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Interactive comment on "Can the heterogeneity in stream dissolved organic carbon be explained by contributing landscape elements?" *by* A. M. Ågren et al.

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General overview: This study is a welcome addition to the field of catchment biogeochemical modeling. The data on DOC concentrations and patterns in the landscape is an important contribution to the growing body of data and conditions around the world. I would have welcomed some estimates of fluxes, but understand that this material is an important precursor to those calculations. I did find that the number of landscape variables seemed very numerous for the final model (see comments below). Many studies of DOC concentrations have reduced the predictor variables to a few key landscape attributes. I think this approach could improve the presentation and use of the

proposed model. One other technical improvement that the authors might consider is trying the new Bayeseian approach INLA (http://www.r-inla.org/). This is an alternative to MCMC stochastic modeling. I believe this technique offers great promise to researchers that use time series measurements. General comments: 1. The abstract could be more specific and concise. 2. A theme is the evaluation f the models is that they are 'okay'. I am curious if the authors are satisfied with this first approximation, or did it fall well short of the expectations of the study? 3. What do the parameter estimates represent in equation (1). Are the parameter values percentages? If 'peat' is an area, is 'A' a modifier for the concentration or a percent of the area? This equation needs to have a bit more explanation to be clear. 4. There are many variables selected for input, but these variables don't appear to play a major role in the evaluation. The landscape variables are generally used as predictors. However, the authors note that prediction isn't a goal (section 4.1). Could this model be used for prediction? What are the shortcomings? 5. It is not completely clear to me what Figure 8 conveys. Perhaps the discussion of this figure could be expanded. 6. Section 3.2 and figure 7 are hard to follow. What purpose do the variables play in the model? If there isn't a great deal of use for the variables, shouldn't they be eliminated in the model run? I'd like to see the most parsimonious model described to reveal the most influential landscape factors. For example, what functional role does tree volume play in discharge? Is this variable actually a covariate for some other variable? Is there a subset of influential variables among the 23 predictors in the model? 7. Freezing can reduce DOC concentrations in high DOC samples. Is it possible to improve the model performance if an adjustment to freezing loss is introduced? Perhaps the relationship of the potential loss in samples vs. residuals could be examined. 8. Is there a potential to represent the areas of uncertainty in the hydrologic pathways in a figure? This uncertainty is a concern in the community of biogeochemical transport modeling. What is the role of large valley bottoms on the transport mechanisms? Should there be some discussion of hyporheic dynamics in the sediments? Specific comments: 1) Page 15916:5. Can you provide some examples of 'scale-dependent' processes? 2) Section 2.1,Page 15917:15. Are

the forests classified as ‘forested wetlands’? 3) P15918:10. Is the other 50% ET or loss through some other pathway? 4) P15919:25. Frozen samples may be subject to DOC loss (see Fellman et al., 2008. Sci. Tot. Env. 392:305-312. 5) P15921:0. If riparian zones are important for DOC flux, which grouping includes these landforms? Sorted sediments? 6) P15928.Section3.2.0. I’m not familiar with PLS so this section was a bit difficult to follow.

Interactive comment on Biogeosciences Discuss., 10, 15913, 2013.