

Interactive comment on “High resolution wetland mapping in West Siberian taiga zone for methane emission inventory” by I. E. Terentieva et al.

Anonymous Referee #1

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The authors present results from the development of a detailed wetland land cover map for the West Siberian Lowland (WSL). The results indicate that the produced map is an improvement over existing products. Special care was taken to develop a classification scheme that could be useful for the methane modeling community. The amount of work performed is impressive and the product generated has potential to improve our understanding of the role of wetlands in the global climate system. General comments: The contents of the paper and the text, particular the language, need substantially more work. Overall, more clarity is needed. The method section lacks detail. Some of the background information provided belongs either into the discussion section or, if not relevant for the development of the product, should be removed. Some of the remote sensing terms in use need more clarification. I suggest reword-

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ing statements and shorten sentences. Please run the document through an English grammar/syntax check (e.g. Word) or invite an English speaker to improve manuscript language, reading flow and understanding. The figures and tables are well done. I have made a few specific recommendations below. My recommendation is to publish this paper but not in the present form. Specific Comments: Title: I suggest a new title: “High-resolution satellite mapping of West Siberian Lowland wetland complexes: Implications for methane emissions” P. 20150 L.3 “sink carbon and emit methane”. Inconsistent since methane also contains carbon. Do you mean sink CO₂ and emit CH₄? L.3-5 Reworded: Fine-scale heterogeneity of wetland landscapes poses a serious challenge when generating regional-scale estimates of greenhouse gas fluxes from point observations. L. 7-8: Reworded: “Training data consists of high-resolution images and extensive field data recorded in 28 test areas.” L.7-10. Reworded: “The classification scheme developed aims at supporting methane inventory applications and includes 7 wetland ecosystem types comprising 9 wetland complexes.” L. 24-26. Reworded: “The West Siberia Lowland (WSL) is the world’s largest high-latitude wetland system and experiences an accelerated rate of climate change (Solomon et al., 2007).” P. 20151 L. 1-3 Reworded: “Poorly constrained estimates of wetland and lake area constitutes a major uncertainty in accurately predicting current and future greenhouse gas emissions (Melton et al., 2013; Turetsky et al., 2014; Petrescu et al., 2010).” L. 4-7 Reworded: “Fine-scale heterogeneity of WSL’s wetland landscapes (Bohn et al., 2007; Eppinga et al., 2010; Bridgham et al., 2013) is not accurately accounted for when wetland CH₄ emission inventories (Glagolev et al., 2011) and net primary production (Peregon et al., 2008) are generated from point-scale field observations.” L. 8-9: Corrected: ... fails to capture fine-scale ... L. 14: “surface” What surface? The soil surface? The leaf surface? The land surface? Does wetland area equate inundation area? Please qualify your statement. L. 16 “Modelers ...” Can you be more specific? Same line: “high-resolution map” Map of what? L. 20 “in aggregate to limited or no ground truth data” Please rephrase this, if possible! L. 26 “high-resolution images” Images of what? Please specify! L. 27 “upscaled estimations” What estimations? P.

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20152 L. 9 “and the model assessment.” Unclear. Please qualify! L. 12 “Urals” Do the authors mean the Ural Mountains? L. 13 “stretching” Remove. L. 14 “great expanse” can be reworded to “vast expanse” L. 14. “flat topography” Nothing has a flat topography. Topography is the study of landforms etc.. If authors talk about the relief of the region then “flat terrain” is appropriate. This will describe that the relief of the region is rather flat than being mountainous/hilly. Please correct all subsequent instances. L. 21 “. . . impeded” Do authors mean “poor”? P. 20153 L. 1-6 Please shorten this or drop all together. If authors use any of this information later i.e. in their discussion, then place it there. Now that I finished this section, I believe that authors should shorten the whole section. Focus on mentioning only the important stuff or cite the relevant literature for reader to look up, then move on. L. 8-P. 20154 L. 2 Did the authors do this? If they didn’t, then they shouldn’t mention it. People are interested to hear about what the authors did. If there is anything important here then it can be talked about later i.e. in the discussion, but not here. Please pay attention to presenting only your work. P. 20154 L. 5 Which Landsat did the majority of images come from? Landsat 4, 5? L. 11-12. Why did the authors do this transformation? Was the native projection of images not good enough? Did it vary? L. 16. 5th Landsat band. Can you provide wavelength or wavelength range for this band? L. 17. What do authors understand as inundation? Can channel 5 be used to mask out standing water that is covered by vegetation? The latter areas are considered inundated but can authors can sense them with Landsat? I believe authors can mask out all open water including inundation that is not masked by vegetation. Please be more specific, else define your terms. L. 29 Is high-resolution imagery from Google Earth multispectral? Can the author say something about the characteristics of these images? Spatial and spectral resolution, sensor, acquisition dates etc. P. 20155 L. 3 Who or what are “they”? L. 6 “contiguous” Do you mean “adjacent”? L. 7 Please define auxiliary data coverage? Do authors mean ancillary data? Remember: readers want to know what they are and what was done with them. Provide more detail, please. L. 7-11 How did the authors judge the quality of their training samples? Did they quantify spectral separability prior to classi-

