Geophysical Research Abstracts
Vol. 17, EGU2015-2298, 2015
EGU General Assembly 2015

Variability in turbidity current frequency within a central Portuguese margin canyon

Joshua R. Allin (1), Peter J. Talling (1), James E. Hunt (1), Michael E. Clare (2), and Ed Pope (1)

(1) National Oceanography Centre, University of Southampton Waterfront Campus, European Way, Southampton, UK. SO14 3ZH, (2) Fugro GeoConsulting Ltd, Fugro House, Hithercroft Road, Wallingford, Oxford, UK, OX10 9RB

Submarine canyons constitute one of the most important pathways for sediment transport into ocean basins. For this reason, understanding canyon architecture and sedimentary processes has significance for oil and gas reservoir characterisation, carbon budgets and geohazard assessment. Canyon sedimentation in the form of turbidity-currents is known to operate on a variety of scales and result from a number of different processes, including landslides, river-derived hyperpycnal flows and tidal or storm resuspension. Despite the expanding knowledge of turbidity current triggers, the spatial variability in turbidity current frequency within most canyon systems is not well defined.

Here, new chronologies from cores in the lower reaches of Nazaré Canyon illustrate changes in turbidity current frequency and their relationship to sea level. These flows were relatively frequent during the last glacial maximum and the last deglaciation, with an average recurrence interval of $\sim$70 years. Mid to early Holocene slowdown in activity (avg. recurrence of 1625 years) appears to occur later than other systems along the Iberian margin. Cores from the Iberian Abyssal Plain also provide the first recurrence interval estimates for large run-out turbidity currents from the central Portuguese margin. These large turbidity currents have an average recurrence interval of 2750 years, broadly comparable to modern turbidity flow events in the lower Nazaré Canyon. This indicates that Nazaré Canyon acted as a depocentre, capturing large volumes of sediment during glacial periods prior to large scale canyon flushing events. However, this sediment capture has largely been restricted to the middle and upper canyon since stabilisation of Holocene sea level. Recurrence intervals suggest that large turbidity flows which flush the canyon operate on a timescale independent of the sea level forcing evident in the lower canyon. While instability-triggered landsliding and tidal/storm resuspension are likely responsible for canyon restricted turbidity flows, a different trigger may exist for long run-out turbidity flows capable of travelling several hundred kilometres.

Canyon flushing events in other systems have been suggested as resulting from landslides triggered by regional earthquakes. However, turbidites from the Iberian Abyssal Plain do not correlate well with previously suggested earthquake-triggered landslides in the Tagus Abyssal Plain to the south. The inconclusiveness of a test for synchronous deposition in distinct basins makes identifying a seismic trigger problematic. The Nazaré fault, which intersects the canyon head, may have a distinct return time for large earthquakes that is different from seismically active areas to the south. This further suggests the need for caution in the use of turbidites as a palaeo-seismological indicator along the Iberian margin.