Greenland Shield

By

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Greenland Shield

- Part of the North American Craton, occupies all of this Island continent but the East Greenland Caledonides and North Greenland Fold Belt, both of which have some Precambrian inliers. Exposed shield rock is effectively restricted to the narrow, ice-free coastlines.
- **Precambrian composite cratons component cratons, shields, blocks, belts, etc.**
- (1) Archaean Block, (2) Nagssugtoqidian, Rinkian and Ketilidian belts, and buried extensions
- **Neighbouring median massifs, inliers, by continent.**
- (a) Caledonide massifs, (b) North Greenland massifs

The Archaean Block, magnificently exposed in southern West Greenland has provided an unusually complete record of early Archean events, including development of Amitsoq gneisses (-3.8 Ga), and still older Isua-Ikasia supracrustal rocks.

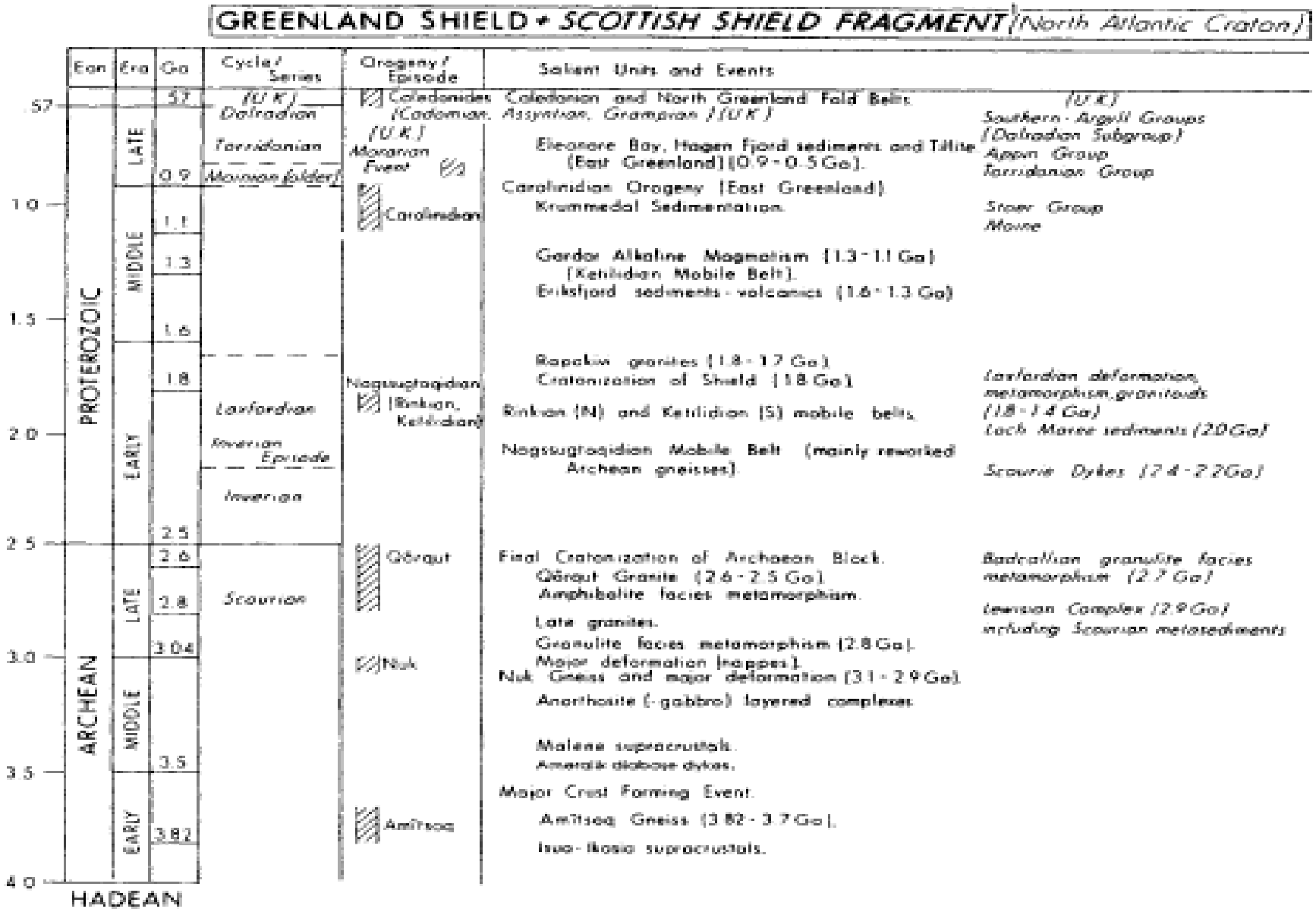


Fig. 1-3d(i). Summary chrono-stratigraphic development of Precambrian crust of the North American Craton—Greenland Shield and Scottish Shield Fragment. Salient crustal units and events are arranged in relation to internal orogenies and resulting tectonic cycles.

Geologic Setting

- Greenland is an unusually large island-continent with a surface area of 2.2x 106 km^2, of which about 80% is covered by Inland Ice.
- The ice-free marginal rim is usually from 8 to 40 km wide but locally up to 250 km wide, with the bedrock magnificently displayed in a bare mountainous region penetrated by long-steep walled fiords.
- By far the largest part of the island is composed of Precambrian crystalline rocks of the Greenland Shield.
- This is flanked to the north and east by the North Greenland and Caledonian fold belts respectively.
- Mesozoic and Tertiary cover sequences occur locally.

