-Anonymous Referee #1Received and published: 6 June 2019

We would like to thank the referee for the valuable comments. We have prepared a point to point response to the comments and will incorporate the changes in the revised manuscript.

-Overall assessment. The current manuscript presents new research regarding the long-term assessment of fire danger based on hydrological data. Overall, it is an interesting study and the manuscript itself is well written. There are some points that could be improved, as highlighted in the following. Minor comments:

-Section 2.1: In its current form, this section would be more suited to a technical report document, rather than to a scientific publication. I would appreciate it if the authors revised their text, avoiding the bullet-style format.

We have revised the text, avoiding the bullet-style format:

For the purpose of this study, four input data sets were used (Figure 1). First, monthly VPD was generated from the AIRS near surface air temperature (Tmean) and relative humidity (RH) Version 6 (Aumann et al., 2003; Goldberg et al., 2003). Please refer to (Behrangi et al., 2016) for the formulation based on monthly air temperature (Tmean) and dewpoint temperature (Tdmean) as well as the reliability of this formulation for monthly VPD derivation. The data are in 0.5 degree spatial resolution and available since September 2002. The second input the model was monthly surface soil moisture data, which are produced at the NASA Goddard Space Flight Center (GSFC) using the Catchment Land Surface Model (CLSM) (a physically based land surface model) and assimilated ground and space-based meteorological observations (Tapley et al., 2004; Houborg et al., 2012; Reager et al., 2015; Zaitchik et al., 2008). The SSM data are available since April 2004. The third dataset was the Global Fire Emissions Database version 4 (GFED-4s), which provides wildfire burned area at 0.25 degree spatial resolution. GFED-4s is primarily derived from MODIS from 2001 to present and is reported as fraction of a cell burned for a given month (van der Werf et al., 2017). GFED data are available since 1997. Finally, in this study, we have excluded agricultural fires by masking out agricultural regions as classified by the 2011 National Landcover Database (NLCD 2011) (Homer et al., 2015).

-L115: Is there any reference that could be used for supporting the statement that GACCs exhibit similar fire weather types?

Here are two publications that support the statement that GACCs are geopolitical boundaries that represent similar fire-weather types and are used to allocate fire management resources across the contiguous United States.

Finco, M. Monitoring Trends and Burn Severity (MTBS): Monitoring Wildfire Activity for the Past Quarter Century Using Landsat Data. 2012, 7.

Abatzoglou, J. T.; Kolden, C. A. Relationships between Climate and Macroscale Area Burned in the Western United States. Int. J. Wildland Fire 2013, 22 (7), 1003. https://doi.org/10.1071/WF13019.

-Table 1: Discussion of results should be removed from the legend of the Table, which should only provide information about the data presented.

The discussion of results was removed from Table 1 legend. Here is the updated legend:

Table 1. Overall model performance and separate influence of individual hydrologic variables. We use Nash-Sutcliffe coefficients to describe the combined Soil Moisture (SSM) and Vapor Pressure Deficit (VPD) simulation performance (ES), the climatology performance (EC) and the individual predictor performance (ES,VPD ES,ssm) vs the observations.

-L219-222: Some references on the different behavior of different vegetation types would enhance the statement made here.

We have added some references on the different behavior of vegetation types:

For example, in the Northern Rockies, it is roughly half evergreen forest and half herbaceous (Figure 1); evergreen forest typically need to be dried to sustain combustion (high VPD in the month prior), while herbaceous communities typically need wet conditions months prior to grow fuels (high SSM 2 months prior) (Littell et al., 2009; Stavros et al., 2014a).

Littell, J. S., McKenzie, D., Peterson, D. L. and Westerling, A. L.: Climate and wildfire area burned in western U.S. ecoprovinces, 1916–2003, Ecol. Appl., 19(4), 1003–1021, doi:10.1890/07-1183.1, 2009.

Stavros, E. N., Abatzoglou, J., Larkin, N. K., McKenzie, D. and Steel, E. A.: Climate and very large wildland fires in the contiguous western USA, Int. J. Wildland Fire, 23(7), 899, doi:10.1071/WF13169, 2014a.

-L229-236: This paragraph is mostly a repetition from the Introduction. I believe it does not add anything to the discussion and could be thus removed.

We will remove this paragraph from the revised manuscript.

-Technical remarks L56: "far away" . Changed
-L70: "Behrangi et al. (2016)" Changed
-L85: "hypothesis" Changed
-Fig.1: Please, annotate the different panels of the figure (a, b, c, ..)

