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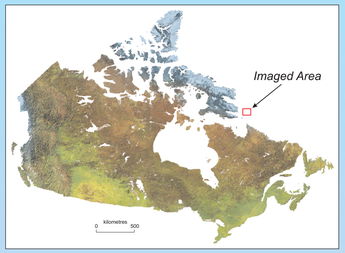
GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA



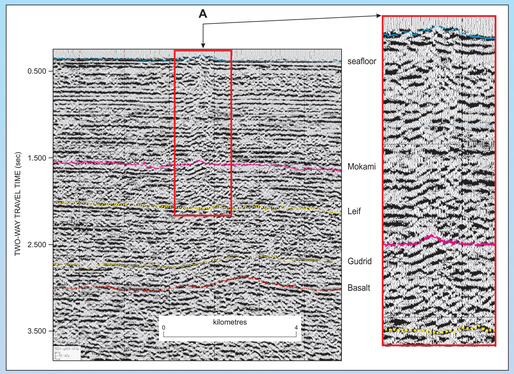


Figure A. This sizeable mound on rather flat lying sea floor is directly over a structural closure seen at the level of the Gudrid sandstone.

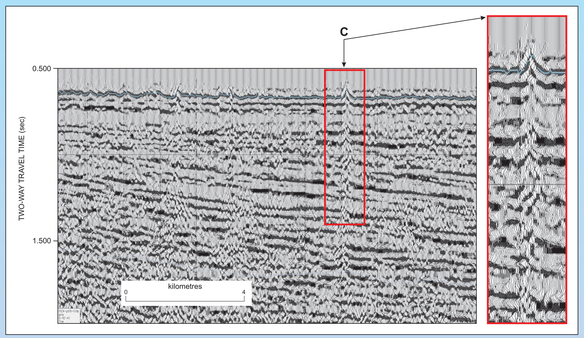


Figure C. This feature appears to lie just off the major Gudrid structures and may indicate the presence of a deeper aspect of the known petroleum system.

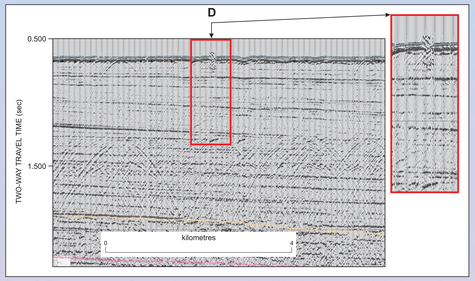
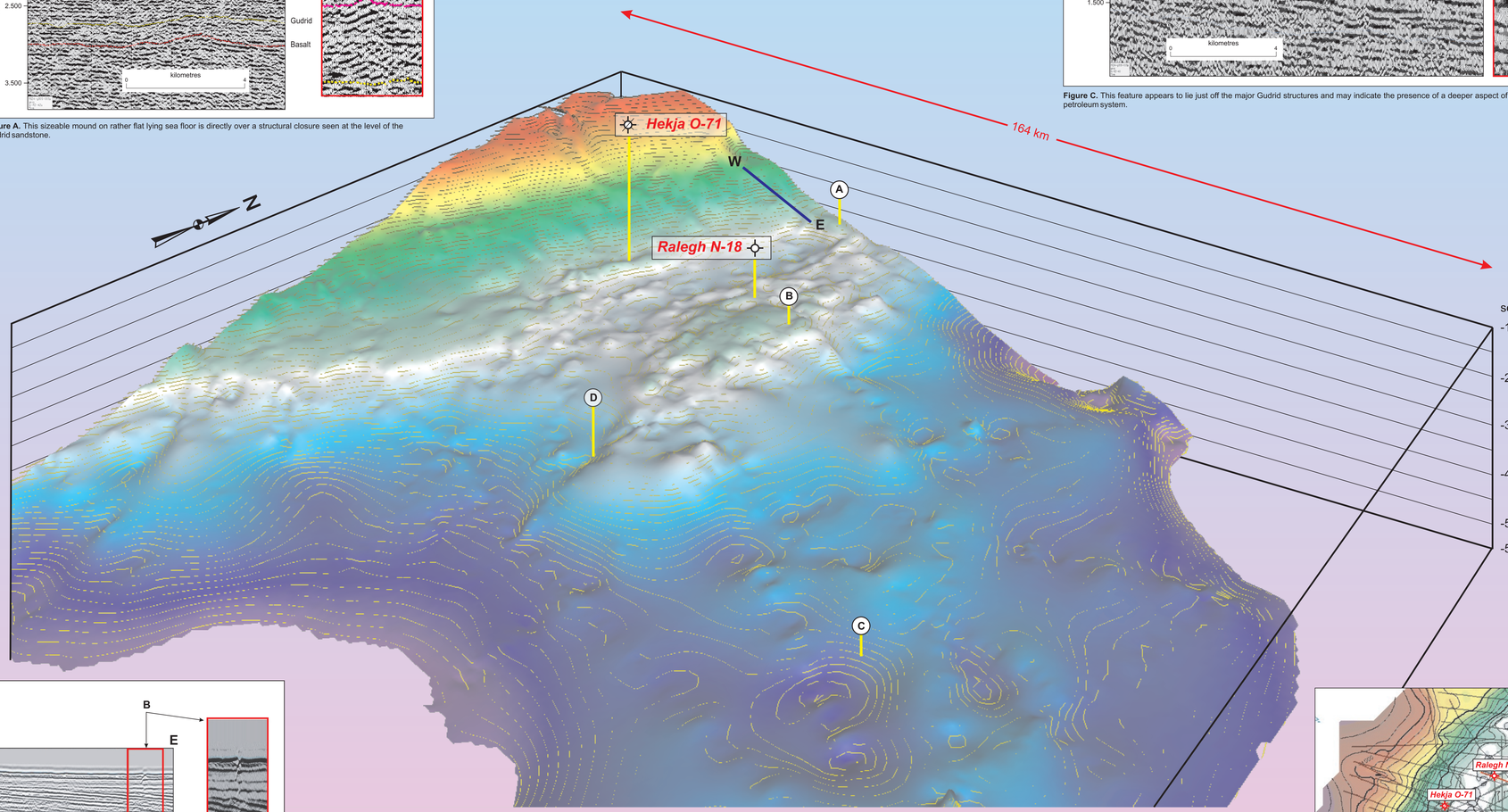


