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THE EUREKAN DEFORMATION IN THE ARCTIC – AN OUTLINE

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The polyphase Eurekan deformational history in the Arctic was not the result of a single tectonic episode. It rather 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 and Northeast Greenland, and Svalbard.

The Eurekan Deformation is characterized by a different structural style 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 zones of deformation in the Canadian Arctic display several curvatures of the trend of the thrusts and folds. The front of the deformation belt towards the Greenland shield, for example, changes from a NE-SW trend parallel to Nares Strait into an E-W trend west of Kane Basin and again to a N-S-trend west of the Inglefield Uplift. This contrasts to North Greenland and Spitsbergen, where Eurekan structures show straight trends over long distances. The phases of the Eurekan deformational history span the Late Cretaceous-Oligocene interval and were caused by different stages of the plate-tectonic evolution in the developing ocean basins surrounding Greenland.

The evolution of the different Eurekan deformation zones is related to the development of the circum-Greenland plate boundaries from Late Cretaceous to Oligocene times. Tectonism was caused by the initiation of 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 interaction between the different continental plates, especially in combination with the development of transform faults, resulted in the formation of several complex zones and areas of (onshore) Eurekan Deformation. Four major stages can be distinguished for the Eurekan Deformation:

- Stage 1: sea-floor spreading in Labrador Sea and rifting in Baffin Bay, Norwegian/Greenland seas and the Eurasian Basin between 100 and 55 million years ago.
- Stage 2: The Early Eurekan phase with sea-floor spreading and transform faults around Greenland resulted in a NE-directed movement and compression at the West Spitsbergen Fold-and-Thrust Belt and sinistral transpression along Nares Strait 55 to 21 million years before present.
- Stage 3: The Late Eurekan phase resulted in a NW-wards directed movement of Greenland with compression along Nares Strait and dextral transpression and transtension along Fram Strait 49 to 36 million years ago.
- Stage 4: final Eurekan movements, termination of sea-floor spreading in Labrador Sea/Baffin Bay and separation of Greenland and Svalbard.

Some remaining main problems concerning the Eurekan deformational history in the Arctic are related to (1) the unprecise dating of main tectonic onshore events, (2) the still unsolved problem of the Wegener Fault (important transform fault or not?), and (3) the western continuation and effects of Eurekan Deformation in western Canada and Alaska.

