Review for *“Drivers of extreme burnt area in Portugal: fire weather and vegetation”* of T. Calheiros *et al.*

In this paper, the relation between Daily Severity Rating percentile (DSRp) and the total burned area (BA) in Portugal is studied, with the aim of understanding its smaller scale (municipal scale) behaviour. The Authors tried to 1) assess if the performance of 90th DSRp (DSR90p) threshold in BA prediction in mainland Portugal; 2) identify and characterise regional variations of the DSRp threshold that justifies the majority of Burned Area ; and 3) analyse if the DSRp spatial variability could be explained with broad classification of land cover (forested vs agricultural vs shrubbed).

As a dataset, weather reanalysis data from ERA5-Land as well as wildfire and land use data from official Portuguese authorities for an extended summer period (15th May to 31st October) from 2001 to 2019 were used.

The treated topic is exceptionally relevant, since fire weather indices can and should be coupled by info on vegetation for optimal wildfire management procedures.

However, the paper should be refined in some parts before being considered for publication.

- Line 43 Define DSR (or at least specify that is a simple reformulation of FWI). This can be done here or at line 135.
- Line 43 The reader needs to understand what a DSR percentile is. In order to get a threshold based on percentiles, we need a set of elements to be sorted in ascending order. On which set were the percentile classes defined? This needs clarification.
- Line 115: how the burnt area dataset is derived? Polygons retrieved from ground assessments? Satellite?
- Line 115: of course, the threshold of 100 ha applies to European fire regime and not to, e.g., North American one.. Maybe this thought can be added in the text.
- Line 130 Why is air temperature and not air humidity the driver for fires?
- Line 145 How was the original classification of COS2018? How was the aggregation performed?
- Line 157 : “was allocated to **this** administrative unit”. What unit are they talking about? The sentence can be reformulated.
- Line 160: Still not clear what BA percentages is.
- Line 163: So for each fire event at municipal scale, the maximum DSR is selected in the days of the event and the whole extent of the municipality?
- Line 162: Why normalise by logarithm? Is this common practice or was a tentative normalisation procedure that ended up in good results?
- Line 173: a percentage is always between 0 and 1. So you might do the difference starting by 1 ... otherwise you need a factor 100 of scaling. I am convinced that a numerical example of FTBA would greatly help the reader.

- Line 180: The section 2.6 is quite cumbersome .Some definitions, such as “p” and “q”, are given and never used in any formula or text. To do some clustering between elements, the elements need to be compared by a distance function (which may need to respect some mathematical constraints.) If I have understood correctly, every element of your set is a series [DSRp_i,FTBA_i], with the several fixed points for DSRp that are common for every municipality and FTBA_i that change accordingly (That is, a disaggregated version of figure 4). The distance is then the correlation between the set of FTBA_i of one municipality and the corresponding set FTBA_j of another one. If that so, please state in line 194 who is m (number of analysed municipalities I guess) and n (the number of (equi-distant?) sampling points in the DRSp scale, I guess).
- Formula 3: specify the upper range of any sum.
- Line 200: this kind of practical example is what makes at least the last part of 2.6 understandable.
- Line 395: does this apply to the Portugal / Southern Mediterranean area? I remind of EUCPM activation of the Czech- German border of July 27 when the FWI was not so high in the area yet several hectareas of forest burned triggering the european activation. https://reliefweb.int/report/czechia/czech-republic-forest-fire-dg-echo-hzs-ustecky-jrc-effis-media-echo-daily-flash-26-july-2022 and https://erccportal.jrc.ec.europa.eu/ECHO-Products/Echo-Flash#/daily-flash-archive/4551
- Table 3: Nearly all the mathematical formulas need revision. (for example, “x” is a variable, not the LaTeX symbol “\times” which produces the right operator; Log(Accumulated BA) description is wrong; BNA writings are in formula format, not in text mode, and they therefore appear stretched; the same for BAF, BAS, BAA.