

Reviewer #1, Steve Taylor

We thank Steve Taylor for his comments and particular for pointing out the error in DMC time lag.

General Comments

Overall the paper is well written and the work is sound - the paper is suitable for publication with minor revisions. The global gridded dataset(s) of fire danger indices presented in the paper will be useful for further analysis of past and future fire activity in earth system modeling. The authors note that other fire danger indices might be added in future. This compilation of historic FWI System values is a good start. The paper suggests/develops methodologies that would also be useful with finer scale regional reanalysis datasets.

Specific Comments

Although the choice of study period (33 years) doesn't line up with the standard climate normal period I assume users could adjust the data to a normal period.

In future updates of the data we will adopt more standard normal periods.

It is worth noting that the FWI System moisture indices (p6559) reflect litter and forest floor organic matter moisture which are important to fire activity in temperate and boreal forests. The FWI System does not reflect other time varying conditions that may also influence fire activity such as live fuel moisture, or atmospheric stability.

We have added the point about live fuel moisture at P6L2 and about atmospheric stability at P7L3. Possible inclusion of the Haines Index is mentioned at P36L3 in the Summary section.

A few small points regarding moisture code timelags (p650): 1) the timelag of the DMC is 14 days (not 12 days as in Van Wagner 1987) 2) the stated timelags are for a standard drying day (21.1 C and 45% RH in July in Canada) 3) timelags will differ for other weather conditions and day lengths.

We appreciate this comment and have mentioned the correct value at P8L17.

The review of global fire weather (p 6565-657) is interesting, but data for, and discussion of fire weather in Africa is notably absent.

We acknowledge this as a shortcoming of the paper. Despite our best efforts, we were not able to involve any expertise for Africa and did not have enough familiarity with the fire situation to take this on ourselves. We hope that it can be addressed in follow-up work.

The authors note caution in applying the DC in Mediterranean regions where deep organic layers are absent (p6568-26). This caution might be extended to subarid regions on all continents (Mexico, Central and South America, Australia, Asia, and Africa). While the DC may still provide a useful indicator of fire danger in sub-arid regions over some parts of the DC scale and some parts of the year, fire danger may not continue to increase with increasing DC over some threshold value, say \sim DC 600-800. Above this fuels are about as dry as they will get but DC continues to increase.

We appreciate this point and have added it at P20L22.

Technical Corrections

5464-24 typo "make therefore make"

Corrected at P15L6, thanks.

Reviewer #2, Anonymous

This review is of "Development of a Global Fire Weather Database for 1980-2012" by Field et al. In general, this is a well written, useful paper for the literature. I have made a number of minor and medium comments on the attached, and believe that after these have been addressed, the paper will be a very good contribution to the literature.

We thank the reviewer for their very detailed and helpful comments. We have made most changes, except for those regarding additional statistical analyses, which we felt were beyond the scope of this paper. We hope that these issues will be addressed by the user community as the data, hopefully, becomes better used. Page and line numbers refer to those in the revised manuscript.

P6557 L1: (Abstract) Make more quantitative in terms of what is put here. So instead of 'gridded' it becomes 'gridded at * resolution', instead of 'individual weather station data' it becomes data from ### individual weather stations. For the results, be more quantitative in the results, what is said is very vague. Be more specific. Since you use acronym MERRA, put (MERRA) first time used. As you do not use DC, then do not put the acronym.

P2L9, Abstract: We have added the spatial resolution, number of weather stations, MERRA acronym and have removed the Drought Code DC acronym.

P2L21: We have made the description of the MERRA DC biases more detailed.

P6558 L27: State scale it is gridded.

P5L3: We have added the common GFWED grid resolution. In Section 3.1 at P11L4 we have also added the 0.5 x 0.5 resolution of the CPC dataset

P6558 L27: I suggest that these are (i), (ii), ..., as you use 1., 2., ... for major headers.

