

Stratigraphy of the Late Archean supracrustal rocks in the Chitradurga Schist Belt, South India

MISHIMA, Kaoru^{1*}, MADHUSOODHAN, Satish-Kumar², HOKADA, Tomokazu³, UENO, Yuichiro¹

¹Department of Earth & Planetary Sciences, Tokyo Institute of Technology, ²Department of Geosciences, Faculty of Science, Shizuoka University, ³National Institute of Polar Research

In the Late Archean (3.0 to 2.5 Ga), Earth tectonic and climatic systems may have changed fundamentally. The earliest known glaciation (~2.9Ga) is recorded in the Mozaan Group of South Africa (Pongola glaciation; Young et al., 1998). Also, in the earliest Proterozoic, Snowball Earth event is recorded in the Huronian Supergroup of Ontario, Canada (~2.4Ga; Young et al., 2001). On the other hand, rise of atmospheric oxygen have been reported (~2.3Ga) based on several geological evidences such as deposition of banded iron formation, and mass independent isotopic fractionation of sulfur isotopes (S-MIF) and its disappearance (Farquahr et al., 2000). These changes may reflect redox perturbation of atmosphere and ocean. However, almost the Late Archean S-MIF record so far came from Pilbara and Kaapvaal cratons, that may have been a single continent (Vaalbara) at that time (de Kock et al., 2009). Thus the observed S-MIF and glaciation event may possibly reflect local environment. It is important to test the globalism of these climatic signatures.

We studied late Archean volcano-sedimentary sequence of the Dharwar Supergroup, occurred in the Chitradurga schist belt, Western Dharwar craton. The Chitradurga schist belt consists of >3.0Ga green stones (Sargur Group) and overlying 2.9-2.6Ga volcano-sedimentary sequence (Dharwar Super Group), which are surrounded by 3.2~3.0 Ga TTG (tonalitic-trondhjemitic-granodioritic) gneiss (Chadwick et al., 2000; Jayananda et al., 2006). The Supergroup is classified into two major groups (lower Bababudan Group and the upper Chitradurga Group).

Our new field mapping and zircon U-Pb dating allows us to reconstruct detailed lithostratigraphy of the Dharwar Supergroup. The lower unit (post-3.0 Ga) consists of basal conglomerate, stromatolitic carbonate, silici-clastics with diamictite (Talya conglomerate), chert/BIF and pillowed basalt in ascending order, all of which are older than 2676 Ma magmatic zircon ages from dacite dyke intruded into the topmost pillowed basalt. The upper unit unconformably overlies the pillow lava, and consists of conglomerate/sandstone with ~ 2633 Ma detrital zircons, komatiite lava, BIF and silici-clastic sequence with mafic volcanics.

Talya conglomerate has been considered to be a basal conglomerate defining the boundary between Bababudan and Chitradurga Groups. Based on our field observation, however, The Talya conglomerate occurs as lens within thick pelite unit and show diamictite texture possibly glacial in origin.. Detrital zircon from Bababudan Group shows 3137Ma for the youngest protolith magmatic ages. Thus, if the Talya diamictite represents glaciation event, this may possibly correspond to the Pongola glaciation.

Keywords: South India, Dharwar Super Group, Late Archean, Stratigraphy, glaciation