Geophysical Research Abstracts, Vol. 9, 02873, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02873

Post Caledonian reactivation of ancient structures in central southern Norway, constrained by apatite fission-track data.

C.A. Leighton

Department of Earth Science & Engineering, South Kensington Campus, Imperial College London, London SW7 2AZ. (callum.leighton@imperial.ac.uk / Phone: 02075947161)

In recent years there has been much controversy over the origin and history of the present-day landforms of southern Norway, with a multitude of tectonic scenarios being proposed. The purpose of this work has been to test these ideas by studying the cooling histories, a good proxy for erosion, of widely sampled rocks from the surface and shallow tunnels across southern Norway, using apatite fission-track analysis.

It is found that the Caledonian nappes of central southern Norway yield fission-track ages of 110-130 Ma at sea level and have a positive age-elevation trend with ages reaching 200 Ma at 2000 m elevation. Inverse thermal history modelling shows these samples have a strong Triassic cooling signal followed by prolonged slow cooling at approximately 30ºC/Ma up until the late Cenozoic. This is distinct from the pattern of ages and thermal histories found in the nearby surrounding Precambrian basement. Here there is no discernable age-elevation trend and all ages are in the range 160-200 Ma. Modelling demonstrates these samples also underwent rapid Triassic cooling but subsequently resided at near-surface temperatures with minimal cooling. All samples probably underwent some more rapid cooling in the latest Cenozoic but this is poorly constrained. There is a clear structural control on the distribution of fission-track ages and the style of cooling. Furthermore, DEM analysis demonstrates that the present-day landscape is also strongly influenced by underlying structure. This may suggest that the same processes that have operated since the Mesozoic may be ongoing today.

The strong Triassic signal seen in all samples is consistent with North Sea and central European palaeogeography where large thicknesses of sediments of Scandinavian provenance are preserved. It is suggested that post-Triassic differential cooling be-

tween the basement and overlying nappes must have resulted from reactivation of Caledonian structures during the Mesozoic and Cenozoic. The Møre Basin, situated NW of southern Norway has a structural grain parallel to that of the onshore Caledonian structures and was actively extending during the observed time of differential cooling. It therefore seems likely that extension in the Møre Basin and passive margin formation prior to the start of ocean spreading in the north-Atlantic region was the driving mechanism for onshore reactivation.