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Interactive comment on "Has fire policy decreased the return period of the largest wildfire events in France? A Bayesian assessment based on extreme value theory" *by* Guillaume Evin et al.

Anonymous Referee #2

Received and published: 27 July 2018

Major comments: The manuscript of Evin et al. attempts to demonstrate statistically that current fire policies in southern France had an effect on large fires burnt area with a return interval of 5 years but not on that of 50 years. They conclude that massive investments in aerial and ground forces are not sufficient to control large fires during extreme fire season (like the 2017 one) and that other strategies should be integrated (e.g. landscape management, self-protection) to leverage fire risk on the long-term. I appreciate the effort to demonstrate analytically a common believe (i.e. fire suppression policies are not sufficient) usually addressed with a qualitative approach or simple descriptive statistics. Although I agree with the general thesis that current fire policies are not yet able to manage large fire seasons like summer 2017 or the ongoing

2018 (and I fully support alternative strategies proposed in the manuscript), I'm not convinced that this experiment provides sufficient evidence that fire policies introduced in France since 1994 are inadequate to manage large fire seasons. Indeed, despite the statistical tests used in the study are quite sophisticated and applied correctly, I have a doubt about modelling fire return periods of 20 to 50 years with a time series of 21 years. Indeed, model uncertainty is very high (Table 4) and at the end of the results section authors state that this uncertainty limits the interpretation of the estimate. Consequently, the key point of the discussion and conclusion (that current fire policy implemented in France is not effective against large fires with a return interval of 50 years) is based on this single uncertain result. The statement at the beginning of the discussion, referring to the sole fire prone region PCr-1, i.e. "...the BA corresponding to a return period of 50 years has not significantly decreased" does not take into account limitations in the analyses. Consequently, the discussion that follows appears to force results interpretation toward a thesis (although, I repeat, it is a thesis that I fully support). In addition, it is not clear to me if differences in other fire regime drivers such as climate, fuel flammability and landscape connectivity where considered in the model when comparing 1973-1994 and 1995-2016 periods. Indeed, if you want to test the "fire policy" driver the the model should account for the variability expalined by other relevant drivers. Note that in Figure 2, after 1994 the sole fire peak in the number of fires>100 ha reaching a level similar to ones before 1994 corresponds to the 2003 fire season, i.e. the major climate anomaly hitting southern France during the period of analysis. Notably, one of the author in a previous similar paper (Curt and Frejaville 2017; DOI: 10.1111/risa.12855) stresses the increase in fire weather index, human pressure and fuel coverage in the second studied period.

Minor comments: Pg1, LN17, LN18 and throughout the text - Eliminate dots after "ha"

Pg1, LN16-LN20 – report initial and end period for fire statistics listed in this paragraph

Pg2, LN1 - Include here other relevant references, e.g. Moreira et al. 2011 (DOI: 10.1016/j.jenvman.2011.06.028), Fernandes et al. 2013 (DOI: 10.1890/120298)

Pg2, LN3-LN5 – I believe here is missing a major driver of the burnt area in southern Europe, i.e. cultural and socio-economic aspects affecting landscape management (i.e., type of urbanization, agriculture and forestry, land control, use of fire, type of post-fire management) which in turn contribute to determine fire likelihood and burnt area. Note that this is supported also by authors at Pg. 3, LN15

Pg2, LN9-LN11 – While I agree knowing the return period of large fires it is useful to governmental agencies and reinsurance companies to evaluate the cost of future fires, I do not believe it is useful to the dimensioning of fire crews during an extreme fire event (this is something decided in real time once the ignition point, the fire weather, potential fire trajectories and values at risk are known). Rather, as the return period of a flood is useful to the dimensioning of infrastructures such as embankments of a river (a similarity used by authors at LN 6-7), the return period of a large fire in a valley is useful to the dimensioning of fuel management measures, e.g. how many fuelbreaks, where they must be located in the landscape, how much large they must be, which is the interval between fuel treatments to maintain fuelbreaks before large fires return, which in turn determine management costs and consequently the number of fuelbreaks I can maintain in a given period.

Pg2, LN14 – later in reading the manuscript I assumed "return levels" the same as "return period", but then I realized it was not the case. However, it is not clear which is the difference between the two. Please clarify here or in the method section

Pg2, LN15 - after "…dedicated studies are available" – Although later in the paragraph authors report several references in relation to methods used to calculate the fire return period, I suggest to insert here 2-3 references to previous studies calculating the large fire return period that author think are very relevant for fire management purposes

Pg2, LN20 – after "Extreme Value Theory" add "(EVT)"

Pg2, LN29 – the fire policy change in 1994 in France appears here for the first time, but it is not clear in what the policy consists, and no references are provided. I would expect

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here, or later in the methods, a clear referring to the policy, and some quantitative data (i.e. indicators of changes in comparison to the previous policy, e.g. number of helicopters used during the fire season, annual area treated with prescribed burning) characterizing the policy. A table could be useful to synthetize information

Par 2.3 and 2.4 – Clearly state what μ,σ, ξ indicators means in terms of fire management Pg8, LN24 – I do not see where the "parameter uncertainty" is reported. Include model uncertainty in figure 4?

Pg12, LN2 – what is meant with "median return levels"? If 20 years, change "Table 4 reports the BA corresponding to high return periods (20 and 50 years)" in "Table 4 reports the BA corresponding to median and high return periods (20 and 50 years, respectively)"

Figure 1 – Large fires are defined as > 1000 ha, while in the text is > 100 ha. As regards the figure caption – after "pyroclimatyc regions" include "(numbered circles)", or something in the legend clarifying what colored circles represent

Figure 3 – as the aim of the paper does not focus on statistical and methodological aspects I would move figure 3 to the supplementary material

Table 2 – it is not clear how it is possible to model fire return intervals > 10 years with time series of 21 years (1973-1994 and 1995-2016)

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