THE PIKWITONEI GRANULITE DOMAIN: A LOWER CRUSTAL LEVEL ALONG THE CHURCHILL-SUPERIOR BOUNDARY IN CENTRAL MANITOBA. W. Weber, Manitoba Geological Services Branch, Winnipeg, Manitoba, Canada, R3H 0W4

The greenschist to amphibolite facies tonalite-greenstone terrain of the Gods Lake subprovince grades - in a northwesterly direction - into the granulite facies Pikwitonei domain (1) at the western margins of the Superior Province,.

The transition is the result of prograde metamorphism and takes place over 50 - 100 km without any structural or lithological breaks. Locally the orthopyroxene isograd is oblique to the structural grain and transects greenstone belts, e.g., the Cross Lake belt (2).

The greenstone belts in the granulite facies and adjacent lower grade domain consist mainly of mafic and (minor) ultramafic metavolcanics, and clastic and chemical metasedimentary rocks (1,2). Typical for the greenstone belts crossed by the orthopyroxene isograd are anorthositic gabbros and anorthosites, and plagiophyric mafic flows.

Available data suggest a late Aphebian age for the prograde greenschist to granulite facies metamorphism. Peak conditions are reflected by saphirin-bearing and opx-sillimanite quartz gneisses which indicate 10 - 11 kb pressure and temperatures of 900 - 1000°C (2).

At its western and northern edge - towards the contact with the Churchill Province - the rocks of the Pikwitonei granulite domain were overprinted by the Hudsonian orogeny; they were deformed, selectively retrogressed and recrystallized under greenschist to amphibolite facies conditions (1,2); locally they were migmatized. The Thompson belt, the Split Lake block and a linear zone south of the Fox River consists of these reworked granulites.

Proterozoic rocks of the Circum-Superior belt (3) (apparently) overlie the reworked granulites along the Fox River and in the Thompson belt. They consist of metasedimentary rocks, mafic-ultramafic metavolcanic and associated intrusive rocks; the magmatic rocks are komatiitic in nature suggesting a rifting environment (3,4).

The contact between the Superior and Churchill Province is a fault. The rocks on the Superior side of this fault are the above-mentioned reworked granulites or rocks of the Circum-Superior belt. Aphebian Kisseynew-type metasedimentary gneisses generally occur on the Churchill side (1).

The Pikwitonei granulite domain has been interpreted as to represent a lower crustal level (2,5,6) which was uplifted to the present level of erosion.

On the basis of gravimetric data this uplift has been modelled as an obduction onto the Churchill Province during the Hudsonian orogeny, similar to the Ivrea Zone (5,6). The fault between the Churchill and Superior Province has been described as suture (7).

However, field geological data suggest that the uplift of the crust is older, late Archean and/or very early Proterozoic and possibly related to a rifting event. Portions of the split-up edge of the Superior craton may be represented by the granulite grade portions of the Wollaston-Nejanilini domain (8,9).

The main evidence for an older uplift is the Molson dykes which intruded into the granulites and the adjacent lower grade terrains of the

northwestern Superior Province when both terrains were at shallow crustal levels, and prior to the Hudsonian orogeny. Since (reworked) granulites form the basement to the Circum-Superior belt, this also suggests early uplift, prior to the deposition of the supracrustal rocks. Preliminary data, based on Pb-Pb isotopes, yield early Aphebian ages for the intrusion of the Molson dykes and the extrusion of the komatiites in the Thompson belt (10).

The present juxtaposition of the Superior and Churchill Province rocks is the result of a collision caused by a northward movement of the brittle Superior Province with respect to the Slave Province. Most of the deformation pattern in the southeastern Churchill Province and the fault pattern in the northwestern Superior block are the result of this relative movement (11).

The collision between the Superior and the Churchill Provinces let to overthrusting of Churchill Province rocks onto the Circum-Superior belt along the Fox River and a strike-slip fault between the Thompson belt and the Churchill Province. The intense deformation - related to the northwards movement of the Superior edge - in the southeastern Churchill Province, suggests a large, but presently unknown lateral displacement along this fault. Compressional stress perpendicular to the Thompson belt probably also some produced vertical displacements along the fault and along splay faults in the Thompson belt, and possibly minor obduction of the Superior Province onto the Churchill Province at Thompson (based on gravimetry). However, seismic reflection in the Thompson area (12) do not support major obduction.

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