METAMORPHISM, STRUCTURE AND STRATIGRAPHY OF THE PRECAMBRIAN OF SRI LANKA

P. G. Cooray

426, Mahakanda Road, Hindagala, Sri Lanka

The Precambrian of Sri Lanka can be subdivided into four major units. The Highland Series (HS) which occupies the central part of the island, consists of metasediments and charnockitic granulites and gneisses metamorphosed in the granulite facies. Two sub-units are recognizable, namely, the Dambulla-Habarana Migmatite Complex (DHMC), with sillimanite-bearing granitic gneisses, and the Hornblendic Arena Rocks (HAR) occupying the cores of elongate basinal structures. Prograde as well as retrograde metamorphism are seen in the HS rocks. Three, possibly four, deformational episodes can be recognized (Berger & Jayasinghe, 1976). D1 and D2 folds are recument to inclined, isoclinal structures seen on all scales throughout the HS; D3 folds were coaxial to the D1-D2 folds and give rise to the dominant open to overturned main Taprobanian fold system. A possible D4 resulted in cross-folding at almost right angles to the D3 folds, leading to the formation of doubly plunging antiformal and synformal structures.

The Southwestern group (SWg), characterized by alternating zones of charnockitic gneisses and granitic-migmatitic gneisses, with well-defined horizons of cordierite gneisses and wollastonite-bearing calciphyres, is lithologically distinct from the HS. It too underwent granulite facies metamorphism. Minor structures are common and major folds, with Taprobanian trend, are tight, isoclinal folds, overturned to the north-east.

The Vijayan Complex is subdivided into an eastern sector (EVC) and a western sector (WVC). Both are predominantly biotite- and hornblende- bearing gneisses, migmatitic in parts, with scattered horizons of marble, calciphyre, quartzite and metasedimentary gneiss. Microcline is the characteristic K-feldspar in the VC. In the WVC, the supracrustal group was intruded by a synkinematic, leucocratic granodioritic magma and a postkinematic, pinkish granitic magma. The rocks were highly ductile during deforma ion, and several phases of gneissification can be seen. The EVC and WVC may have different antecedents and origins.

A few granites are intruded into the VC and the SWg, and small serpentinite bodies occur near the HS/EVC boundary. An apatite-bearing charbonate is intrusive into the WVC.

The stratigraphic relationships of these units is unclear. The VC may be: (a) the early floor on which the HS sediments were laid down; (b) the granitized equivalents of the HS; (c) miniplates which deformed the HS sediments by colision. The HS/EVC boundary could be a Transitional Zone (TZ), a low-angle thrust, or a normal fault. The HS-WVC boundary could mark a limit of granitisation; and the HAR could be VC rocks preserved in basins, or HS rocks subjected to lower grade metamorphism. The SWg-WVC relationship is not known.

K-Ar ages (Cooray, 1969b)suggested a widespread overprinting on all rocks at 450 and 600 Ma ago. RB-Sr WR ages (Carwford & Oliver, 1969) suggest that the HS was metamorphosed 2100 Ma ago, the VC rocks were formed about 1100 Ma ago, and the Tonigala Granite was intruded about 900 Ma ago. Ion microprobe dating of zircons from the HS and VC (kroner et al. 1985) sugests widespread granulite metamorphism at 1100 Ma.