Figure D. This anomalous sea floor mound structure is probably a "sideswipe" image, i.e., this line does not directly overlie the structure.



3-D view of the Gudrid Formation sandstone as mapped from seismic data and converted to a structural interpretation in depth. The actual seismic grid is unevenly spaced with an average line spacing of about 8 kilometres, this mapped seismic interpretation of the Gudrid has been gridded at 750 m spacing to preserve structural details.

Compare this view of the area with the map view of the same area at right.

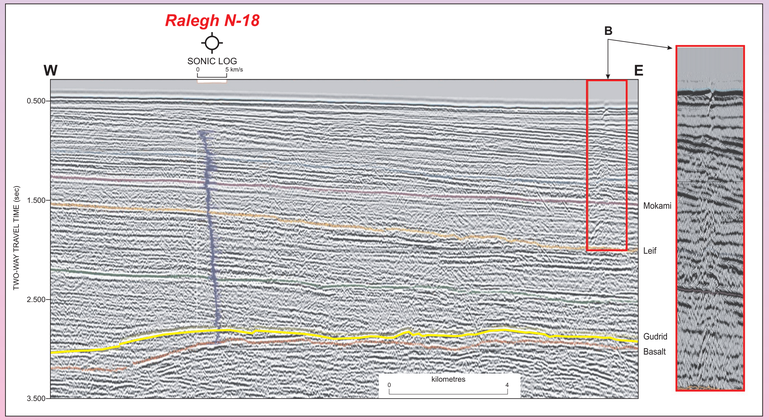


Figure B. Seismic section overlying the Ralegh N-18 well showing the pockmark feature noted in the text.

The Hekja O-71 well drilled in 1979 is a significant gas discovery, located roughly 150 km west of the entrance to Frobisher Bay, Nunavut, Canada. The reservoir of Danian age Gudrid sandstones here is over 85m in thickness of which 44m produced gas and hydrocarbon condensate when tested. Although the testing done was not rigorous by current standards, gas resources on the order of 2 Tcf appear present in this structural trap (Klose et al, 1982). A later well at Ralegh N-18 drilled 26 km to the northeast also found these sandstones but was a technical failure, barren of hydrocarbons. From the mapping this well appears to have been drilled in a structural low as compared to a high point that would form a structural trap for hydrocarbon accumulation.

The maps presented show the seismic reflection mapping of the Gudrid Formation converted to depth in perspective and plan views. The Hekja discovery site can be easily seen as a distinct structure. However, immediately east of the unsuccessful Ralegh well an untested structure of about ten times larger area is present. Numerous other structural traps can be seen in this area, some of which show signs of probable hydrocarbon venting to the seafloor, as can be seen in four examples.

The positive relief seafloor features seen at A, C and D appear to have been formed by rising fluids, most likely hydrocarbons, from considerable depth. These three features may be partially organic in origin; similar to other bioherms seen offshore Norway overlying known petroleum fields. These features represent a fairly new type of chemo-synthetic community where methanogenic bacteria feed on the upwelling cold seep hydrocarbons and are in turn fed on by cold water corals which can build into reefs measuring tens of metres in height over the seafloor (Hovland and Risk, 2003). By comparison, the feature at B appears to be a pockmark, a crater-like feature caused by the violent expulsion of fluids from below. This type of feature may be a type of subsea mud-volcano as the pockmark sits well over the very large structural trap mentioned earlier and would have hydrocarbon fluids sourced from the Gudrid reservoir sands shown as the yellow horizon on the labeled seismic section. It is interesting that the pockmark feature appears to be close to the structural crest of this reservoir.

Current technology has yet to make these resources economically viable, hence these petroleum deposits are classified as "stranded", essentially stuck due to the costs of production and transport. However, from the seismic and well test data, this area offshore Baffin Island must be regarded as a probable world class hydrocarbon deposit that awaits future development.

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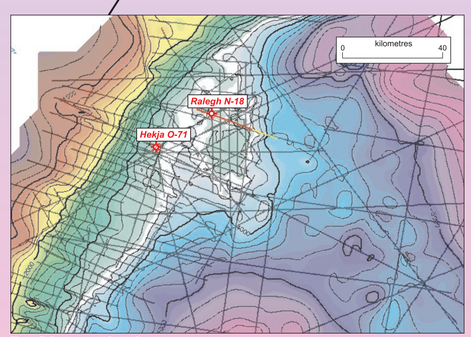

Figure E. Depth to top of Gudrid Sandstone

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Hekja O-71, a major stranded gas discovery offshore Baffin Island with seismic examples of probable gas vents

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