



Iceberg keel marks on the Porcupine Basin, Irish continental shelf

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Swath sonar bathymetry reveals sinuous and semicircular seabed features in a large-scale study carried out using Irish National Seabed Survey data from the Porcupine basin, Irish continental shelf. These marks can be found at present water depths from less than 250m to at least 570m, and they extended over an area of approximately 40,000 sq Km. We interpret them as keel marks created by floating icebergs detached from the retreating ice sheet during the most recent cold stage (<75Ka). Furrows are sinuous features inscribed in the sandy seabed subsurface. The dimensions of the iceberg tracks vary from 4-15 m deep, 50- 500m wide and from several hundred meters to in excess of 20 km long. Some larger furrows have lateral berms 1-2m high. Semicircular features can be up to 1km diameter and up to 12m deep. These can be found at the end of furrows, and are interpreted as terminal grounding pits, or isolated craters probably caused by sudden changes in the iceberg draft. The keel marks are generally oriented towards north or northwest, however a second minor northeast orientation is present throughout the entire dataset. The variation in orientation may be explained by short-term ocean current or wind patterns..

Acoustic seabed classification using multibeam backscatter (12KHz & 95KHZ) and pinger data (3.5KHz) indicate that the keel marks are relict features. The acoustic backscatter response (EM120-12KHz) from the west of the Porcupine basin furrows is generally low amplitude. Image analysis at the meter-scale shows a smooth texture indicating that the furrows are infilled with sediment, in contrast to high amplitudes and rough texture on the berms. These berms appear smoother with medium amplitude values when analysed on the high frequency acoustic image (EM1002-95KHz).

Surrounding areas not affected by keel marks have generally intermediate backscatter amplitudes and irregular texture. Ground-truthing in these areas has proven the seabed to be primarily sand.