

New seismic techniques to image oceanic internal waves

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Background Internal gravity waves within the ocean play an important role in the mixing and transport of heat, salt, nutrients and other suspended matter in the ocean. Until recently, it has only been possible to observe these waves by probing them directly. In the past decade, a remote sensing observation method was developed that uses oil industry seismic reflection data to image internal waves. This studentship offers the chance to apply this new seismic oceanography technology in the North Atlantic, and also to extend the technique by using echo-sounding technology that is traditionally employed to locate fish shoals.

Objectives (1) To develop a new technique of using fish-finding echosounder data to image and measure internal waves. (2) To employ established techniques to measure internal waves on multi-channel seismic data acquired during oil exploration and academic research, and compare these results with the new internal wave measurements. (3) To build up an atlas of spatial and temporal changes in internal waves in Rockall Trough, NE Atlantic, in order to provide new constraints on ocean mixing.

Methods The project will make use of our large database of seismic water layer images that includes conventional seismic reflection sections as well as fish-finder echograms. More echosounder data will be acquired during the project, and the student will have the opportunity to participate in research cruises. The multi-channel seismic data will be processed and interpreted in our geophysical imaging lab. The methodology for processing the echosounder data to give internal wave measurements has been pioneered by Stephen Jones at Birmingham University.

The Geosystems research group in Birmingham has internationally recognized expertise in seismic oceanography and seismic data processing and interpretation. In addition to excellent links with the oil industry, the main suppliers of seismic data for seismic oceanography, we also collaborate extensively with UK, Irish and German Marine Institutes.

References

Jones, S.M., Sutton, C., Hardy, R.J.J., Hardy, D., Seismic imaging of variable water layer sound speed in Rockall Trough, NE Atlantic and implications for seismic surveying in deep water, *In: Vining BA, Pickering SC (eds) Petroleum Geology: From Mature Basins to New Frontiers – Proceedings of the 7th Petroleum Geology Conference* (2010) doi:10.1144/0070000.

Jones, S.M., Hardy, R.J.J., Hobbs, R.W., Hardy D., The new synergy between seismic reflection imaging and oceanography, *First Break* 26(8) (2008) 51–57.

Applicants with BSc or MSci in Geoscience or Oceanography are invited to contact Stephen Jones (s.jones.4@bham.ac.uk) to discuss the project