Accretionary Evolution of the Dharwar Craton – Evidence from Geochronological and Geochemical Studies

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High resolution geochronological and geochemical studies are useful to understand tectonics and crustal evolution during Archean. Significant additions to the continental crust were considered as a result of mantle plume activity. The presence of komatiites and plateau basalts in the Archean greenstone belts represent predominance of volcanism caused by mantle plumes, whereas, occurrence of bonninites, adakites and dacites point to volcanism in the arc setting. Archean granitoid magmas were to a large extent formed as a result of subduction of oceanic crust. Juxtaposition of the rocks formed in diverse tectonic settings to make up the Archean continental crust has been ascribed to plate tectonics.

The Dharwar craton consisting of vast tracts of greenstone-granite terranes is an ideal candidate for assessing the relative role of mantle plumes and horizontal tectonics in building continental crust during the Archean. The craton consists of a series of greenstone belts that are characterized by volcano-sedimentary ensemble of rocks interspersed with Tonalite-Trondjhemite-Granite (TTG) or Quartz-Monzo-diorite-granodiorite (QMG) suite that occupy a large segment of continental crust.

It has been long recognized that the granitoid suite of rocks are made up of several phases that intruded at different periods of time. The oldest granitoid rocks, as well as, the Sargur Group of rocks considered oldest among the supracrustal rocks are found in the western parts of the Dharwar craton. While relatively younger granitoid rocks are reported from the eastern parts of the craton. They have juvenile character although some of them show evidence of older crustal contamination of their sources or parent magmas. It has been reported that the greenstone belts from other cratons have rocks formed over 40 to 300 Ma duration. The genetic relationship between the magmatism in the greenstone belts and adjoining granitoid terranes is not well understood. Available geochronological and geochemical data will be discussed in the light of various models proposed for growth of continental crust during Archean in the Dharwar craton.

Keywords: Dharwar craton; geochemistry; geochronology; tectonics; Archean; crustal evolution.