Precambrian Provinces

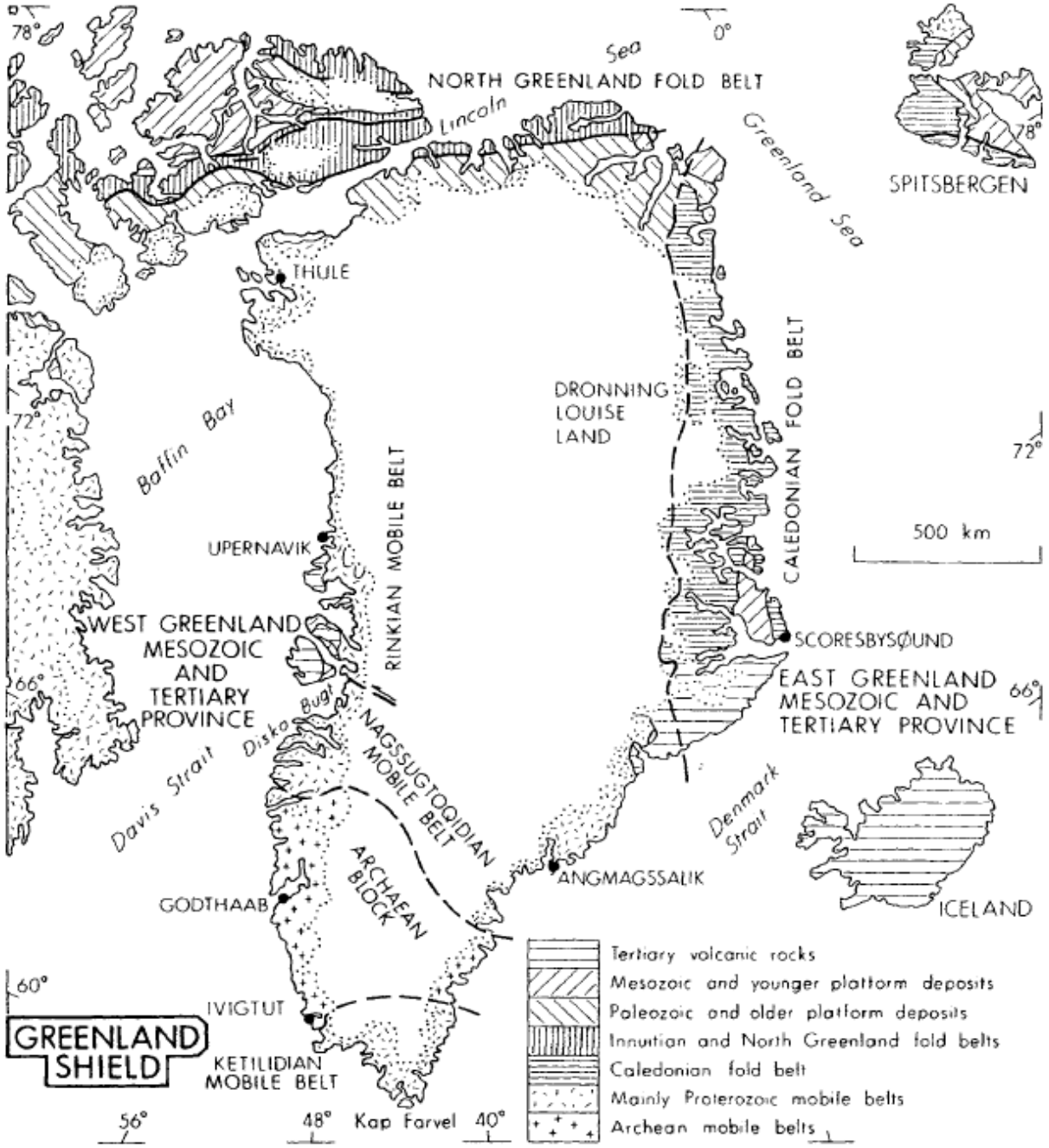
- Four major structural provinces are recognized in the Greenland Shield.
- The Archaean Block, 300- 700 km wide, is flanked by the late Archean to early Proterozoic Nagssugtoqidian and Rinkian belts to the north and Ketilidian Belt to the south.
- The Archaean Block is mainly composed of complexly deformed, high-grade Amitsoq orthogneiss dated to 3820 Ma. The gneisses contain still older metasupracrustal units (Akilia and Isua metasediments), as well as younger metasupracrustal units, anorthosites, diabase dikes, and late granites (2.5 Ga). The structural pattern is highly varied and complex.
- The Nagssugtoqidian Be|t to the north, about 300 km wide, comprises Archean gneisses, largely reworked in early Proterozoic time (--1.8 Ga), but containing sizeable bodies of un-reworked Archean crust, together with thin early Proterozoic metasupracrustal in-folds. Amphibolite facies prevails with local granulite facies. A pronounced regional planar fabric prevails.

Precambrian Provinces Continued

