CURRENT INFLUENCES ON MOUND STRUCTURES IN THE PORCUPINE SEABIGHT: RESULTS FROM IMAGE ANALYSIS

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Mound structures, identified as coral banks, are found in the Porcupine Seabight along the NE Atlantic Continental Margin. They are associated with the growth of large colonies of the deep-sea coral species Lophelia pertusa and Madrepora oculata. The mounds can reach heights up to 150m above the seabed, and multiple structures can be up to a few km long and 200 to 500m wide. They occur at depths between 500 and 1100m, at 3 geographical locations in the Seabight. The Belgica Mound Province is located on the eastern flank, while the Hovland and Magellan Mound Provinces lie in the north of the Seabight. The mounds of latter province are mostly buried, while both other provinces contain ample seabed structures.

Both Hovland and Belgica mounds were studied in 1997 by means of sidescan sonar imagery during the UNESCO-IOC Training Through Research cruise (TTR7). Additional subbottom profiling data, shallow cores and video tracks were collected at the same time. Later on, the sidescan images were reprocessed and parts were analysed with TexAn, software developed to study image texture with the aid of Grey Level Co-occurrence Matrices. The Magellan mounds could be studied from high-resolution 2D and industrial 3D seismics. The 3D data set contained the upper 400ms TWT of an industrial data block, provided by Statoil Exploration (Ireland) Ltd. and its partners Conoco (U.K.) Ltd., Enterprise Energy Ireland Ltd. and Dana Petroleum plc. Mathematical morphology (top-hat transformations) and geostatistical tools helped in separating mounds (and associated moats) from the background.

All image analysis techniques revealed interesting information on the current regimes and influences on and around the mounds. Most mounds were surrounded by moats, scoured in the seabed.

The sidescan images showed that image textures in the Belgica Province were much rougher than in the Hovland Province. Cores and video data allowed to relate this extra roughness to a possibly more energetic current regime. A link with locally enhanced currents as result of internal tides, could be a possible explanation.

Both moats and mounds in the Magellan province are strongly elongated in N/S direction. A N/S directed current seems to have played an important role during mound development.

Thus, all mounds did develop in areas with clear current influences, although the exact process seems to have been different for each of the 3 provinces.