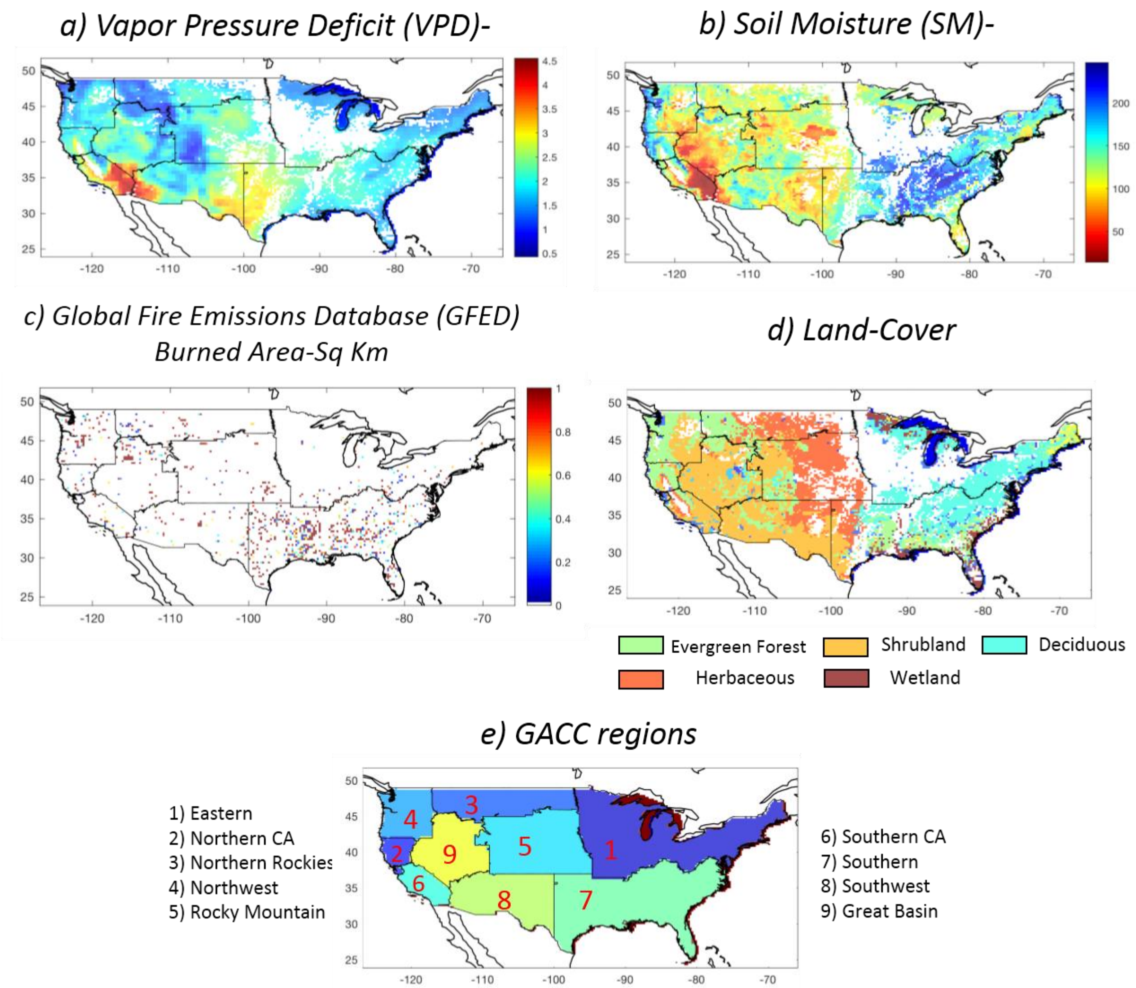

Figure 1: Snapshot of August 2010 of the datasets used in relation to the Geographic Area Coordination Centers (GACCs).

-Equations: Please, number all the equations present in the manuscript.

We have numbered the equations. Here is the list of the numbered equations:

$E_w = \sum_{j=1}^{12} E_j \, * \, FAB_j$ (1)

$E_j = 1 - \frac{\sum_{i=1}^{n}(AB_{obs,i} - AB_S)^2}{\sum_{i=1}^{n}(AB_{obs,i} - AB_C)^2}$ (2)

$AB_s = AB_C + AB_A$ (3), $where$

$AB_A = a + b * (VPD_A) + c * (SM_A)$ if $E_j > 0$

$AB_A = 0$ if $E_j \leq 0$

-Section "Results" is not numbered. Same for "Discussion and Conclusions".

Section "Results" will be 5th and section "Discussion and Conclusions" will be 6th section.

-L166: "evergreen vegetation". L172,175:"herbaceous vegetation". L184: "worst" instead of "least". Changed all