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Biogeosciences Discussions

Interactive comment on "Cajander larch (*Larix cajanderi*) biomass distribution, fire regime and post-fire recovery in northeastern Siberia" *by* L. T. Berner et al.

Anonymous Referee #2

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The article "Cajander larch (Larix cajanderi) biomass distribution, fire regime and post-fire recovery in northeastern Siberia" is an excellent body of work showing how data from different spatial resolution satellite sensors can be used to scale up information on the relationship between tree shadows and above ground biomass to examine issues of climate change.

While I like the approach presented in this paper, I was curious as to how sun angle variation and snow depth may have influenced AGB estimates among the WorldView-1 models. If this potential source of model error was assumed negligible, some explanation as to why is warranted. Also, I was curious as to why winter Landsat-5 data

were not used to scale up WorldView-1 AGB estimates? Models presented here relate TSF-WV to AGB and then AGB to summer Landsat-5 data. Models making use if winter Landsat-5 data would have outperformed that of summer Landsat-5 models. The key is the benefit of snow cover, which hides potentially confounding spectral signatures related to variable ground vegetation and moisture status. Adding a section about choice of summer Landsat-5 data over winter (with snow cover) data should be mentioned; with an acknowledgement that research has shown that winter Landsat-5 data has produced more accurate estimates of AGB compared to those calibrated with summer Landsat-5 data.

Also, references were made to non-tree vegetation (herbaceous and woody brush). Shadow contributions from woody brush can have substantial influences on total shadow fraction, which will vary according to snow depth. Again, what was the snow depth and what were the impacts on model calibration?

Much of the work in the paper hinges on accurate estimation of fire age from the interpretation and or timing of satellite images. As the authors have stated, recent fires in boreal landscapes produce unique multi-spectral signatures in the visible, near-infrared, and short-wave infrared regions of the electromagnetic spectrum and that such signatures become decreasingly detectable over the course of $\sim$six years. After six years, stand-replacing disturbance is not spectrally distinguishable as that of fire. I was curious as to why attempts were not made using the n=25 field plot data to link tree ring data of "surviving trees" to the fire origin of spectrally ambiguous disturbance patches that were beyond the stated 6-year mark in age? With such tree ring data data, one could have developed empirical regression equations to relate disturbance age to multi-temporal vegetation progression signatures using Landsat-5 data to better estimate disturbance origin among older fire scars...even if the Landsat archive was spotty. This, of course, assumes that fire is the dominant stand-replacing disturbance agent in this region.

Interactive comment on Biogeosciences Discuss., 9, 7555, 2012.