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Interactive comment on "Remote detection of water property changes from a time series of oceanographic 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-

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 a). Page 405 lines 14 to 16. Something more should be said here about the principle used to find the new SWT property values. Other bits of information about this appear later in a) and b). On line 21 (page 405) there is reference to a “sequential quadratic programming method” but it is not clear (for lack of information in lines 14-16) what this method is “trying to do”. On page 407 lines 7-8 (and in several figure captions) there is mention of iteration of stages 1 and 2; such iteration should be described on page 405 (perhaps after line 25. A related matter is the choice of time step. In paper b) it is admitted that the weights (W) can affect the outcome of TROMP as distinct from OMP - should the choice of W also be an item on page 405?

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Page 406 line 2. Use SWT regularly from its first definition on page 403 so the reader does not forget its meaning.

Page 407 lines 11-18, and figure 4. Simply a comment: the noise strikes me as what one might expect near a multi-dimensional minimum, where values can be varied with little effect on the function being minimised - and the more dimensions the greater the scope for such noise.

Figure 2 needs to be in colour (as at present) or a range of dash / dot-dash lines used.

Figures 3, 4, 5 respectively refer to 3, 5, 5 iterations. The number of iterations seems to be arbitrary. Something should be said in the corresponding text about why these particular numbers of iterations were used, and in the conclusions about how to choose the appropriate number of iterations.

Interactive comment on Ocean Science Discussions, 2, 399, 2005.