

Hydrol. Earth Syst. Sci. Discuss., 4, S1970–S1974, 2008

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**HESSD**

4, S1970–S1974, 2008

Interactive  
Comment

## ***Interactive comment on “Assessing the biodegradability of terrestrially-derived organicmatter in Scottish sea loch sediments” by P. S. Loh et al.***

### **Anonymous Referee #2**

Received and published: 22 January 2008

#### General Comments

There is a major flaw with this manuscript. The majority of the data has been published previously and recently in Estuarine, Coastal and Shelf Science. Whilst I presume that the authors have tried to produce a synthesis paper for HESSD including the data previously published alongside previously unpublished oxygen uptake rates I do not feel that the conclusions differ substantially between the two papers. I understand the value of the additional of the oxygen data in supporting the parameters/data already published and therefore suggest that this manuscript may warrant publication as a note

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but not as a full article. This note would draw the attention of the community to the usefulness of oxygen uptake rates combined with other parameters measured in this study, making use of the correlations carried out in this manuscript, towards assessing biodegradation of organic matter in sea Lochs and other aquatic systems. The full data set need not be published again, just the oxygen data and the correlations of oxygen with the other parameters, referencing Loh et al. 2008 when referring to the previously published data. Below are my revisions should this be published as a full article. This paper is within the remit of HESSD. It is a well referenced manuscript and a good treatment of the data that are presented. There are a few suggestions that would strengthen the manuscript. The objectives of the study are outlined in the introduction this would also be a good place to include hypotheses, state them clearly here. Outline the statistical tests used in the methods section. Include all statistical results in the results section. Refer to the corresponding methods and results sections when discussing correlations in the discussion. In the conclusions accept or reject the hypotheses. Without hypotheses the paper is highly descriptive.

Specific Comments Materials and Methods Page 4009, Section 2.1.1: Could you outline in your text where your sample sites are in relation to the sills in Loch Creran? Section 2.1.2: Is there a reference you can cite for the residence times of the waters in Loch Etive? Section 2.3.1. Page 4011 Line 12 and 13: How exactly were the samples fixed? You might include a reference here; Can you cite Loh et al. 2002 in the methods section? It would be beneficial for the reader if you included a paragraph in a section at the end of the methods i.e. as section 2.3.5 Statistical analyses. Here you should outline the statistics e.g. anova, pearson correlation and package you used and the rationale behind this.

Results Try to keep the results section tight, that is, keep all inferences for the discussion section. Specifically, page 4014 lines 13-16, page 4015 lines 6-10 and 19-20, page 4016 lines 5-6 and 21-27, page 4017 lines 2-4.

You have also stated on several occasions during your results section that there are

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significant trends/results but yet you have not given a p value or stated the statistical test use. I recommend that you include this information in the following places: page 4014 line 22, page 4015 lines 6 & 21, page 4016 lines 7, 10 & 13. In section 3.2.1 state changes in oxygen uptake rates along the Loch and refer to figure 2.

Discussion In a separate section e.g. 2.3.5 Statistical analyses include the correlation in the methods. Also include correlation results in the results section and refer to this section in the discussion e.g. page 4017 line 15 add on &#8230;by correlating total lignin with total OM and OC (sections 2.3.5 and 3.1), and so forth for all other correlations carried out.

Figures and Tables It would be useful to include a table showing the stable isotope data, or to include it in Table 4. It might also be useful to include a statistical table showing the results from all the correlations carried out.

#### Technical Corrections

The text would flow better if you always referred to the Lochs as Loch Creran and Loch Etive and not Etive and Creran. Where typing and grammatical errors are present in the manuscript the corrected form is below.

