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Interactive comment on “Molecular characterization of dissolved organic matter from subtropical wetlands: a comparative study through the analysis of optical properties, NMR and FTICR/MS” by N. Hertkorn et al.

Anonymous Referee #1

Received and published: 13 October 2015

This paper by Hertkorn et al. uses analyses of optical properties (absorbance, EEM-PARAFAC, etc), NMR, and FTICR/MS to characterize and compare dissolved organic matter from three subtropical wetlands. The results of these analyses are very comprehensive and reported in detail throughout the manuscript, and on the whole these data are an important contribution to the characterization of wetland DOM. The novelty of combining detailed NMR and FTICR/MS analyses to environmental DOM samples was previously demonstrated in Hertkorn et al., 2013, but the application to a different system (wetland DOM) plus the addition of optical property analyses and comparison

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between sites makes this a valuable contribution to the field. The NMR results in particular are extremely detailed, especially in comparison to the other two analyses, and as such I recommend some reorganization and editing to the manuscript. My specific comments are detailed below. If these moderate revisions are addressed, I would recommend publication in Biogeosciences.

Major comments:

The abstract is too long and needs to be shortened - in particular the amount/length of the results presented in the abstract needs to be reduced and/or summarized more efficiently.

Primarily because the results of the NMR analyses are much more extensive than the other two analytical approaches, the results and discussion section seems disjointed and would benefit from reorganization. As sections 3.2 to 3.6 are exclusively about NMR, the headings of these sections should reflect that explicitly - I would suggest three parts to the results and discussion section: optical properties, FTICR/MS, and NMR. Then sections 3.2-3.6 should be subsections under the NMR section (though there are also some issues with a few of these specific subsections which are mentioned below).

Section 3.3 seems out of place within this manuscript. A test of the extraction selectivity is not mentioned in the abstract, introduction, or conclusions as part of this study and is not addressed in the methods section. If the authors wish to include this test in this paper, it needs to be evaluated specifically with regards to wetland DOM. Also the extraction selectivity is only tested for the NMR analyses - what are the implications for FTICR/MS analysis, which also was performed on PPL extracts? Another option would be to move this discussion to the supplemental material along with Figure 3.

The comparison to an open ocean sample (section 3.6) is useful given the biogeochemical links between wetland and marine systems, but this section again only includes the NMR analyses. A few references to this open ocean sample are included

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in the FTICR/MS section, but the comparison should ideally include all three analytical approaches and be combined into one separate section along with any biogeochemical implications from the data (possible DOM degradation signatures, terrestrial vs. marine components, etc). If this comprehensive comparison is not available, this section should become a subsection under the NMR results and be clearly identified as such.

Is it possible to quantify the differences in NMR analyses between sites? The cluster analysis (Figure 9, panel A) from the FTICR/MS data is a nice visualization of the quantitative differences between sampling sites, and something similar that included all the results of all the analyses (if possible) would really strengthen the authors' conclusion that DOM composition varied among wetlands. The quantitative extent of differences among samples can be difficult for readers less well-versed in NMR to grasp from simple comparisons (i.e., FCE-L > FCE-S > PAN > OKA). The data presented in Table 2 helps with this.

A summary or conclusions section is missing though section 3.8 gives a broader overview-type perspective to the results. This should be clearly titled as conclusions or a separate conclusions section added with the most pertinent results and their implications (or both; i.e., section 4 'Conclusions and biogeochemical significance').

Minor comments:

- The entire manuscript should be thoroughly checked for consistent use (or non-use) of Oxford commas.
- Please check that all abbreviations are defined (for example, SUVA254 is not defined in the text, and EEM-PARAFAC is only defined in the abstract).
- pg 13716, lines 5-6: this sentence is repetitive (South/southern Florida mentioned twice)
- pg 13718, line 4: should this reference be Dittmar et al., 2008 in LO Methods?
- pg 13720, line 25: a word is missing here, perhaps **for**? ('... was acquired **for** an

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acquisition time of 1 s, ...’)

- pg 13725, line 19: should this word be ‘**where**’ rather than ‘**were**’?
- pg 13732, line 26: Yuan et al., 2011 does not appear in the reference list
- pg 13744, line 7: move ‘**that**’ to before ‘many’ (‘... suggest, in agreement with previous reports ... , **that** many of the bulk ...’)
- pg 13752, line 12: Yang et al., 2011 appears in the reference list but is not referenced in the manuscript (perhaps this should be Yuan from pg 13732 or vice versa?)
- pg 13759, Figure 4: panels are out of order (A should be upper left) and the first part of the caption is confusing and should be reworded for clarity (panel B is SPE-DOM from which site?)
- pg 13764, Figure 9 caption: extra word in (b) description, remove either ‘**in**’ or ‘**to**’ from ‘molecular compositions common **in to** all six wetlands SPE-DOM’

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