NGU
Norges geologiske undersøkelse
Geological Survey of Norway

RESEARCH PROJECT

Basement fracturing and weathering on- and offshore Norway - genesis, age and landscape development (BASE)-

The Geological Survey of Norway (NGU) is carrying out a new integrated project on genesis, age and landscape development of fractured and weathered basement on- and offshore Norway. A crucial momentum in this project is the establishment of a new K-Ar dating facility at NGU.

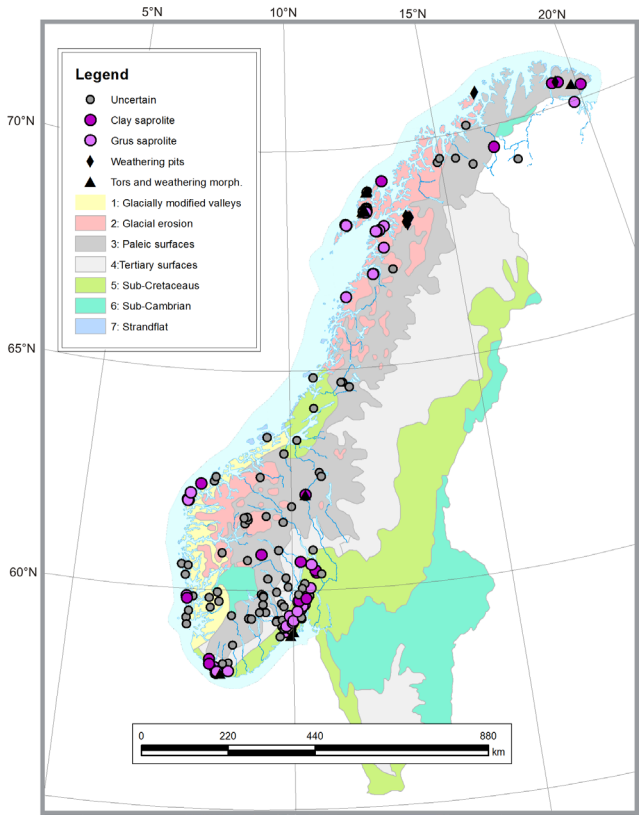

Figure 1: Overview of known weathering localities and saprolites in Norway and landscape generations after Lidmar-Bergström (1995). Base will focus the research in areas of south western Norway, Lofoten/Vesterålen, and adjacent offshore regions.

Basement weathering is widespread in Scandinavia and commonly thought to be related to (sub-) tropical conditions during the Mesozoic or cool climate conditions during the late Cenozoic (Fig. 1).

Recent oil discoveries in weathered and fractured basement off southwestern Norway, demand new research efforts on how Mesozoic climate, and late Cenozoic uplift and denudation have effected fracturing and weathering of the crystalline basement (Fig. 2). It remains poorly understood how these different forcing factors interact with each other, and their relative importance is unclear.

BASE will address these uncertainties with the following research tasks:

1. Improved chronological constraints and quantitative understanding of key processes, which trigger, maintain and provide positive feedback between fracturing, faulting, and weathering.

2. Imaging of weathered and fractured bedrock to better map hydrocarbon reservoir units and model possible secondary hydrocarbon migration systems.

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BASE will establish a conventional K-Ar dating facility at NGU focusing on clay and other mineral dating applications. The new facility will complement the existing ^{40}Ar-^{39}Ar dating facility and will allow to constrain in time saprolite genesis and brittle fault activity and thus better assess the spatial and temporal evolution of weathering and fracturing processes (Fig. 2)

The mapping and analysis of basement weathering in combination with a thorough understanding of the spatial evolution of faults and fractures will provide key information as to the formation mechanisms and characteristics of important unconventional oil reservoirs. New K-Ar ages will constrain the time dimension of this reconstruction.

BASE is a collaboration between NGU and SINTEF Petroleum Research and is sponsored by four industry partners.

Figure 2a: Weathered granite core boulder in kaolinitic saprolite at the Ivø kaoline quarry, southern Sweden.

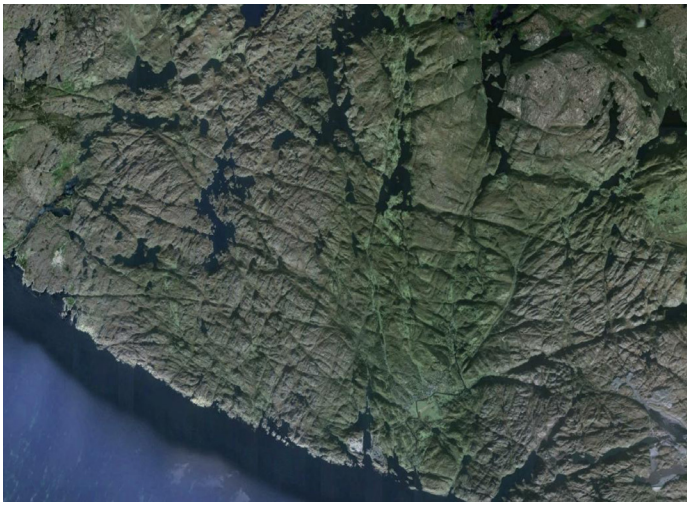

Figure 2b: Google Earth image of southwestern Norway. The region is saturated of faults and fractures, which correspond to prominent sets of lineaments. Remote sensing combined with field structural analysis will help to unravel the geometric and kinematic evolution of the regional brittle deformation history.

BASE FOCUS

- Geomorphology of weathered landscapes
- Saprolite genesis and characteristics
- Spatial and temporal evolution of brittle deformation
- Tectonic and climatic boundary conditions
- Imaging of weathered landscapes
- Fluid flow modelling through weathered bedrock

MAERSK OIL

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