

## ***Interactive comment on* “The carbon budget of the North Sea” by H. Thomas et al.**

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Comment

### **Anonymous Referee #1**

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#### General Comments

This is a well written, timely paper on the carbon budget of a shelf sea. The authors should be commended at their attempt to constrain one of the most difficult components of coastal ocean biogeochemistry: the lateral export of carbon to the adjacent ocean, which they are able to do through a documented hydrologic model. The paper is well constructed and succinct and I endorse its publication. I do think the authors need to consider atmospheric deposition. It does not enter the discussion/budget at all. Recent coastal carbon budgets have highlighted the importance of atmospheric inputs to carbon budgets.

#### Specific comments:

-on page 372, the first paragraph of section 2.3. The authors cite numerous studies on the water budget of the north sea. They then mention that these studies adequately describe the main features, yet miss some of the details. They then mention that the problem is “overcome” by using the budget of Eisma and Kalf. The authors should be a little more explicit here. Most readers will not be familiar with these studies. What

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are the major discrepancies? How does Eisma and Kalf differ from the other studies? Since the water budget is a major part of the story- I think it warrants a little more detail.

-Why did the authors decide to solve for air-sea CO<sub>2</sub> exchange? It looks like they have CO<sub>2</sub> measurements and could include direct estimates of CO<sub>2</sub> air-sea exchange in order to determine if their carbon budget closes. This might provide an interesting result.

Technical comments -page 374 line 7. The sentence starting with “Realising” is structured oddly and probably should be rewritten for clarity.

-similarly, the sentence starting with “Stratification” on page 378, line 4 should be rewritten for clarity.

-page 376 last paragraph. The section on heterotrophy and Co<sub>2</sub> air-sea flux needs to be cited.

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Interactive comment on Biogeosciences Discussions, 1, 367, 2004.

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