



Mapping the regolith: Deep weathering and its impact for the Norwegian landscape

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Different epochs of glaciations onshore Norway eroded and removed almost entirely the overlying sedimentary successions. The preglacial landscape is consequently masked by glacial erosion and the landscape as it is today might reflect the impact of deep weathering. The numerous sounds and islands along the Norwegian coast could to a large extent be conditioned by exhumation and erosion of weathered basement.

Onshore Norway and in wells on the Norwegian continental shelf quite a few examples of deeply weathered and fractured basement are observed. A couple of hundred meters deep saprolites in narrow fracture zones were for example observed on the mainland of south-eastern Norway. Furthermore along the Norwegian coast several places like Lista, Karmøy, Vågsøy and at the Lofoten-Vesterålen archipelago, are well known for significant amounts of deeply weathered basement. A comprehensive mapping of these remains of weathering gives valuable indications if and to what extent the today's Norwegian landscape can be the product of glacial erosion of not only sedimentary rocks, but also thick packages of soft, deep weathered basement.

New high quality aeromagnetic data were acquired along the Norwegian coast over the last years by the Geological survey of Norway as part of a crustal onshore-offshore project (COOP) and were applied for systematic mapping of deep weathering in conjunction with reprocessed data by using the AMAGER (AeroMagnetic and GEomorphological Relations) method. Onshore Norway the AMAGER method was successfully applied in SE Norway (Olesen et al. 2007) and comprises a correlation of morphological depressions and magnetic lows. The method is based on the not necessarily but for Norway common observation that saprolite shows a noticeable reduced magnetization compared to the parent material and is moreover easily erodible. Relative magnetic lows correlating with topographic depressions in eroded and exposed basement landscapes are hitherto likely to indicate the location and distribution of deep weathering. Offshore, on the Norwegian shelf the AMAGER method is not easily applicable due to possible sedimentary coverage. But folded and fractured basement and the alteration of basement rocks by weathering processes, however, cause noticeable characteristics of the rock's physical parameters, which are also likely to be detected by marine geophysical methods. From onshore-offshore high-resolution aeromagnetic data we correlated noticeable onshore deep weathering/fractured basement lineaments with magnetic features offshore and 2D seismic data were finally used to confirm the character of the interpreted magnetic features.