

Interactive comment on “Satellite Hydrology Observations as Operational Indicators of Forecasted Fire Danger across the Contiguous United States” by Alireza Farahmand et al.

Anonymous Referee #2

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****General comments:**

This manuscript aims to predict monthly fire danger across the United States at the scale of the Geographic Area Coordination Centers (GACC), using the preceding vapor pressure deficit (VPD) from AIRS satellite mission and assimilated soil moisture as two predictors. Overall it is a very interesting topic and can provide valuable information for fire management planning. The results showed that the prediction of monthly area burned worked better than using the long term monthly mean climatology of fire activities.

However, a more meaningful test or evaluation of the forecasting capability would be

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to quantify if the approach can capture various categories of fire danger, especially considering there are already quite a few forecasting models available as mentioned in the Introduction.

Although VPD and SSM had been shown highly correlated with fire activities from other studies and for sure these two need to be included, I think it would still be necessary to explore other variables such as temperature and have a rigorous variable selection.

For the model assessment, I think some standard statistics such as R² between observed and predicted monthly burned areas would be helpful.

**** Other specific comments are listed below.**

1. Introduction can be a bit more thorough, especially with regard to the fire management need, such as how forecasting of fire danger is helpful for fire prevention and suppression, and what is the preferred lead time?
2. Fire danger (Line 78) was defined as amount of area likely to burn given an ignition. The GFED burned area dataset, however, represented the actual area burned, which included the contribution of both ignition probability and fire spread once ignited. Please clarify.
3. What land cover product was used (e.g. in Figure 1)? For GFED Burned Area map, it doesn't look like the unit is in sq km as the color bar shows 0-1. Also I think it would be helpful to show a map of long term mean August burned area from GFED.
4. How the regression models were built needs clarification. For example, for each month and each GACC, each sample is a 0.25 deg grid cell? Please list the sample size for each GACC.
5. Some of terms described in Line 134-136 are not consistent with those shown in the Equation (Line 133), e.g., Xobs vs. ABoBs.
6. Would it make more sense to summarize the forecasting skill over the fire season

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rather than whole year?

7. Figure 3: it is hard to see the association between SM, VPD, anomalies and burned areas, I'd suggest use single column.

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