

# ***Petrophysical Characterization of Danian Deep-Water Coral Mounds, Faxe, Denmark***

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## **Project Purpose**

Deep-water corals form impressive mounds up to 180 m high in the modern oceans. For example, the 155 m high Challenger Mound in the Porcupine Basin is constructed by an alternation of coral floatstone and wackestone units. In the Straits of Florida, mounds can be as high as 120 m and coalesce to form kilometer long ridges. Thus, their size and abundance make them potential but hitherto unexplored reservoirs. Little is known about the petrophysical properties of these mounds. In the early Cenozoic strata (Middle Danian) of Denmark, large reefal mounds, similar in size and shape to modern ones, occur in deep-water carbonate settings. In the Faxe quarry, the reefal limestone and its associated facies are mined and can be sampled for a petrophysical characterization of these mounds (Figure 1).

## **The Faxe Quarry**

The Faxe limestone quarry is dug into a pronounced topographic bank and exposes a complex of inter-bedded coral and bryozoan limestone banks of Middle Danian age. The most extraordinary feature at the Faxe quarry is the great coral bank complex.

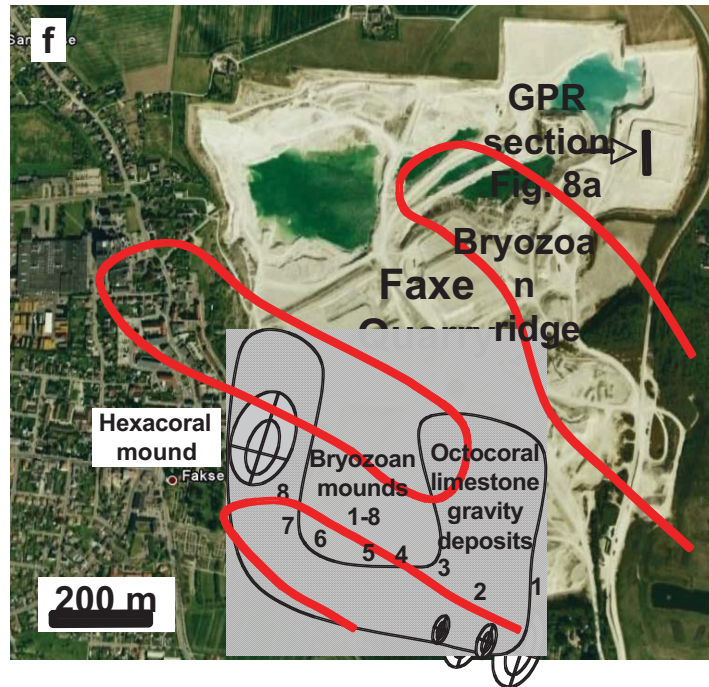


Figure 1: Aerial view and geological map of the Faxe quarry. The red lines outline the bryozoan ridges while hexacoral mounds and their associated facies dominate the crosshatched area.

The Faxø Mound, which is slightly elongate in the NW-SE direction and covers over 1 km<sup>2</sup>, has an immensely rich fauna and has undergone some diagenetic alterations (Figure 2). The individual coral banks are up to approximately 20 m high and stacked mounds are estimated to be up to 100 m high. The coral banks are inter-bedded with bryozoan banks.

The coral mounds are predominantly built by 3 genera of ahermatypic scleractinian corals: *Dendrophyllia*, *Faksephyllia*, and *Oculina*. Other species of scleractinian coral do, however, also occur, as do octocorals and stromatoporoid sponges. (For more details see [http://geosites.dk/themes/danian\\_selandian/ds\\_fakse\\_kalkbrud/index.html](http://geosites.dk/themes/danian_selandian/ds_fakse_kalkbrud/index.html)).

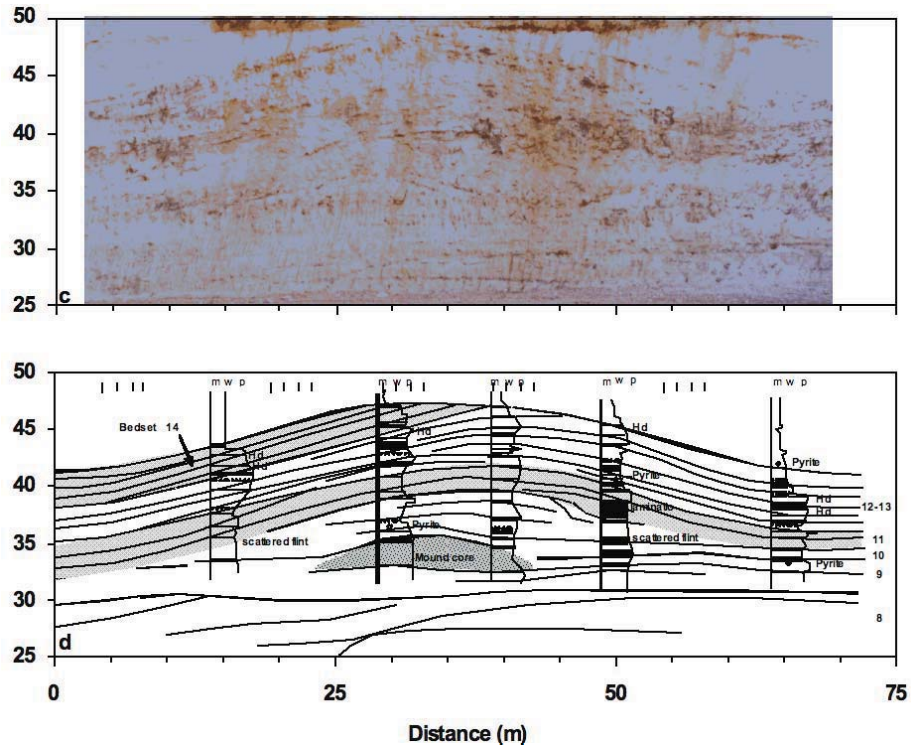


Figure 2: Photograph and line drawing of part of the Faxø Mound displaying the internal architecture of the deep-water coral reef.

### Scope of Work

The geometry and texture of the mounds are assessed using photography and surface mapping. The main focus of the project is to measure porosity, permeability, sonic velocity, and resistivity of the mound strata. In addition, the pore structure will be documented with quantitative digital image analysis parameters. The petrophysical measurements and the digital image analysis will be integrated into a sedimentological and diagenetic characterization of the mounds.

### Deliverables and Expected Results

This study will produce the first petrophysical characterization of deep-water coral mounds of Danian age. It is expected to provide a basis for evaluating the reservoir potential of deep-water build-ups of this and other ages.