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Interactive comment on "High-resolution forest carbon flux mapping and monitoring in the Pacific Northwest with time since disturbance and disturbance legacies inferred from remote sensing and inventory data" *by* Huan Gu et al.

Anonymous Referee #2

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This is a pretty good and potentially useful paper that could be published after some modifications. The main problems I can identify are (1) the introduction is poorly written in places, (2) an important and highly relevant citation is missing, and (3) the discussion needs more work.

Detailed comments below address some problems with the introduction. The missing citation is more troubling since it presents an alternative approach to using the CASA model for estimating growth (or NEP) which is a center piece of this study. The citation is: Raymond, C. L., Healey, S., Peduzzi, A., Patterson, P. 2015. Representative

regional models of post-disturbance forest carbon accumulation: Integrating inventory data and a growth and yield model. Forest Ecology and Management 336: 21-34. This should be referenced in a couple of places (p. 2 line 20 and p. 4 line 1).

The discussion should compare using the CASA model and using the Raymond et al. approach which relies on an FIA driven empirical model, the Forest Vegetation Simulator (FVS). What are the advantages and disadvantages of each approach, and do they yield similar results (the regions are different but still may be able to compare results for one or two forest types). I also suggest that the discussion should explore in more depth the many assumptions and inferences that have to be made to estimate time since disturbance for "undisturbed" pixels (section 2.2.2). For example, the Kellndorfer biomass map used to estimate biomass of "undisturbed" pixels has fairly high uncertainty at the pixel level; some pixels were assigned forest types based on a nearby neighbor pixel, etc. By the way, the title of section 2.2.2 is an oxymoron – if the pixel is "undisturbed" there should not be a time since disturbance. So instead of "undisturbed" the authors should use a different term to identify pixels that had no detected disturbance since 1986, perhaps something like "recently undisturbed".

Specific comments

The title is too long and redundant. Suggest "High-resolution forest carbon flux mapping in the Pacific Northwest with disturbance legacies inferred from remote sensing and inventory data". Could also leave out "in the Pacific Northwest".

p. 1 line 22: delete the second "probabilistic,"

p. 1 line 26: re-word so that it does not appear that tracts of land can somehow "see".

p. 2 line 13: replace "is itself a sort of record of" with "reflects"

p. 2 line 14: replace "general" with "predictable rate of"

p. 2 line 22-23: needs some rewording. The idea is that it is important to include small-scale disturbances down to some minimum threshold, not that disturbances typically

are at this small scale.

p. 2 lines 27-28: add "at smaller scales" to the end since national forests inventories can provide useful guidance only at larger scales. But importantly note, it is possible to conduct field inventories at very small scales, so the statement is not very correct at all, only partially correct with respect to national forest inventories.

p. 3 lines 11-12: One objective is clearly stated. What are the others? The last sentence of this paragraph seems to be another objective, but then, I'm confused as to whether the purpose is to develop a method for large-scale monitoring and management, or small-scale, or both?

p. 3 lines 27-28. Terminology again – "undisturbed" pixels by definition should not have a time since disturbance.

p. 3 line 32: Biomass curves were developed by forest type group and productivity class. How were these 2 classes allocated to the 5 NEP classes described on p. 4 lines 2-4?

p. 3 line 35: add citation after "...varying severity".

p. 6 line 26: replace "stand" with "standard"

p. 8 line 21: sentence that begins with "Again" needs editing.

p. 9 lines 24-25: the imprint is not so clear to me. Maybe need to highlight somehow on the graphic.

p. 10 lines 12-14: One could argue that inventory data does not provide such a reliable estimate of biomass/age. Both of these variables can be rather difficult to measure/estimate especially with respect to the selection of biomass equations, but also the difficulty of assigning a stand age to stands that are uneven-aged.

p. 12 lines 1-7: not statedâĂŤFIA does not do a good job of detecting recent disturbances because the remeasurement cycle in the PNW is about 10 years, so the

average time lag of the data at any point in time is at least 5 years.

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Discussion paper