

The Eocene Eurekan deformation in the Arctic - architecture and kinematics of a strange foldbelt

Karsten Piepjohn (1), Werner von Gosen (2), Franz Tessensohn (3), and Lutz Reinhardt (1)

(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany (Karsten.Piepjohn@bgr.de), (2) GeoZentrum NordBayern, Erlangen, Germany, (3) Adelheidsdorf, Germany

The polyphase Paleogene Eurekan deformational history in the Arctic represents a complex sequence of successive tectonic stages, which produced a number of intra-continental deformation zones with changing, sometimes opposing, lateral, oblique, and convergent kinematics along the involved plate boundaries in the Canadian Arctic Archipelago, North Greenland, and Svalbard. The Eurekan deformation is characterized by different structural styles with the development of fold-and-thrust belts in Spitsbergen and in the Canadian Arctic, distinct compressional thrust zones in North Greenland and Ellesmere Island, large systems of strike-slip fault zones in Spitsbergen, Northeast Greenland and Ellesmere Island, and the combination of both compressional and lateral fault zones in northern Ellesmere Island.

Eurekan tectonism was caused by the opening and continuous evolution of the Eurasian Basin in connection with the development of the Labrador Sea/Baffin Bay and the North Atlantic Ocean spreading ridges. The following tectonic stages can be distinguished which are responsible for the Eurekan deformation:

- Pre-Eurekan Stage: sea-floor spreading in Labrador Sea and rifting in Baffin Bay, Norwegian/Greenland seas and the Eurasian Basin (100-53 Ma).
- Eurekan Stage 1: sea-floor spreading and transform faults around Greenland resulted in a NE-directed movement with (a) sinistral transpression along Nares Strait and probably sinistral motion along the fault zones parallel to the north margin of Ellesmere Island, and (b) compression at the West Spitsbergen Fold-and-Thrust Belt (53–47 Ma).
- Eurekan Stage 2: NW-wards directed movement of Greenland with (a) compression along Nares Strait and parts of Ellesmere Island combined with dextral motions parallel to the continental margin of the Canadian Arctic Archipelago (b) and dextral strike-slip tectonics along Fram Strait (47–34 Ma).
- Post-Eurekan Stage: termination of sea-floor spreading in Labrador Sea/Baffin Bay and separation of Greenland and Svalbard.

The Eurekan deformation can be defined as being the result of plate-tectonic movements during the simultaneous sea-floor spreading in Baffin Bay/Labrador Sea, the North Atlantic and the Eurasian Basin, when Greenland was a separate plate surrounded by active plate boundaries 53 and 34 Ma ago.