

Tectonic history of the cratonic lithosphere in San'in region of SW Japan: a key to understanding Precambrian evolution and correlation.

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【Purpose and content of research】

The formation of Japanese islands is a **complex and unique** tectonic evolution that began with the separation of continental mass from the eastern Asia continental margin during Paleozoic Era (540 million years ago). This was followed by a **series of subduction and accretionary activities** (Wakita, 2013). This subduction of the early formed continental crust and recycling into the mantle irreversibly changes the mantle characteristics (Kimura et al., 2014). Studying mantle derived rocks from time to time reveal the evolution of mantle beneath and hence provide insights into the **subduction tectonics**. Such tectonics are argued to exist from Precambrian times even though the presence of **modern style plate tectonic activity** is still debated.

Purpose of the research: Major lithological units in **Japan arc** are represented by Cambrian (539 Ma) to Quaternary (2.58 million years ago to present). The presence of a Precambrian basement is also debated and is mostly composed of metamorphosed rocks like gneisses and amphibolite. Such fragments of older crust are also found in San'in area.

My research so far focused on the Precambrian terrane of southern India and in this project my attempt is to find similar older crustal fragments from the basement rock formations in San'in area.

Methodology: Investigation of the nature and composition of the older rocks through **high quality geochemical data set** will help in a better understanding of the **evolution of Japanese islands** while providing key information on the differences and similarities between **present** and **past plate tectonic** activities.

【Research achievement (acquired knowledge, results, research papers, conference presentations, potential applications for external research grants through this research project)】

The proposed methodology included gathering key subduction related samples from both Precambrian terranes of southern India as well as from San' in area, southwest Japan.

During the research period because of the winter climate, it was not possible to collect samples from Japan. However, as for the samples from southern India (Fig.1), volcano-sedimentary rocks were analyzed, and a preliminary data set is created. The research timeline was as follows:

November 2022- Purchase of necessary lab apparatus and consumables using the research fund.

December 2023- 1) Preparation of bead samples for major element geochemical analysis.

2) Whole rock geochemical analysis using XRF facility at the Department of Earth Science, Shimane University.

January 2023- Sample preparation for trace element geochemical analysis using clean room facility.

February 2023- Trace and rare earth element geochemical analysis using ICP-MS instrument

housed at the Department of Earth Science, Shimane University.

Important finding from the data set is the **arc-like mantle source** for the older metavolcanics (Fig. 2). Further interpretation of the data is going on and a manuscript with the current data set is under preparation.

Figure 1. Simple geological map of study area, Dharwar craton, southern India showing field location (Sreehari et al., 2021).

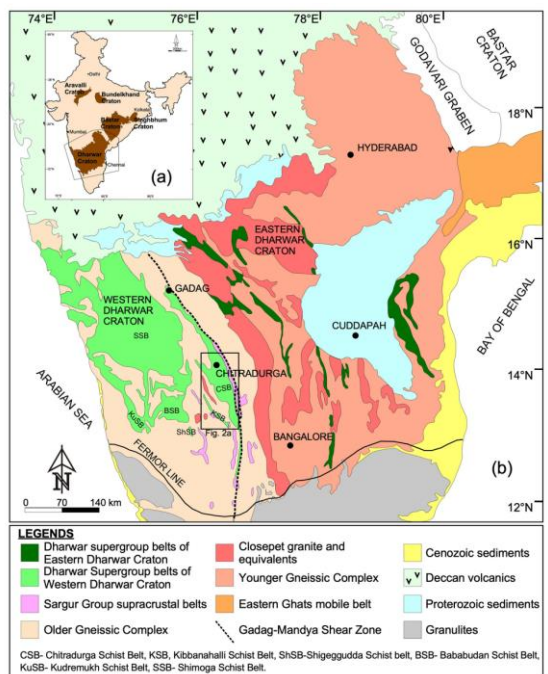
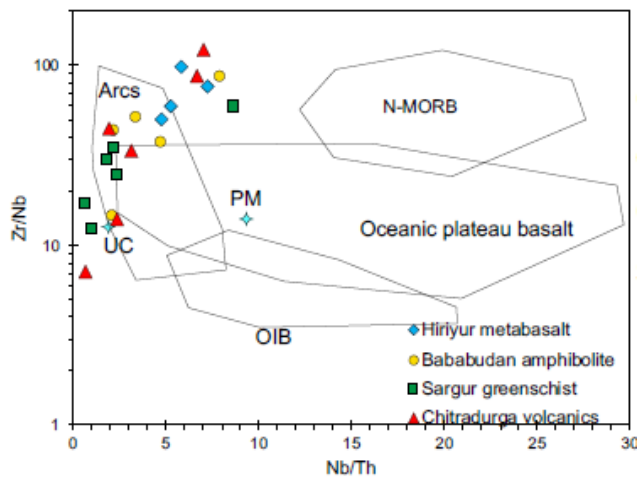


Figure 2. Trace element ratio diagram for mantle source constraints. Older Sargur and Chitradurga groups are showing Arc like mantle source



As for the San'in region, preliminary field work is planned to start by the end of this month. Application to external funds like KAKENHI young researcher's grants, if successful, will steer the progress of this ongoing research.