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Interactive comment on “Dissolved organic matter composition and bioavailability reflect ecosystem productivity in the Western Arctic Ocean” by Y. Shen et al.

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This manuscript offers novel insight into the budgets of total and labile dissolved organic matter (DOM) in the Western Arctic Ocean. Tracking labile carbon by measuring amino acids, the authors reveal contrasting roles for the Chukchi and Beaufort Seas in the export of labile DOM to the carbon hungry Central Arctic basins. Surface waters of the Beaufort Sea, which has low primary production and receives considerable DOM inputs from the Mackenzie River, were found to contain low levels of labile DOM as indicated by amino acids yields. By contrast, the DOM in the high productivity waters of the Chukchi Sea was enriched in amino acids, and by inference, labile DOM. The

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accumulation of amino acids in the Chukchi Sea points to an intriguing uncoupling of biological production of labile DOM and its heterotrophic consumption. Possible mechanisms facilitating this accumulation are presented. Whatever facilitates labile DOM accumulation in the Chukchi Sea, the labile DOM can be exported, indicating that the Chukchi plays a significant and far greater role than the Beaufort Sea in fuelling heterotrophic production in the oligotrophic waters of the Central Arctic basin.

The manuscript is well written, scientifically sound and is recommended for publication after the following minor edits are made.

Page 9573, line 19: there is no full stop after the parentheses enclosing the Sakshaug 2004, Carmack and Wassmann 2006 references.

Page 9574, line 5: include a citation for the statement about amino acids being enriched in plankton derived DOM.

Page 9574, line 24: include a citation for the statement about the definition of labile, semi-labile and refractory DOM.

Page 9576, line 7: was the Consensus Reference Material used. If so, cite the relevant website etc.

Page 9579, line 15: as labile DOM was not quantified directly in this study, it seems a stretch to state that the amino acid degradation index did not offer a good indicator of labile DOM, whereas amino acid concentrations of yields were indicative of labile DOM. The statement made here should be edited to indicate that the two indices of labile DOM used in this study did not consistently agree, and so only the amino acid yields were used to define labile DOM. Some justification should then be added to indicate why amino acid yields are the more robust indicator of labile DOM. I expect they are, as amino acids are on average more labile than the bulk of DOM, but a sentence or two making the reader aware of the caveats involved would be welcome.

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