Geophysical Research Abstracts
Vol. 15, EGU2013-1622-1, 2013
EGU General Assembly 2013

The Long Term Response of a Continent Adjacent to a Hyperextended Margin: A Case Study From Scandinavia

Tim Redfield (1) and Per Terje Osmundsen (1,2)

(1) Norwegian Geological Survey, Trondheim, Norway (tim.redfield@ngu.no), (2) Department of Arctic Geology, University Center, Longyearbyen, Svalbard

We present data that link Scandinavia's passive margin domains under a unified system invoking isostatically-driven, post-extension phase vertical adjustments to severe crustal thinning. Topographic and geological data indicate that the relative location of the first landward occurrence of total crustal embrittlement or deformation coupling $\sim$ the Taper Break $\sim$ controlled and continues to control Scandinavia's post-thinning geomorphic evolution. Formed during Late Jurassic or Early Cretaceous thinning yet marked today by seismicity, the Taper Break closely approximates the boundary between 1) less-stretched lithosphere that increases in rigidity both towards land and through post-rift time, and 2) the highly attenuated, pervasively faulted, permanently weakened lithosphere of the distal margin. Following the stretching, thinning, and exhumation phases proposed by other workers, an accommodation phase is warranted. Commencing during "sag" basin time and continuing today, it is probably driven by thermal cooling and mass transfer from the escarpment to the basins offshore. The accommodation phase does not entirely coincide with the traditional post-rift phase as the former may contain the latter. During accommodation, the original syn-rift escarpments can be eroded to very low base levels. Sharply-tapered margin segments can undergo subsequent rejuvenation by out-of-sequence normal faulting and footwall uplift, probably in response to tensile bending stresses engendered by lithospheric scale flexure. Accommodation phase uplift at passive margins is the inexorable and penultimate phase of hyperextension, and may perhaps be followed by the onset of subduction localized by the weakened lithosphere of the distal margin and the ocean-continent transition. [See Redfield and Osmundsen (2012) for diagrams, definitions, discussion, and supporting citations.]

CITATIONS
Redfield, T.F. and P.T. Osmundsen, 2012, GSA Bulletin, doi: 10.1130/B30691.1