P5L8: Thanks, we have changed the numbering of these point.

P6559 L3: This is in general a strong introduction, but it feels just a tad light on references towards the beginning, and towards the end, I suggest that you tell the reader how the paper is organized. In other words "This paper is organized as follows. We first described the Canadian FWI System in more detail (Section 2). We then...."

P3L13: we have cited de Groot and Flannigan [2014] when describing the wide use of the FWI system

P4L9: We have cited Lee et al. [2002] in describing how FWI maps have usually been estimated using geostatistical techniques.

P5L14: we have added a paragraph describing how the paper is organized.

P15L12: we have added a similar introduction to the regional analyses.

P6559 L5 : If you are going to state there are three and three, then break them out. So "The three moisture codes are:

(i) *****

(ii) *****

(iii) *****"

and then do the same for the other three. This will make it easier for the reader.

P5L6: We have added two sentences introducing the moisture codes.

P6L17: We have added a sentence introducing the behavior indices

Please ensure that references are included anywhere needed so reader can come back to these if needed. You have so many acronyms building up, that I suggest you either in the introduction, or in this section, you introduce a table of acronyms for the entire paper.

P38: We have added a table of all acronyms used in the paper.

P6559 L23: I would suggest this needs a reference, unless you are saying what you are doing. But, you are not defining how FWI is calculated, but rather following established literature. Why is 'System' in caps?

P7L13: We have added a reference to Van Wagner [1987], the primary technical reference for the FWI System. 'System' is capitalized according to convention, for reasons that are also unclear to us.

P6559 L23: This is why it is important to do a table of acronyms. You have put in 'LT' without every defining it, so first time introduced here, it needs to be defined "local time" in brackets.

P7L11: we have defined 'LT'

P6559 L24: Although it is clear that precip is totaled over 24 h, it is not clear whether temperature is an hourly measurement (averaged over hour or instantaneous on the hour) and more importantly the wind, as this values changes a lot if one is considering 1 minute vs. one hour averaged measurements. I would suggest rereading the rest of your paper, considering whether what you are saying requires the reader to go back to other literature to figure out what you did 'exactly', as in the example I have given.

P7L12: We have clarified that the temperature and RH measurements are instantaneous at 12:00, and that wind speed is the sustained windspeed at 12:00.

P6560 L3: Any references you might give?

P7L17: we were drawing this conclusion ourselves, but in the previous sentence have added a reference to Lawson and Armitage [2008] who emphasize the need for continuous weather data.

P6560 L15: Based on the introduction and what was written previously, I don't have a feeling for what these values represent, what a typical range is. Perhaps you can give a better feeling for all of your codes, when they are introduced, and typical ranges?

P6560 L18: Same as previous comment, I don't have a feel for what this number means.

P6L9: For this and the previous comment, beginning with the FPMC, we have very briefly mentioned the ranges of each FWI component and values that are considered extreme in Canada.

P6560 L23: Based on this paragraph, which is key, do you feel that an intelligent outsider not familiar with the index, would be able to repeat what you have done? I think they would find it difficult. I suggest that you go through this paragraph, and really consider if someone can go step by step and recreate your approach. I think most steps are there, it is just written in a manner that is not conducive to 'the approach considers the following steps'.

P7L21: We acknowledge that replicating the startup procedures would be difficult, but concede that, after an honest attempt, could not describe it more clearly. It was felt that this was a more 'procedurally' straightforward description than from the CWFIS. We note that all code used to generate the dataset is available should a user wish to see the procedure directly.

P6560 L27: Either tell us (in the next two sentences, or following them) that the number and areas of the masked out areas will be given in Section *, or tell us here how many areas and grid cells this is for each case. One item that is not clear here, is does this mean that if ten years it has a 'masked' criteria and one year it does not, you do consider it for that one year? So average temperature is less than -10 deg C, except for one year it is -9 deg C?

