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Interactive comment on "Partial coupling and differential regulation of biologically and photo-chemically labile dissolved organic carbon across boreal aquatic networks" *by* J.-F. Lapierre and P. A. del Giorgio

Anonymous Referee #5

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General Comments This manuscript describes an extensive study of biodegradable (Bd-DOC) and photo-chemically degradable (Pd-DOC) dissolved organic carbon across a large range of boreal lakes, rivers, and wetlands (mostly beaver ponds) in Quebec, Canada. The authors quantify percent and total concentrations of Bd-DOC and Pd-DOC, and relate these pools to specific optical DOM properties, including fluorescent components, and to nutrient concentrations (total N, total P). Based on these relations, they conclude that terrestrial landscapes are important sources of both Bd-DOC and Pd-DOC pools to aquatic systems, and that autochthonous sources of Bd-

DOC are important in some systems but that terrestrial inputs of Bd-DOC can be large enough to overwhelm the significance of the autochthonous pool.

I very much enjoyed reading this manuscript. It is well-written and the authors thoughtfully and effectively present the current state of knowledge of degradable DOC in aquatic systems, the gaps in our knowledge, and how this study aims to address some of those gaps. I found the approach to be technically robust, and while broad conclusions are made the authors are careful not to overstate their significance. The topics addressed are very relevant to the scope of the journal, and the results and conclusions are certainly of interest to the broader scientific community studying terrestrial-aquatic linkages and carbon dynamics. I have some specific comments about issues that the authors should address, listed below.

Specific comments 1. Section 2.4: Some details on the incubations need clarification. Specifically, were the Bd-DOC incubation samples on Day 0 and Day 14 re-filtered at 0.45um prior to DOC analyses for DOC loss determination? Also, were the Pd-DOC incubations conducted on water filtered at 0.45um or at 2.8um? 2. Section 3.2: It would be instructive for readers if the maximum excitation/emission wavelengths for each PARAFAC component were provided, either in the text or a table/figure caption. 3. Section 3.2, and Table 1: In presenting and discussing fluorescence component "concentrations", I think it is important for the authors to state that these are still relative concentrations rather than absolute concentrations, and that they are expressed in Raman Units. This would clearly convey that the authors do not mean concentrations in mg/L. 4. Section 3.4: Did the authors test the effect of stream Strahler Order on Bd-DOC or Pd-DOC within the rivers dataset? It would be interesting to know if there was any relationship. 5. Section 4.1: It is unclear what exactly the authors mean by "freshness". In some places it is discussed in the context of time since export to aquatic systems. Is what the authors mean, or is it more in the context of extent of prior decomposition (both biological and photochemical)? Some clarification is needed here.

BGD

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Technical comments 1. Section 2.3, line 20: “was” should be “were” 2. Section 2.4, line 5: “that” should be “than” 3. Section 2.4, line 26: “alters” should be “alter” 4. Section 4.1, line 4: delete “of” 5. Section 4.1, line 21: change “synonym of” to “synonymous with” 6. Section 4.3, lines 8: “. . .not only may biologically labile DOC be produced. . .” 7. Fig 3, caption: I don’t understand the equation presented for 3b (what is C.I.0.58?)

Interactive comment on Biogeosciences Discuss., 11, 6673, 2014.