Geophysical Research Abstracts, Vol. 7, 10042, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10042

Towards a 4D topographic view of the Norwegian Sea margin: From glaciated mountains to the deep shelf

M. Smelror, E. Larsen, Ø. Nordgulen and S. Buiter
Geological Survey of Norway, NO-7491 Trondheim, Norway

The present day continental and shelf topography of the Norwegian Sea passive margin is a product of complex interactions of lithospheric scale processes, the composition of the basement and Caledonian roots, and external forces from varying palaeoclimatic and tectonic regimes through the Mesozoic and Cenozoic. Phases of extension (Late Jurassic-Early Cretaceous, Mid- and Late Cretaceous, Paleogene) and compression (Late Cretaceous, Eocene-Oligocene boundary, Middle Miocene), basin subsidence, and regional uplift in the earliest Tertiary and Neogene, controlled the evolution of the sedimentary mega-cycles on the shelf. Prior to the Cimmerian tectonic phase, the land areas experienced deep erosion in the warm and humid mid-Jurassic climate forming a regional paleic surface. Tectonic movements in the Late Jurassic-Early Cretaceous, with differential uplift along major fault zones, led to a more pronounced topographic contrasts during the Cretaceous. Thick sequences of clastic sediments accumulated in the deeply subsiding basins on the shelf during the Cretaceous. Following the latest Cretaceous phase of tectonism and regional uplift, a new paleic surface developed in the Paleocene. On the western side of the summit (drainage divide), deeper erosion took place along pre-existing weakness zones, creating the template of the present day valleys and fjords. During the latest Neogene glaciations and subsequent uplift, huge sediment aprons were shed on to the Norwegian Sea and Barents Sea margins. The uplift caused by the post-glacial isostatic rebound continues today. Raised Quaternary marine clay represents potentially unstable ground (quick clay) pose a challenge to the development of modern settlements and infrastructure. Avalanches and rock falls along steep valley and fjord sides creating tsunamis in lakes/fjords represents another geohazard related to the extreme topography. Better understanding of processes affecting the crustal structure and history will contribute to improved hazard assessment a deeper appreciation of our physical environment.