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Interactive comment on “Calibration and evaluation of the Canadian Forest Fire Weather Index (FWI) System for improved wildland fire danger rating in the UK” by M. C. De Jong et al.

Anonymous Referee #3

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General comments:

The authors have done a thorough job with the large task of overhauling an FWI system for an entire country, and I applaud them at that. Perhaps the issue I see not so much scientifically, but rather philosophically with the way in which the FWI was modified here. In principle, the FWI in Canada was designed to replicate fuel moisture conditions in a standard pine stand, and as a result is calculated using the same equations across the entire country (and indeed around the world where used), save the overwintering component of the DC. Your percentile-based approach appears very much scientifically sound, but there are complications to be found where in theory each grid

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cell may have differing thresholds or structure in the FWI, so that simpler operational guidelines (such as the commonly used FWI>19 threshold in Canada) would be more difficult to communicate. In practice in a large country like Canada, each jurisdiction has differing thresholds categorizing FWI into for “High”, “Extreme”, etc hazard levels, and these vary by climate. In practice, since an BUI of 40 is results from the same set of weather beforehand across the country, it is easier to train staff to the expectations of fire behaviour at those levels for a particular fuel complex. In any case, my concerns are not so much scientific as applied, but I think the application of such a variant of the FWI and its implications for firefighter training are worth considering.

My other larger consideration is with the overlay of fuel type in this model. When you build Theil-Sen models by land cover type (as on page 7016), what happens when the land cover type changes? Would the percentiles here per land cover type be the only time that this FWI is calculated? Would future fire events (and more extreme weather) then also change the calculations behind the FWI? This could present problems for the deployment of such a model in the future.

My above concerns notwithstanding, the manuscript is skillfully clean and well laid out. I have very few editorial comments, listed below alongside more specific comments:

Specific comments:

The title on the right sidebar of the journal lists “FFWI System” when the proper name is “FWI System”

Page 7004: Given that the MOFSI has the same categories across the entire UK, how badly would a model with differing FWI thresholds per region perform across the UK?

Page 7019: Given a ~5 month fire season, would a 99th percentile not occur 1-2 times per year, rather than “one in several year”. For indices that are less wind-sensitive and vary less per day such as BUI, I could see that the 99th percentile would indeed be only every few years.

Page 7019: the detailed narrative for the Berkshire fire is far too detailed for a paper of this broad scope. I'd suggest cutting this back a fair bit.

Page 7021: Is there a statistically-sound way of convincing the reader that the skill of your model on these extreme weather days is better than random chance? What is holding you back from just painting everything exceptional? Can you link this back to AUC or some other statistic that would account for false positives and better reflect the true skill of the model?

Page 7024: The paragraph on lines 7-20 is excellent, and more discussion of this nature should be fleshed out in the paper in my opinion.

Page 7038, figure 2: in panels b and c, is the trend similar when examining area burned rather than just the number of fires? Given that fire size varies by a few orders of magnitude, a few small fires ~ 1 ha may be quite different that one fire of 100-200 ha.

Figure 7: in the rank-percentile curves, is there any consideration of fire size? Is there a good justification for not weighting this by fire size somehow?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 6997, 2015.

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