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Ocean Science
Discussions

Interactive comment on "Mapping turbidity currents using seismic oceanography" *by* E. A. Vsemirnova and R. W. Hobbs

E. A. Vsemirnova and R. W. Hobbs

r.w.hobbs@durham.ac.uk

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Response to comment by Barry Ruddick and Berta Biescas

Thank-you for the suggestion we call the event imaged on the seismic section a "tubidity layer", we had thought that the term "tubidity current" would differentiate it from a "gravity driven flow", though the shape of the feature and your calculation shows this interpretation is plausible. However, as the seismic data is only a snapshot we have no history of how the event was generated so we cannot be conclusive as to its nature and your suggested terminology avoids doubt.

To address your other points

1)Again this comment is most helpful. We did not subtract any baseline voltage hence

it is likely that this is why the "red" curves (those with added sediment) are displaced to the right. However, the seismic method is only dependent on the vertical derivative (Ruddick et al 2009) so any constant baseline voltage will not effect computation of the gradient functions (figures 2f & 2g) nor the synthetic seismic trace (figure 3). Equally it will not effect the inversion of the real data.

2) In principle yes we could compute the ratio of the reflections from the thermohaline contrasts at $\sim$500m and this sediment laden layer. However, this would not help the calibration as we do not have an independent measure of the temperature/salinity at the time of the seismic acquisition. In figure 1, the gain has been increased to make the sediment laden layer visible and most of the reflections from the thermohaline layer are clipped by the dynamic range of the grey-scale used for the plot. Hence the strong black/white banding over this interval. We compute a reflection coefficient of $\sim$0.00004 for the sediment laden layer which is significantly lower then those computed for the thermohaline boundary which are up to 50 times larger and consistent with values published for other seismic oceanographic surveys.

3) Yes we have processed other data in the area and yes we do see weak reflection events of a similar nature. However, many of these other data are commercially confidential. In general the reflectivity tended to show only thin layer as we observe on figure (1) on the lower margin slope or be thicker as in the centre of the channel but disjointed. In this case we suspect the data was collected in typical weather conditions and is too noisy to obtain a clear image. The seismic data we present was collected under ideal conditions (wind force 2 to 3) which is unusual for this part of the world hence we were able to recover these weak reflections. However, it is possible that data from elsewhere, given good seismic data, may contain events caused by sediment loading but in general these will be weak compared to those created by temperature and salinity contrasts.

Interactive comment on Ocean Sci. Discuss., 8, 1803, 2011.