

## **D-20: Deformation and charnockitization of granitoids in the Wannu Complex around Anuradhapura**

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Geological investigation in the Wannu Complex in an area ~200 km<sup>2</sup> E and SE of Anuradhapura has shown that 80-90% of the area comprised meta-granitoids which locally contained an extensive mafic dyke swarm. The granitoids, intruded into the then minor supracrustal rocks and are likely to have an intrusion age of ~1000 Ma thus predating all known main phases of deformation and metamorphism. Some of the granitoid layers, exceed ~200 m in thickness and form the prominent hills of Mihintale, Katupotakanda, Getalagamakanda and Ritigala. Quartz and feldspar are the major constituent minerals of the granitoids, and orthopyroxene, hornblende and biotite are the mafic minerals, which rarely exceed ~10-15 vol%, indeed granitoids with ~ 5 vol% or less mafic minerals are most common. Garnet was found in one granitoid.

All the rocks, including dykes, have experienced at least 5 phases of ductile deformation, D<sub>1</sub>-D<sub>5</sub>. The peak granulite facies metamorphism occurred about 580-540 Ma ago during the strongest deformation, D<sub>2</sub> which destroyed the original igneous, as well as previous D<sub>1</sub> fabrics converting the granitoids into charnockites (or enderbites). The intensity of charnockitization of the granitoids seems to be directly proportional to the amount of mafic minerals present. Quartz, feldspar, pyroxene and hornblende have recrystallized during the D<sub>2</sub> deformation and formed fine-grained platy aggregates parallel to the second foliation (S<sub>2</sub>) produced during early D<sub>2</sub>. Long axes of these aggregates are parallel to the D<sub>2</sub> stretching lineation.

Isoclinal folds of S<sub>2</sub> represent D<sub>3</sub> deformation after which the rocks were folded by D<sub>4</sub> and D<sub>5</sub> which occurred whilst the rocks were still under granulite facies conditions. D<sub>5</sub> formed large-scale syn- and antiforms, and

their axial plane cleavage was represented by a nearly N-S vertical foliation and quartzo-feldspathic veins. After this, a widespread retrogression had led to localized decharnockitization of meta-granitoids, which appeared to be restricted to  $S_2$ -foliation zones and along some of the  $S_2$ -parallel pegmatoids. This retrogression was followed by a local incipient charnockitization which post-dates the formation of large-scale folds ( $D_5$ ), - patches of arrested charnockite cross-cut the axial plane cleavage of the  $D_5$ -folds as well as a very thin ( $\sim 2-3$  mm thick) dyke system, which in turn cut  $D_5$  axial planes. This demonstrates that a very late stage fluid phase, probably magmatic, was involved in the formation of arrested charnockites.