

Interactive comment on “Detecting changes in Labrador Sea Water through a water mass analysis of BATS data” by A. Henry-Edwards and M. Tomczak

Anonymous Referee #2

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This is one of two closely related papers by the authors, a) “Remote detection of water property changes from a time series of oceanographic data” and b) “Detecting changes in Labrador Sea Water through a water mass analysis of BATS data”. They need to be read and (subject to editorial decision) published together. A) describes a water-mass analysis method “TROMP” to be applied to time-varying properties in mixed waters to derive water property changes in water-mass sources; however, only synthetic data are used to learn about the method - it is not shown to be successful when applied “in anger”. B) describes application to real time-series but depends on the method description in a). Thus the two are inter-dependent.

The topic is important because (as stated in a) climate change (or shorter-period changes in air-sea fluxes) may change water mass properties and so affect water-

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mass analysis. The approach as an extension of best-practice water-mass analysis, to allow directly for source-water changes, seems logical; experience with it should be published. The general approach of the authors in writing the papers appears to be in this “spirit”. They describe various means of constraining the freedom of the method to help it succeed - generally the fewer water properties allowed to vary and the tighter the limits, the better the results, provided that preliminary trials and other available evidence are used in choosing these constraints. I am left feeling that the approach is still rather “ad hoc”; this would be helped if in conclusion there were a systematic list of all the types of trial that the authors considered and found useful on occasion.

Their inter-dependence raises the question of whether the two papers should in fact be merged to one. There are two separate motivations: (i) method development and (ii) learning about the BATS time-series and Labrador Sea Water. However, as presently arranged, these are not properly separated between the two papers. Especially, paper b) contains several “learning experiences” about TROMP. The introduction to paper a) is quite long and better justified by serving both papers. I think that the authors need to justify why these should be two papers.

(Having said this, the present versions are clearly and logically written).

More detailed comments, paper b).

Page 420, lines 5-6. I don’t think that this finding, of most reliable results if SWT properties vary slowly, is really explicit in a). Is more iteration between stages 1 and 2 per time step an alternative to small changes per time step?

Page 421, lines 21-23. This is a TROMP “learning experience” more appropriate to a). It also indicates that something needs to be said, where appropriate in the text and in conclusion, about how the weights should be chosen.

Page 423, line 20. Can one define “low” numerically? The LSW contribution is always > 20% here.

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Page 423 lines 22-24 and page 425 lines 5 to 26. These sentences are more about TROMP “learning experience” than the BATS series or LSW.

Table 2. The parameter weights here must depend (I think) on the units used for the water properties. This should be made clear.

Interactive comment on Ocean Science Discussions, 2, 417, 2005.

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