



Meteorology Seminar

Title: Mixing oil and water: The new synergy between reflection seismology and oceanography

Speaker: Steve Jones (TCD)

Date: Thu 20th March 2008 at 2:15PM

Location: Mathematical Sciences Seminar Room

Abstract: When standard seismic reflection processing techniques are targetted at the water layer, images of oceanic thermohaline structure can result. Hydrocarbon exploration has moved out into the deep-water frontier over the past two decades, and the expanding database of seismic reflection profiles across continental slopes and deep water basins now promises to shed new light on problems such as oceanic mixing and continental slope stability. Reprocessed legacy seismic data from Rockall Trough, west of Ireland, illustrate several potential advantages to oceanographers. At the small scale, internal waves of wavelength several hundred metres to a few kilometres can be observed on single shot gathers, and their amplitudes, frequencies and propagation speeds measured directly. Maps of internal wave properties over large spatial areas are beginning to allow wave generation sites to be identified, so that important generation mechanisms can be inferred. Interesting features seen on larger scales (tens of kilometres) within the permanent thermocline include packages of highly reflective water with sharp, very steep boundaries and lenticular structures that resemble meso-scale eddies. Such features vary on time periods of hours to days, and the time scales of variation in reflectivity at different spatial scales can be quantified by looking at overlapping profile segments, intersecting lines within grids of 2D profiles, and 3D surveys. In future this information might help to estimate mixing

rates. The hydrocarbon industry can also gain from the new synergy. Variations in water-layer travel time caused by variations in thermohaline structure must be accounted for when processing 3D and 4D seismic surveys, and it is important to know the strength and variability of water currents when planning seabed installations. Just as important, there is 'green capital' to be made from supplying data for ocean and climate research. In future, we hope that industry will be able to routinely copy the water-layer part of new seismic reflection datasets to an international database that can be accessed by ocean and climate researchers. Such a strategy would benefit society at minimal additional cost to industry.