CHEMISTRY OF THE OLDER SUPRACRUSTALS OF ARCHAEAN AGE AROUND SARGUR

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In the Archaeans of the Karnataka craton two stratigraphically distinct volcano-sedimentary sequences occur, namely the older supracrustals of the Sargur type and the younger Dharwar greenstones. The dividing line between these is the 3 by old component of the Peninsular gneiss.

The Sargur supracrustal rocks are seen as tight to isoclinally folded remnants of quartzite-k-pelite-carbonate-BIF association in the Archaean tonalitic to trondhjemitic gneisses. These gneisses around Gundlupet give an age of 2850 Ma (Rb-Sr, metamorphic) and 3300 Ma based on U-Pb method on zircon separates. The metasediments occur as bands 10 to 100 metres thick and over 2 Kms long continuously at places within the gneisses. The bands have been intensely deformed and primary structures are generally not preserved. The striking feature of this association are its thinness, abrupt lateral variation and repetition. Another significant feature is the local presence of thin spessartine garnet rich mangan-horizons between carbonate and BIF units. These sediments thus have all the characteristics of continental marginal basin affinity. Amphibolites, interbanded with the metasediments represent original basaltic intrusives or extrusives. No unequivocal evidences like pillow structures have been found. The Sargur supracrustals are best exposed in the region between Sargur and Terakanambi, south of Mysore city (see field guide).

Quartzites are essentially orthoquartzites, however every gradation between this and pelites can be seen in the field, in the form kyanite/sillimanite-garnet and fuchsite bearing quartzites. Often paragonite containing appreciable Cr_2O_3(1.3%) representing altered kyanite/sillimanite is also seen. Some of the quartzites have abundant rutile and zircons. BIF horizons contain grunerite,orthopyroxene,-garnet, scarce hornblende and biotite in addition to magnetite and quartz. Pelites are represented by sillimanite, kyanite, corundum and graphite. Paragneisses contain sillimanite, garnet, biotite and feldspars. At places, pelites have zircon and rutile as accessories. Mn-horizons which are seen only locally contain spessartine rich garnet, clinopyroxene and quartz. Carbonates are represented by calc-silicate rocks having assemblages calcite, dolomite, calcic plagioclase, scapolite, diopside, hornblende, phlogophite and sphene.

The trace and rare earth element chemistry of the Sargur

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metasediments show, in general, marked similarity to the Archaean sediments. The significant departures are in the nickel and chromium abundances. The REE data of the Sargur pelites of the Terakanambi region represented by Silli-gt-bio-feldspar schists and paragneisses show LREE enrichment and flat to enriched HREE pattern. Sillimanite bearing pelites (N1, N5) have overall REE abundance and show negative Eu anamoly. The REE pattern of samples (N_{2-4}) are similar to the Archaean pelites, particularly to those of Isuas and Malenas of Western Greenland. Nil to slight Eu depletion is again typical of Archaean sediments. Highly enriched HREE pattern of N5 can be attributed to abundant zircons in the minerology. The Sargur pelites have generally lower concentrations of ferromagnesian elements and higher abundances of incompatible trace elements such as LREE, Zr and Th, resulting in higher ratios of La_N/Yb_N(av. 6.09); Th/Sc (av. 1.44) and La/Sc (av. 2.92). Chromium content of the pelites vary from 450 to 100 ppm and nickel from 180 to about 30 ppm.

Banded iron formations have very low REE abundance. They show slightly enriched LREE and flat to depleted HREE pattern. Eu is anamolous with slight enrichment and this is in contrast to marginal depletion to enrichment pattern of Proterozoic iron formations. Presence of positive Eu anamoly in Sargur BIF indicate oxidising environment. Eu/Sm ratios vary from 0.38 to 0.91, typical of Archaean BIF values.

REE abundance in the Mn-horizons is comparable to that of the Archaean sediments. Mn-horizons show enriched LREE and flat HREE with anamolous Eu. REE patterns of these bands is well evolved and has similarities with PAAS.

Amphibolites of the Sargur terrain are mostly low potassic tholeiites of oceanic affinities. This is in contrast to the Dharwar volcanics, which have continental tholeiitic character. Amphibolites generally exhibit a less fractionated REE pattern (La_N/Yb_N = 1.19), except for sample N26 (La_N/Yb_N = 3.6).