

The Norwegian strandflat: Insights into an old weathering front

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Reusch introduced the term 'strandflat' in 1894 to describe the flat-lying low relief landscape along and off the Norwegian coast. This landscape is only observed in the Arctic region with additional examples from e.g. western Greenland and is commonly excepted to be the product of Quaternary wave- and ice- abrasion. We suggest that repeated periods of deep weathering altered the basement such that it was subsequently easy to erode. Deeply weathered bedrock on the Norwegian strandflat is similar to weathering occurring beneath Mesozoic strata at offshore basement highs (e.g. the Utsira and Frøya highs) indicating this surface has an older origin. Initial K/Ar age dating of saprolite remnants confirm Mesozoic ages and some localities on Andøya reveal even older, Carboniferous ages. Geophysical measurements on the strandflat indicate the existence of remaining thick packages of weathered bedrock, which are mostly preserved in joints and fractures. We thus argue that the present day strandflat is an old weathering front, that has been stripped in quite recent geological time through Quaternary erosional processes. Mapping potential deep weathering along the Norwegian strandflat shows an obvious correlation with tectonic fault systems on the shelf and indicate a relation between deep weathering and the development of the Norwegian margin. Rifting along the margin and fractured basement rocks could have facilitated deep weathering and increased weathering rates. Main observed weathering difference is between western and mid Norway and the Lofoten-Vesterålen-Vestfjorden region, which we suggest is due to the location relative to the rifting in the North Sea and the Norwegian Sea. The greater Vestfjorden region constitutes a part of the Mesozoic rift system with an abundance of uplifted and rotated fault blocks, whilst mid Norway was located more remotely relative to the rift centres in the Møre-Haltenbanken area. Consequently, we find the remnants of deep weathering on rotated fault blocks in Lofoten-Vesterålen whereas saprolite occur in the more gentle landscape along the coast of Trøndelag. We suggest that the deep weathering in the Hamarøya, Lofoten and Vesterålen areas is preserved because of the young uplift and erosion of this area (Late Pleistocene age). Most of the ice was transported in ice streams through Vestfjorden and Andfjorden leaving the interior of the mainland and the inner Lofoten-Vesterålen archipelago relatively unaffected, whilst along the coast of Nordland and Lofoten-Vesterålen a wide and extensive strandflat zone has been exhumed due to Quaternary erosion.