

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

G. Buffett

gbuffett@ija.csic.es

Received and published: 19 September 2011

The manuscript "Mapping turbidity currents using seismic oceanography" by E.A. Vsemirnova and R.W. Hobbs claims to present the first seismic reflection images of a turbidity current in the Faroe-Shetland channel, between the Faroe and Shetland islands, north of Great Britain. The seismic images show a curious feature in the water column separated from the seafloor and the shallower seismic reflections in the upper 500 m of water. The authors do a good job of demonstrating that this is indeed a turbidity current through the seismic image as well as the other methods of independent verification. I am however, left with a few open questions. I have also made some minor technical, orthographic and grammatical corrections which I will outline later.

Main points: 1. The timing of data acquisition of the seismic data (1994) and CTD C650

obtained suspended sediment content (1999) should be addressed. Turbidity currents, being rather sudden, fast-moving events would mean that the suspended sediment content would vary considerably over time. However, the fact that there was some change in suspended sediment content at all in the CTD data (dry matter and high OBS readings) does indicate that there was some event that led to this high value. I am not sure how frequent turbidity currents are in this area, but the authors should perhaps emphasize that the seismically imaged turbidity current candidate is likely a unique event to one which gave rise to the high CTD/OBS values.

2. In the section on modeling, the authors, assuming suspended sediment content would largely be of quartz and used a bulk density of 2700 kgm-3. I would like them to explain why this value was used and not a lower value since they are referring to the density of sediment suspended in water, not solid quartz. Shouldn't the assumed value of bulk density be significantly lower than that of solid quartz?

Minor comments/suggestions (line by line): p. 1804, line 6: space after "900" m (and all subsequent cases of a number followed by a unit).

p. 1806, line 3: insert "the" before "water mass".

p. 1806, line 3: replace "through" with "by".

p. 1806, line 14: insert "the" before "sea floor".

p. 1806, line 19: insert "the" before "proposed".

p. 1806, line 26: change "up on" to "upon".

p. 1807, line 4: change "were" to "was".

p. 1807, line 6: change "l" to "L" for 147 liters (because it is less ambiguous).

p. 1807, line 6: my calculation of 147 L in cu. in. was 8970, not 9324 as stated. The authors may wish to confirm this.

p. 1807, line 9: insert "the" before "overlying".
p. 1807, line 14: change "correlates with" to "correlating with" or "which correlates with".
p. 1807, line 18: insert "are" before "indicative".
p. 1808, line 18: insert "the" before "impedance".
p. 1809, line 17: replace "," with "and" before "density".
p. 1809, line 21: replace "seismic image" with "seismic reflection imaging".
p. 1809, line 24: insert "the" before "quantity".
p. 1809, line 26: insert "the" before "seabed".
p. 1809, line 27: insert "is" before "caused".
p. 1810, line 2: insert "," before "1990".
p. 1810, line 10: insert "is" before "given".
p. 1810, line 9: insert "the" before "sea".
p. 1810, line 10: insert "." after "determined".
p. 1810, line 18: change "yet minimises" to "while minimising".
p. 1811, line 18: insert "the" before "instrument".
p. 1811, line 21: change "suggests" to "who suggest".
p. 1811, line 22: change "75-100 mgl-1" to "75-100 mgL-1").
p. 1812, line 9: insert "the" before "water".
p. 1815, Figure 1. (c): I would suggest adding a small insert map of the regional location in one corner of the profile map.

C652

p. 1816, Figure 2 caption (g): insert "the" before "intrusion".
p. 1817, Figure 3 caption, line 2: remove "as" after "whereas".
p. 1817, Figure 3 caption, line 5: change "is" to "was" after "cases".
p. 1818, Figure 4 caption, line 3: change "turbiditic" to "turbidity".

In general this manuscript is well-written, concise, thorough and clearly outlines the research done. Most importantly, this work illustrates the utility and versatility of seismic oceanography as an ever increasing part of physical oceanography. To the best of my knowledge this paper shows the first image (not just seismic image) of a turbidity current on a large scale. In addition, it shows that when temperature and salinity are properly constrained, suspended sediment content can play a role in creating seismic reflectivity. Turbidity currents are phenomena of high importance in the understanding of processes in physical oceanography and marine geology as well as the practical importance of understanding shelf/slope processes in terms of geo-hazards. I recommend the manuscript for publication once my comments have been addressed.

– Dr. Grant George Buffett Leibniz-Institut für Meereswissenschaften IFM-GEOMAR
Gebäude Ostufer Wischhofstr. 1-3, Geb. 8D/217 D-24148 Kiel Germany

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

C653