster*, *sylvestris*) species. P4, L144. By definition “fire frequency” is the number of times a given area has burned in the past, divided by the number of years considered, thus an annual probability. You must rename this variable for what it really is, i.e. Number of fires, here and elsewhere in the text and figures. P4, L144-145. Regardless of size.

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