Abstract Page 4006 Lines 7 & 8 change to: Lignin data indicated the importance of riverine inputs contributing to land-derived carbon in the lochs as total lignin (&#923;, mg/100 mg organic carbon, OC), which decreased&#8230; Line 11: suggested Line 14: sedimentary OM Line 16: Furthermore, Line 20: oxygen uptake rates, Rp values and the molar&#8230;

Introduction Page 4007 Line 25: omit &#8216;the&#8217; from &#8216;the gas chromatography.&#8217; Page 4008 Line 12 change &#8216;the study&#8217; and insert the reference to which you are referring e.g. Kristensen (1990) showed that&#8230; Line 13: lower Rp values Line 14: Rp values in conjunction with the molar.. Line 15: During the initial stages of &#8230; Line 17: Increases in the OC/N ratio also

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imply&#8230; Line 20: This study relates lignin.. Line 21: oxygen uptake rates, Rp values and the molar&#8230; Line 22: sedimentary OM&#8230; Lines 24 & 25: oxygen uptake rates, the molar OC/N ratio and Rp values&#8230;

Materials and Methods Page 4009 Line 21: Loch Etive is characterised by prolonged periods of water stratification. Page 4010 Line 9: All other locations were visited every four months. Line 11: 10 m below the surface (m.b.s.). Line 12: The trap consisted of &#8216;how many?&#8217; collection tubes (dimensions: 11 cm inner diameter and 100 cm in length) and was serviced once a month. Line 14: and the overlying water was siphoned off. Line 17: oxygen uptake rates were measured Line 19: and freeze-dried the following day Section 2.3.1 Oxygen uptake rates Page 4011 Line 3: collected from 10 mbs&#8230; Line 5: in situ Line 9: causing sediment resuspension and in order to maintain uniform oxygen concentrations (Overnell et al. 1995). Line 19: determined was over the&#8230; Line 20: Oxygen uptake rates were&#8230; Section 2.3.2 Page 4011 Line 24: follows the methods&#8230; Page 4012 Line 27: the exact nature of the material.. Page 4013 Line 10: The Rp value which is defined as the..

Results Section 3.1 Page 4014 Line 7: State that there was no temporal variation in either sediment trap or sedimentary organic matter Page 4016 Line 3: The sediment trap material Line 7: during transport to the sediments the OM&#8230; Line 14: surface sediments decreased significantly from&#8230;

Discussion Section 4.1 Page 4017 Line 12 replace suggest with demonstrate Line 15 & 16 Total lignin was highly correlated with % total OM and TC suggesting that&#8230; Line 20: Terrestrial material contributes significantly&#8230; Line 26: Degradation of lignin is a slow process owing to its complex nature&#8230; Page 4018 Line 3: As a result of these findings, lignin is thought to be found in the refractory OM fraction. Line 6: refer to correlation or section where correlation results are found. Lines 12-13: references to include? Line 6-7: significant decrease from the head to the mouth of Loch Creran in agreement with Overnell et al. 1995 and Loh et al. 2002. Put the significant result into the results section. Lines 16-20: Rephrase this sentence or split into smaller

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sentences that are easier for the reader to digest. Line 24: in situ. Oxygen uptake rates have&#8230; Line 27: remove however Page 4020 Line 1: Our data support.. Line 2: as increased rates indicate an increase in mineralization rates of OM. Line 4: and is closely related to the sedimentary OM and carbon content. Can you correlate OC and oxygen uptake rate to support this?? Lines 15-16: include correlations in results section and refer to this section in discussion. Line 18: Sedimentary OM has higher biodegradability near major riverine inputs. Line 21: refer to table 2. Line 27: Conversely the Rp values do show a trend.. Page 4021 Line 6: Fresh plant material has a high nitrogen content and degrades rapidly.. Lines 8-9: Care must be taken when interpreting OC/N ratios because sources of organic matter can also be identified using these ratios in addition to degradation. For example a OC/N ratio of ~7 points to a marine source of OM&#8230; Line 23: that the increase in OC/N ratios&#8230;

Conclusions Page 4022 Line 13: The observed decrease in lignin&#8230; Line 15: terrestrial material contributes significantly&#8230; Line 27: sedimentary OM. Page 4023 Lines 5-6: Finally, we were able to relate biodegradation of sedimentary OM to molar OC/N ratios. (omit line 6).

References Update in press and online publications where necessary.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 4005, 2007.

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