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fication? L. 16 Patch effects. This looks as if it is a result so likely it does not belong here. L. 19 What are the filter parameters? Any weights? What is the size? P. 20156 L. 5 I suggest to replace “water” with “open water “. L. 6 Same thing. Suggest authors say “Open water bodies fewer . . .”. L. 21 “resolution cell size” Do authors mean “sensor spatial resolution”? P. 20157 L. 10 Which high-resolution images? Google Earth? If so, are they multispectral? L. 8-12 I suggest that authors provide more detail on the unsupervised classification unless this is the “Peregon approach”. L. 26 How did authors manage this? Were floodplains masked prior to this? If so, what data was used for masking floodplains? P. 20158 L. 5-6 Context? L. 25 “feasible” I believe that “reasonable”, “practical” or “economical” may be better words here. Feasible simply means it’s possible. P. 20159 L. 26-27 Please define patch effect. And where do I find it? “ensue from” Do you mean “result from”? Abrupt leaps? What is this and where do I find it? Is this shown in any of the figures? P. 20160 L. 4 reworded “low evaporation and minimal runoff” L. 7 reworded “for one hundred kilometers” L. 16 “cupola” I suggest to use “dome” here. L. 27-P.20161 L. 1 Suggest rewording: e.g. “The southern and middle taiga wetlands exhibit similar spatial patterns; however, the area of fens increases in a stepwise fashion due to the abundance of carbonate soils and higher nutrient availability.” L. 1-5 Suggest rewording: e.g. “Velichko et al. (2011) provide evidence for the existence of a vast cold desert in the northern half of the WSL, whereas the southernmost part was an area of loess accumulation. The border between fen and bog-dominated areas extends near 59°N, and corresponds to the border between the southern and middle taiga zones (Fig. 4c and e).” L. 15 “neighboring classes” Spatially or spectrally close? L. 22-26 Confusing. Suggest rewording or explain in more detail. L. 26 “disposed” Do authors mean “arranged”? P. 20162 L. 9-10 How so? Can low-resolution images do a better job? Explain. L. 14-16 Suggest rewording: “During dry period, swamps were often confused with forests, whereas in the field they can be easily identified through the presence of peat layers and a characteristic microrelief. L. 20 “snow melt” ? L. 24 “indicate”? Do authors mean “achieve”? P. 20163 L. 12 “turn” Do authors mean “develop”? L. 14 “commonly” Do authors mean “typically”? L. 15

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“Oppositely” Do authors mean “in contrast”? L. 17 “interannual variability” of what? L. 18 “reasonable” Do authors mean “important”? L. 18-21 Suggest rewording. P. 20164 L. 1 “results from PALSAR.” Please cite Clewley et al (2015) and Chapman et al. (2015) L. 7 Schroeder et al. (2010, 2015) actually combined active with passive microwave sensors to measure open water. L. 27 “describe” Sure. But authors should also mention that they “developed” their map. P. 20165 L. 10-13 Suggest rewriting. L. 17 “most ambiguous” Do authors mean “least discernable”? L. 20 “embracing at least”? “As in “covering at least”? L. 23 “was oriented” Do authors mean “geared towards improving methane emissions ...”?

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