P9L6: We have described, fairly qualitatively, the areas that have been masked out. We have clarified that if the long-term criteria are not met (annual mean temp > 10C, annual mean precip 0.25mm/day), then that grid cell is excluded from the entire dataset.

P6561 L3: provide a couple sentences below this header, stating "In this section we *****, *****, and *****" so reader knows what is coming.

P9L11: we have added an introductory sentence for Section 3.

P6561 L6: Add "(MERRA)

P9L17: We have added MERRA

P6562 L23: Somewhat vague here. Either refer to later section where you will be more precise, or state "discussed in more detail below" or be more precise here.

P6562 L23: Again, a bit vague. Either state the section (e.g., further details given in Section *) or give the specifics here.

P6562 L24: Same comment. Be more precise here, or tell us it is coming.

P12L6: we have added a reference to Table 1 in the previous sentence and pointed out that individual processing procedures are described below.

P6563 L9: periods

P12L20: Done, thank you.

P6563 L13: "following local procedures which we now describe."

P13L2: Done

P6563 L15: Grammar?

P13L5: We have fixed this by splitting it into two sentences.

P6563 L15: in-text citation needed?

Most of the station data is not publicly available, but rather needs to be obtained directly from individual agencies. This information is in a README file as part of the distribution. We have added a Data Access section to the end of the paper.

P6563 L17: Break this out into specifics, with

(i) Thailand.

(ii) Australia

(iii) All countries.

this will make it easier for the reader.

P13L4: we have split this up into paragraphs for each source.

P6564 L10: All of these need in-text citations for the actual data bases. Try to avoid putting web

addresses (if that is what you use) in the text, and instead put them in the reference list.

So (NCDC, 2015) in the text.

Then in the reference list.

NCDC (NOAA National Climatic Data Center) (2015) Home page. [Online] Available from: [http://](http://www.***.***)

www.***.*** [Accessed 1 April 2015].

I suggest you do this for all of the 'data' places you refer to.

P14L15: The Smith [2011] BAMS article is the primary reference for the NCDC ISD. For the others, following the above comment, most data needs to be obtained by contacting contributors from the individual agencies. This information is provided in the README file as part of the data distribution.

L6564 L12: It wasn't clear to me how big these periods of missing data were, or how many. In other words,

consecutive numbers and totals. This needs much better explanation.

I get to Table 1 and go through this paragraph and the last, and I still don't really have a concrete feeling for how much gaps impacted the data or elsewhere. . This is an important item to explain. The way this is being written, almost requires the reader to consult with the authors to figure out exactly what was done--the reader would not do the same analysis given the same sets of data, as they would be unsure how gaps were dealt with.

L6564 L14: How often did this occur? Which locations?

L6564 L21: This is good, but still not enough to know exactly which years and for how many hours/days/ consecutive periods, data were missing. You could always include supplementary material with this information?

P15L3: we felt that the description of limited data availability for different periods in Southern Europe and Indonesia gives a representative indication of what is (and is not) available during the periods in Table 1. The daily input data is also provided as part of the distribution. This includes flags indicating 1) whether the precipitation was 'real' or taken from MERRA and 2) whether 80-120-18 antecedent precipitation criteria was met on a particular day. We have also included plots of these in the data distribution. We prefer to provide this as part of the data distribution as we hope to update the dataset annually, but cannot do this for supplementary information at the journal.

P6565 L1: Again, help the reader out, tell them what is coming. "Here we present results for each continent" or something like that.

P15L12: We have added an introductory paragraph for Section 4.

P6565 L13: Here and below, avoid having numbers on their own. So here, it would be approaching DC = 450. This of course will 'repeat' it, but much easier to read.

Added throughout.

P6565 L19: Here and elsewhere, if you use words like small, large, frequent, few, then add some quantitative descriptions, so "large fires (e.g., on average five fires > *** ha every year)"

We have added quantitative descriptions wherever possible in the regional sections.

