

Interactive comment on “MOSEV: a global burn severity database from MODIS (2000–2020)” by Esteban Alonso-González and Víctor Fernández-García

Anonymous Referee #1

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General comment

The manuscript presents a newly developed global database of MODIS-based burn severity indices for the 21st century. I believe that such readily available dataset is an important development which would enable researchers to perform a range of analyses focused on global fire dynamics and impacts. I can certainly see myself using the dataset in the future. The manuscript is generally well structured and written, however, I have a few concerns and comments which I would like the authors to address before publication.

My main critique of the manuscript is twofold. Firstly, the presented comparison of

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the MOSEV vs Landsat burn severity estimates is very limited and offers little in terms of actual validation and uncertainty estimation. While I do realize that validating such a dataset is difficult to say the least, but with little extra work the authors could help the potential users of the MOSEV dataset to gauge magnitude of uncertainties and biases associated with the burn severity estimates. In particular, it would be useful to see distributions of the burn severity indices in addition to the presented comparison data. Secondly, the manuscript lacks discussion on what typical satellite-based pre- and post- burn NBR (and hence dNBR or RdNBR) values are and how they relate to biomass consumption/fire severity as measured by field studies or any other methods. Please see the specific comments for further details.

Specific comments

Lines 55 – 57: The sentence is the only place that I could see where a quantitative estimate of how well satellite-based burn severity estimates relate to field data. This is key information and the discussion should be expanded. It is currently not clear if these published dNBR and RdNBR validations against field estimates of biomass consumption and plant mortality apply to Landsat data? Where ther any MODIS data-based validations? Also please provide estimates for different environments if available. This information is critical in supporting the undertaken comparison of MOSEV dataset with Landsat estimates (which serves as the only validation at this point).

Line 85 (Figure 1) What does “Fires Detected” conditional block represent in the flowchart? Is this simply checking if MCD64A1 tile contain burned pixels of something else? If additional filtering to MCD64A1 data was applied, what were the implications for MOSEV coverage in comparison to MCD64A1 burned area?

Lines 100 – 105: From the description it is not clear why burned area date uncertainty is inflated by 8 days in Eq. 3, but the same is not done when determining preNBR date in Eq. 2. Could authors explain this.

Lines 163 – 170: The section presents mathematical ranges of the data, however it

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would be also very interesting to see distributions of actual retrieved values, perhaps in the results section. In particular, what proportion of total dNBR and RdNBR estimates have negative values and what is the interpretation of this result. This is very interesting as MCD64A1 burned area algorithm uses difference in reflectance of bands p5 and p7 (p7 is also used by MOSEV) to determine burned area in the first place.

Line 178: “no fires were detected” is ambiguous as the term is usually associated with active fire satellite products. Was active fire detection data used in the study? If not, perhaps “no burned area pixels” would be more clear.

Lines 202 – 203: I’m not sure if the scatterplots (Fig. 4) make it possible to tell whether there’s a positive bias in MOSEV estimates vs Landsat. To me it seems that at lower values MOSEV estimates are lower, and that this results in the slopes of linear fits seen in Fig. 4. For dNRB subplot in particular I see a dense cluster of negative MOSEV dNRB values which correspond to low (but positive) Landsat dNRB. This also applies to post-NRB plot. Would be useful to see histograms of the values to compare the distributions as well as scatterplots.

Line 221 (Figure 4.): A few questions/comment and suggestions here:

1. Why the authors chose not to present pre-NBR subplot? Given that post-NBR shows highest correlation but dNBR and RdNBR indicate weaker relationships, the question rises what is the situation with the pre-NBR estimates.
2. Do the plots show all of the validation data? To me it seems that negative values were cut off.
3. I think it would be very useful to see histograms of the estimated burn severity indices. In particular, distributions of global MOSEV values (could be data from one year, 2019) and distributions of data used for comparison with Landsat, showing both MOSEV and Landsat values. This would show if the selected comparison regions are representative of global values and any biases between MOSEV and Landsat-based

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estimates.

4. In addition, rather than having pooled global comparison, I think it would be very interesting to split the analysis data into different land cover types. MODIS product MCD12Q1 (which has the same projection and tiling system as MOSEV) for the year 2019 could be used to determine land cover for the comparison burned pixels. It would be indeed interesting to see what the agreement between MOSEV and Landsat estimates is for forests versus grasslands and agricultural land. This suggestion is however optional as this would involve analysis of new datasets.

Lines 233 – 235: What are the algorithmic differences between MOSEV and other MODIS-based burned severity products? Also, a discussion of differences between MOSEV and other MODIS-based NBR studies should perhaps be included in the introduction.

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