Using cold-water coral mini-mounds as analogue for giant mound growth: assessment of environmental drivers and anthropogenic impact

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Cold-water corals (CWC) are found along the whole north-eastern Atlantic Margin from Norway to the Gulf of Cadiz. In the Porcupine Seabight, these coral reefs (mainly *Lophelia pertusa* and *Madrepora oculata*) accumulate into large mounds of up to 250m high (e.g. Challenger Mound), which have been well studied over the past two decades (Roberts *et al.*, 2006). The detailed mechanism of the start-up phase of such large CWC mounds is however not yet fully understood. Therefore, it is essential to study analogues of these stages that are not well recorded in larger mounds. The FWO MINIMOUND project (2013-2016) aims to investigate the initiation, growth and demise of 'small' CWC mounds and to determine the role of climatic and hydrocarbon-seepage related processes as well as anthropogenic impact. This high-resolution multidisciplinary study will focus on three 'minimound' provinces along the Biscay continental margin: (1) the Explorer and Dangeard Canyons on the Celtic Margin (Stewart *et al.*, 2013), (2) the Guilvinec Canyon on the Armorican Margin (De Mol *et al.*, 2011) and (3) the Upper Ferrol Canyon on the Cantabrian Margin. These minimounds are fossil (9.7ka BP) and occur at relative shallow depth on the interface between the Eastern North Atlantic Central Water (ENACW) and the Mediterranean Outflow Water (MOW). Contrastingly, most present-day living CWC reef habitats dwell in the deeper MOW depth range, relying on the density and dynamics of this water mass for their food supply.
The objectives of the project are threefold: (1) the establishment of a chronostratigraphic framework and the reconstruction of palaeoceanographic changes over the last 15.000 years in order to determine the impact of glacial to interglacial climate change on the ENACW-MOW interface and the CWC habitats (Frank *et al.*, 2011); (2) the minimound province at the Upper Ferrol Canyon shows a close association with hydrocarbon-seepage (pockmarks) which allows to assess the role of hydrocarbon related processes in CWC mound formation; (3) the potential impact of anthropogenic fisheries activities will be investigated.
These objectives will be tackled through a coupled geophysical, sedimentological and integrative approach, including the palaeoceanographic and biogeochemical study of USBL guided cores in cooperation with the BGS (UK), LSCE (Gif-sur-Yvette, France), IFREMER (France), IGME (Spain) and IEO (Spain). Two sampling campaigns with the R/V Belgica will be undertaken. In addition to core collection, drop frame images will be acquired to allow habitat mapping and predictive modeling of the CWC habitats in cooperation with the Marine Institute of Plymouth University (UK).

References

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