

Interactive comment on “Deep ocean exchange with west-European shelf seas” by J. M. Huthnance et al.

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We thank the referee for his constructive comments (shown in “quotes”).

“This paper is a review (overview) of processes involved in and studies of exchange between the NE Atlantic and the coastal areas of western Europe. The paper includes a discussion of nutrient and carbon exchange as well as the more traditional variables of water volume, heat and salt. This paper covers a variety topics. A context section (2) describes the geographic and oceanographic setting of various sections along the coast, illuminating some of the similarities and differences. There are theoretical estimates of exchange as well as estimates obtained from more inclusive numerical mod-

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els. There are references to a wide variety of experimental/observational campaigns focused on exchange processes. The major result of the paper is Table 1 (Section 4) which estimates the water exchange for various regions by various processes. Section 6 provides detailed comments by region of processes and exchange estimates.”

No response required.

“The source for numbers in Table 1 is incomplete. Two processes (frictional layer and wind stress) are explained in the paper. The others are due to work by other authors or perhaps by the authors of this paper but taken from other papers. It would be helpful to have some indication in Table 1 which results are newly calculated and which are taken from other references.”

It is true that the cited sources are incomplete (although some other sources are cited, e.g. for several West Iberia processes, section 6.1, and Southern Biscay eddies, section 6.2). This interacts with the comment below about introducing Table 1 to structure section 4, which has been adopted, and the balance between sections 4 and 6. Sources cited have been completed but some of these (for region by region) have to be in section 6. It is too cumbersome to have all citations directly indicated in the Table. [Section 6 as referred to here becomes section 5 in the revised version].

“There is a bit of discussion in the paper about carbon flux. But, these results are not tied to exchange values in Table 1. Perhaps a second table could be constructed based on the estimated primary production of a given shelf area and the estimated volume fluxes in Table 1 to make a guess at the processes that might close these budgets. For example, if an area has considerable volume exchange then what concentration of POM would be needed for the given volume exchange to balance the PP budget. I recognize the difficulty involved and the fuzzy nature of this calculation (estimate?) but it would tie the two topics together in this paper.”

For the combined sectors from the Celtic Sea around the west of Britain to the North Sea, primary production is approximately balanced by respiration and we expect inputs

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to be approximately balanced by POM flux (concentration times volume exchange), neglecting burial (new Table 2 in revised version). This comparison is made in the revised version albeit more detail is deferred to Wakelin et al. (in preparation).

“I find the discussion in Section 4 to be a bit jumbled. The topics seem to jump from high frequency (tides, inertial waves) to low frequency (rectified or forced currents) and back again. It would be useful to introduce the Table (p 1069 lines 17-21) at the beginning of this section and then use it as a way to organize the discussion of the processes.”

This is fair comment (although the sequence is not exactly as implied here). We have adopted the suggestion to introduce Table 1 at the beginning of section 4, and aligned the Table columns and section 4 sequence. Other items previously in section 4 but relating more to context than to exchange have been moved to the “Context” section 2. A caveat (related to the next comment, and that about the sources for numbers in Table 1) is that some of the cited sources only come in the sector summaries (section 5 in revised version).

“Since Section 6 discusses specific regions, Section 4 could put less focus on all the places where these processes happen.”

J. Simpson (referee) also comments on the structure; the suggestions are not entirely reconcilable. In view of the DEOS context of this paper aiming to inform on the west-European context, it seems appropriate to emphasise the specific regions (in Section 6) as suggested here. In revision, repetition has been minimised by a clear distinction between explaining processes in general (section 4) and putting all evaluation by region in section 6 (section 5 in revised version).

“I am a bit curious about the reasoning in Section 6.3 (Eastern Biscay). The first line indicates that river flow is about equal to the excess evaporation in this region.”

This is not the intended meaning of the first sentence. River flow is estimated as more

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than six times (evaporation – precipitation). The text has been revised to emphasise this.

“The next line says that the coastal salinity is approximately oceanic. The third line says that there needs to be substantial exchange to maintain a salty coastal area. It seems that the coastal area can maintain oceanic salinity with no oceanic exchange at all. Is there other evidence for strong oceanic exchange?”

This comment is negated by the actual/intended meaning of the first sentence.

“As a final grumble, I find the run-on sentence (using semi-colons to splice sentences together) and list style of writing (clauses following colons) to be a bit jarring. This is particularly evident in the Abstract. Or the text on p 1065 lines 27-28 (which should not be in parenthesis). Perhaps this is the style preferred by the authors, so perhaps the Editor could decide if this is important or not.”

We have changed the particular examples cited, and many others. The first author acknowledges a tendency to the style objected to. On the other hand, colons and semi-colons are punctuation with a purpose, to enable sub-structure so as to clarify logic and proximity in argument.

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