P6566 L17: "(on average, 75 mm yr⁻¹ from YYYY to YYYY, reference)"

For consistency with the other station comparisons, we have simply removed the rainfall totals.

P6575 L5: Figure 8 feels like it belonged 'before' the results section, coming after the methodology. But, this is your decision to make where you want it to appear.

P6575 L7: Unclear. refer reader to section where discussed, or be specific.

P11L18: we moved this paragraph to the end of Section 3.1 and have made Figure 8 the first figure.

P6575 L11: I think you need to put the end date (at least for the Figure 9) not 'onwards'

P31L13: Changed.

P6577 L19: I get to the end of the results, after looking at all the figures, and I don't feel like I really have a good feeling (same was true for the data) that I understood, other than a fairly qualitative description, the range of the data spatially, temporally, in terms of DC. I would suggest thinking about some other ways of presenting summary statistics for the data, so is not just 'all' page after page of descriptive results. There are two main items being used for FC--spatially gridded data and time, and these do not come through well in the final results their variability. Finally, coming to the end of the results, and discussion, I do not have a good feeling for uncertainties and limitations. This is particularly important for a paper like this, as to what uncertainties there might be for the resulting data produced in time.

P30L4: We have avoided computing any additional statistics, but have added a Section 4.8 'Summary of DC comparisons' where we make some general comments across different climate zones. The main limitation of the data we identified was the disagreement at low latitudes between MERRA and the gauge-based calculations, which is stated in Section 5.

P6577 L77: Throughout, you need to better signal (without it being core to the argument in the text) the supplementary material.

P9L3: We have stated at the start of Section 3 that all data are available as part of the distribution.

P6586, Table 1: Tell us who's ID this is.

P51L7: We have added this to the caption of Table 1. Except for the Canadian stations, all stations were specified by their WMO IDs.

Tell us whether these are 'full years' used.

We interpreted this to mean how much data was missing. As discussed above, we have included detailed information on this as part of the data distribution and discussed representative cases for southern Europe and Indonesia, but without adding extra details to the manuscript itself.

P6588 Figure 1: Figure caption feels a bit incomplete and definitely not stand alone. Tell us what the monthly mean DC is based on (years used, data input--or refer reader to section in the text). For subsequent figures you can state "See Figure 1 caption for further details" In terms of the figures themselves, label them A, B, C, D. Add 'degrees' (symbol) for anywhere you have lat and long measurements. You have done monthly mean DC measurements for a given number of years. But what this does not give us an idea of is the spread of DC values over the years. I suggest you need to discuss this (in the text--is it normally distributed, thus justifying the use of a mean?) and here, consider using ± 2 s.d., or perhaps 25%-75% (and mode). This will put much of the results into much better context.

P55: In all figures, we have added letter captions and degree symbols to the figures. There was no effective way of describing what years went into each plot. Rather, as mentioned above, we felt that our discussions of the Southern Europe and Indonesian stations provides a good indication

that the number of years in each plot can be quite limited. Station specific information is very easily accessible as part of the data distribution. Likewise, the statistical details suggested here were beyond the scope of the paper, which was to document the development of the dataset and provide in only the most basic sense, how it compared to conventional calculations from station data. We hope that users investigate issues about the appropriateness of different statistics in detail.

P6596 Figure 9: Do you really mean global mean FWI, or rather global gridded (size of grid cell) mean FWI?

P62L3: We have changed this to 'Global gridded mean FWI'

P6597 Figure 10: Be consistent. use the word 'average' or 'mean' throughout, but do not go back and forth. As before, make it clear to the reader whether underlying probability of the values in each cell over the years is normally distributed or not, make figure caption more complete (what is grid resolution, refer reader to where procedure discussed, etc.).

Throughout, we have replaced 'average' with mean. As described above, for the purposes of this paper, we are not addressing the statistical distributions of the station or gridded data.