- The much broader and less well-known Rinkian Belt to the north, with its own distinctive structural style, is also composed of widespread basement gneisses with local metasupracrustal cover, collectively folded and metamorphosed at upper greenschist-amphibolite facies. Isotopic ages are common in the 1870-1650 Ma range. However, large masses of Archean crust are known to be present.

- To the south of the main Archaean Block, the narrow Ketilidian Belt is characterized by large granitoid plutons, 1.85-1.75 Ga, including rapakivi and other late granites with variable early Proterozoic metasupracrustal cover, all affected by Ketilidian Orogeny (1.8 Ga).

Main geologic outline and divisions of the North American Craton--Greenland Shield divisions



Precambrian Provinces continued

- At the southern tip of Greenland a variety of dykes and central complexes of nepheline syenites and other silica-undersaturated rocks constitute the 1.3-1.1 Ga Gardar Province.
- In east Greenland, Krummedal metasediments bear the imprint of the Carolinidian Orogeny (~1.0 Ga), and late Proterozoic Eleanore Bay and Hagen Fjord metasediments of the Caledonian Orogeny.
- Spitsbergen Archipelago, to the northeast, includes restricted patches of late Proterozioc metasupracrustal rocks, including prominent Varangianage tiiloids of the Hecla Hoek Geosyncline.