Saprolites on- and offshore Norway: New constraints on formation processes and age

O. FREDIN[1,2], H. ZWINGMANN[3], J. KNIES[1], R. SØRLIE[4], E.M. GRANDAL[4], J.-E. LIE[4], A. MÜLLER[1] AND C. VOGT[5]

[1]Geological Survey of Norway, NO-7491 Trondheim, Norway (*correspondence: ola.fredin@ngu.no)
[2]Norwegian University of Science and Technology, NO-7491, Trondheim, Norway
[2]CSIRO, ESRE, Bentley, WA 6102, Australia
[3]Lundin Petroleum AS, NO-1366 Lysaker, Norway
[4]University of Bremen, D-28359 Bremen, Germany

The origin of landscapes in Scandinavia has been debated for more than a century and the discussion is as vigorous as ever today. In short, one school proposes that most of the geomorphology can be explained by glacial and periglacial processes, while others argue that the landscape partly is inherited from earlier etching, stripping and exhumation episodes, and has been preserved through cover of sedimentary rocks and selective glacial erosion. One key argument used by the latter proponents is the relatively widespread occurrences of saprolite in Scandinavia. Here we attempt to characterize and date these saprolites both on- and offshore Norway.

One key locality is the Utsira high, which is an offshore crystalline basement horst in the Norwegian North Sea partly overlain by Paleozoic and Mesozoic strata. The area has received significant attention recently due to large petroleum finds, specifically the Edvard Grieg (16/1-8, 2007), the Johan Sverdrup (16/2-6, 2010) and the Luno 2 (16/4-6 S 2013) discoveries done by Lundin Norway.

Significant areas of the Utsira high basement appear to be deeply weathered and saprolite is found in exploration wells. We utilize K-Ar dating of illite diagenesis and geochemical analysis of the saprolite to characterize weathering age and processes. The data suggest deep weathering of a granitic landscape during late Triassic, followed by a transgression and deposition of sedimentary strata. The K-Ar data thus agrees with the stratigragraphic position of Utsira high saprolite below Jurassic sediments.

Our hypothesis is that the similar landscape and saprolite onshore Scandinavia is of similar origin and age as the offshore equivalent. Preliminary onshore data are inconclusive but more testing will be made.

Simulating Macromolecule Behaviour on Calcite Surfaces

COLIN L FREEMAN*[1], DAVID SPARKS[1], GABRIELLA KAKONYI[2,3], MARIA ROMERO-GONZALEZ[2,3], STEVEN BANWART[2,3] AND JOHN H HARDING[1]

1 Department of Materials Science and Engineering, University of Sheffield, Sir Robert Hadfield Building, Mappin Street, Sheffield, S1 3JD, UK
2 Department of Civil Engineering, University of Sheffield, Sir Frederick Mappin Building, Mappin Street, Sheffield, S1 3JD, UK
3 Kroto Research Institute, University of Sheffield, North Campus, University of Sheffield, Broad Lane, Sheffield, S3 7HQ, UK

Large molecular interactions with mineral surfaces remain complex to understand due to the range of conformations and multiple binding sites. Yet these molecules are vital for a large range of systems including biomineralisation, biomimetics, and cellular adhesion. Therefore it is key to understand how larger molecules behave at these interfaces.

In this presentation we explore how poly-acrylic acid (PAA) as an analogue of many biological molecules interacts with calcite surfaces. Modelling this binding with atomic scale processes is difficult due to the vast range of conformations that must be considered. We are able to model a PAA molecule of 28 monomers in a variety of conformations via the use of novel metadynamics methods and determine how the surface influences the conformation. By studying the system at a range of pHs we make comparison to experimental studies in solution and at the surface on different calcite particles. The results provide insights into how highly charged large molecules interact with these surfaces and how the structure of the molecule influences this behaviour.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.6