# The late Caledonian structural grain and its influence on Late Paleozoic and younger basin evolution in the North Atlantic-Barents Sea Region

***Arild Andresen, Department of Geosciences, University of Oslo***

Post-Caledonian basin evolution in the North Atlantic - SW Barents Sea region is strongly controlled by a late Caledonian (Late Paleozoic) structural grain. The link between this structural grain and younger basins is well recognized onshore Northeast Greenland and Svalbard, but evidences are also seen in the on-land geology of Nordland, Troms and Finnmark.

The Caledonides in the North Atlantic Region (British Isle, Northeast Greenland, Scandinavia and Svalbard) are the result of collision between Baltica and Laurentia in Late Silurian-Early Devonian times. Various lines of evidence indicate that the collision between the two lithospheric plates was oblique, resulting in the development of major strike-slip shear zones (e.g. Storstrømmen Shear Zone in NE Greenland, Møre-Trøndelag Fault Complex in Norway and the Billefjorden Fault Zone in Svalbard). All of these crustal-scale structural features, mostly of Devonian age have controlled the development subsequent younger basins.

Acting more or less contemporaneous with the development of the abovementioned strike-slip faults in NE Greenland were the development of 2 extensional (?) fault sets, striking N-S, and NW-SE , respectively, and a less prominent set of normal faults striking E-W: all with respect to present day coordinates. Emplacement of N-S striking lamprophyre dykes indicates that the main extensional event is Early Devonian in age. Many of the N-S striking faults, however, were reactivated as basin-bounding -faults during subsequent phases. Of particular interest are new thermochronological data on a N-S striking lamprophyre dyke swarm bordering the Jameson Land basin, documenting a Late Kungurian (260 Ma), not Early Triassic, rifting event. Termination of the Jameson Land basin to the north is most probably controlled by a NW-SE striking fault. It is furthermore interesting the see that the feeder dykes to the Cenozoic basalts covering the coastal areas of NE Greenland are striking NW-SE and N-S, respectively, as are the transform faults ( Jan Mayen FZ) and extensional faults associated with spreading ridges east of NE Greenland and N of Iceland

The structural grain of the Svalbard Caledonides in pre-Cenozoic/pre-opening time is NW-SE, if Eurasia, including the Barents Sea, is rotated clock-wise back to its original pre-opening position. This structural trend is oblique to both the N-S trend in the East Greenland /Scandinavian Caledodonides as well as the E-W trend of the Carboniferous North Greenland fold-and-thrust belt. This discordance in structural trends is best explained by the arrival of crustal blocks/terranes from East Greenland and the Iapetus Ocean at the termination of the East Greenland Caledonides at a passive E-W oriented, rifted margin along northern Greenland. This tectonic model furthermore explains the juxtaposition of various Caledonian continental terranes in Svalbard, separated by a fanning pattern of terrane boundaries in the Western Barents Sea. The Billefjorden Fault Zone, one of several terrane bounding strike-slip faults, reactivated as a down-to-the-E extensional fault in the Early Carboniferous, later reactivated as an Eocene up-to-the-E high-angle reverse fault associated with basin inversion.

Recent provenance data from Hinnøy indicate a complex transfer zone, composed of NNE and ENE striking normal faults linking the Vestfjorden Basin in the south to a post-Caledonian half-graben east of the Vestfjorden-Vanna Fault Complex in Western Troms.