Geophysical Research Abstracts, Vol. 7, 00486, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00486

Late Cenozoic history of the Barents Sea margin: elucidating the link between elevation, erosion and climate

F. Butt (1), A. Elverhoi (2) and A. Solheim (3)

(1) Department of Geography & Geology, University of the West Indies, Mona Campus, Kingston 7, Jamaica (faisal.butt@uwimona.edu.jm / Fax: +1876 977 6029 / Phone: +1876 927 2728), (2) Department of Geosciences, University of Oslo, Oslo, Norway (anders.elverhoi@geo.uio.no / Fax: +47 2285 4215 / Phone: +47 2285 6653), (3) Norwegian Geotechnical Institute, Oslo, Norway (anders.solheim@ngi.no / Fax: +47 2223 0448 / Phone: +47 2202 3059)

The Barents Sea is a shallow epicontinental sea covering an area of about 1.2x10^6 km^2 in the Artic/subArctic region. Late Cenozoic climatic changes in the area are relatively well-constrained. Estimates of erosion rates from the two major basins, the northwestern Storfjorden Basin and southeastern Bear Island Basin during the last ~2.3 m.y. are also available. Isostatic modelling has shown Barents Sea to be a subaerial platform at 2.3 Ma. Transition towards a 'sea' began around 1.6 Ma and was complete by 0.8 Ma. Data show that there are orders of magnitude differences in the sediment yield values from the two basins in the 2.3-0.8 Ma interval. The values become almost identical for the submarine post-0.8 Ma phase. The question then arises: how can the differences in sediment yield and hence erosion rates, from two adjacent basins that lie in the same general climate zone, be reconciled?

In our opinion the answer lies in difference in relief between the two areas. The simulated initial relief in the Storfjorden Basin at 2.3 Ma is much higher compared to the Bear Island Basin. The difference, however, became much less pronounced over time and the basins were essentially similar in the post-0.8 Ma period. Ice first reached shelf break along the western Svalbard-Barents Sea Margin around 1.6. However, due to higher relief, there may have been limited glacier growth on Svalbard and the northwestern Barents Sea at the onset of Northern Hemsiphere cooling at 2.6 Ma, while the lower-relief southwestern part could still have had an essentially non-glacial and con-

sequently much less erosive regime.

The drastic decrease in the sediment yield from the Storfjorden Basin post 0.8 Ma; becoming similar to Bear Island Basin could be an indication of similar erosion rates in the two basins following 0.8 Ma. The timing (0.8 Ma) is significant for two reasons: 1) there had been a transition from high frequency, low amplitude 41 kyr glacial-interglacial cycles to low-frequency, high-amplitude 100 kyr cycles following $\sim$0.9 Ma – the mid-Pleistocene climate shift, and 2) the Barents Shelf transformed into a ‘sea’ after 0.8 Ma. This implies that although the ice sheets formed post 0.8 Ma were more extensive than the ones formed earlier, they were marine-based and therefore less erosive.

We therefore conclude that while climate may have provided the impetus, the way climate change manifested itself in modifying the erosional regime in the Barents Sea region was a function of elevation.