Geophysical Research Abstracts
Vol. 13, EGU2011-9229, 2011
EGU General Assembly 2011

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The influence of strike-slip related tectonic inversion on the structural development of the Barents Sea has been long recognized and dated to late Palaeozoic, Mesozoic and Cenozoic. A series of detailed structural analyses of the master fault complexes of the southwestern Barents Sea have recently been performed by the PetroBar project group centered at the University of Oslo, summarizing the major events of inversion and settingese into a plate tectonic context.

Devonian – early Carboniferous. The late Palaeozoic structuring of the southwestern Barents Sea was strongly influenced by the structural grain inherited from the Timanian (Vendian/Ediacaran) and Caledonian (Cambrian – late Silurian) orogenies, namely E-W to WNW-ESE (Timanian) and N-S to NE-SW (Caledonian) trends. The latest to post Caledonian structuring was presumeably accompanied by a component of dextral shear that also affected the westernmost Barents Sea area, whereas the areas away from the major sutures seems to have escaped the direct effects of this shear. As a result of increasing ENE-WSW-directed extension in the late Devonian – early Carboniferous, the general tectonic style of the interior Barents Sea switched to that of extensional half-grabens during the Frasnian, developing a horst-and-graben type terrane, and including NE-SW-trending faults in the Nordkapp Basin and the Bjarmeland Platform in Visean time.
Mid to late Carboniferous – early Cretaceous. Although the mid Carboniferous marks the closure of the Uralian Ocean by collision of the West Siberian Craton with the eastern margin of Baltica and the incipient emergence of the Uralian Orogen, tectonism declined in the western Barents Sea by the end of the Carboniferous. Still, shear-related tectonic activity can be traced in the N-S-striking master faults in Spitsbergen like the Billefjorden and the Hornsund fault system and the central segment of the Bjørnøyrenna Fault Complex, which separates the westernmost Loppa High from the Bjørnøya Basin. The latter is basically a zone of westerly facing extensional faults characterized by increasing structural activation in Moscovian times.
For the late Mesozoic and Cenozoic structuring, the study area was affected by Cretaceous inversion is concentrated to the eastern and southern margins of the Loppa High, where inversion and the development of a positive half-flower-like structure related to a phase of shear is seen for the western segment of the Asterias Fault Complex in the Aptian - Hauterivian. For the Bjørnøyrenna Fault Complex, or The early Cretaceous saw a dextral strike-slip event, the structuring being modified by releasing and restraining bends. This was followed by a head-on contraction associated with reactivation of extensional faults, the development of folding and footwall cut-offs and folding and thrusting in the hanging wall. The tectonic activity again increased throughout the Cretaceous, with accelerating subsidence towards the end of the Cretaceous. In its initial stage of opening, which was constrained to the early Eocene (magnetic anomaly 24), the Western Barents Sea - Svalbard shear margin functioned as a transform fault, which incorporated at least three separate segments with a right-stepping, en ecehlon geometry. This configuration opens for a polychronous development with varying principal stress situations characterizing the different segments at any time, because the movement was initiated in the SSE, spreading northwards. The transform propagated northwards throughout the Eocene – earliest Oligocene, terminating with the establishment of a passive margin. Three stages in the structural development of the shear margin are recognized

1) The earliest of these was dominated by WNW-ESE-directed extension and the initiation and development of rotated fault blocks, whereas
2) the second phase involved inversion, particularly focused in the master faults delineated ha larger fault blocks.
3) Exactly as for the Sørvestsnaget Basin, relief associated with the system of rotated fault blocks and exhumed inverted faults became passively filled in by sediments and overstepped by glacial sediments derived from the Scandinavian mainland and dumped in the deep Arctic Ocean.