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Gas hydrate stability and fluid-escape features in deep-water environments west of Ireland

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Hydrates are ice-like solids composed of water and gas that form at low temperatures and high pressures. Their formation and dissociation in response to changes in sea level and/or water temperatures has global implications for continental slope stability and for climate change. This poster presents the results of a first assessment of the potential occurrence of hydrates in relation to shallow fluid escape features on the broad continental margin west of Ireland, using results from Zone 3 (depths of 200-4500 m) of the Irish National Seabed Survey (INSS). The assessment involved i) theoretical modelling of hydrate stability within INSS Zone 3 for present and past (glacial-stage) conditions, and ii) reconnaissance-level observations of the seabed across Zone 3, using 3D-visualisation techniques.

The thickness and distribution of the hydrate stability zone was modelled for present-day conditions, and for conditions representative of a glacial stage, using bathymetry and bottom water temperatures acquired during the INSS, plus geothermal gradients from a regional IODP dataset. The seabed across INSS Zone 3 (450,000 km2) was 'explored'by 3D-visualisation of gridded subsets of the raw multibeam data, affording resolution up to tens of metres; selected INSS 3.5 kHz echosounder profiles were also examined. Four categories of seabed feature are recognised that may be indicative, directly or indirectly, of gas/fluid escape. Pockmarks $>$100 m in diameter are recognised at several locations in depths of 300-900 m. Mounds (up to 300 m high and several kilometres across) occur across depths of 300-3000 m and include known carbonate mud-mounds as well as volcanic cones. Scarps marking the headwalls of slides are common on the steep ($>3^{\circ}$) slopes flanking the Rockall Trough and Porcupine Seabight, in depths of 500-1500 m. Canyons are mainly restricted to the eastern

slopes of the Rockall Trough and Porcupine Seabight, although some broad channels occur west of the Rockall Bank.