A GEOLOGICAL PROJECT PROPOSED BY THE GEOLOGICAL SURVEY OF INDIA FOR THE INTERNATIONAL POLAR YEAR 2007-2008

Major Theme
Constraining Magmatism and Metamorphism associated with Pan-African tectonic event in India and Antarctica

Scientific Objective
Comparison of Pan African crustal Processes in Kerala Khopndalite belt, India and central Dronning Maud Land, east Antarctica.

Area of work
Wohlthat ranges, central Dronning Maud land, East Antarctica and Kerala Khondalite belt, India

Background Information
The central Dronning Maud Land has a geological evolutionary history comparable with Kerala Khondalite Belt (KKB). Apparently both these areas have indicated a dominant role of Pan-African tectonic event in its crustal evolutionary history. India which was part of east Gondwanaland was joined to Antarctica along with Sri Lanka, Madagaskar and Africa. The amalgamation of several cratonic blocks during 650-500 Ma Pan-African event was responsible for the observed metamorphism and magmatism in both CDML and Kerala Khondalite belt region.

Central Dronning Maud land area comprising the Wohlthat, Orvin and Muhlig Hoffmann ranges expose metamorphic units like metapelites (Khondalites), garnetiferous leptynites, Migmatite gneisses, Px-Granulites, calc silicates, garnet biotite gneisses with massif anorthosite, and plutonic granites and charnockites. The metamorphic units have indicated a strong Pan-African metamorphic imprint reaching upto granulite facies. Calc silicate is a prominent unit exposed in the area associated with metasedimentary units and indicating to have undergone highgrade metamorphism. These calc silicates with humite, scapolite, wollastonite and forsterite are very similar to calc silicates occurring within KKB. Profuse development of small shear...
zones is seen in CDML area which probably might be the offshoot of a major shear zone. Similarly the exposed metamorphic rocks within the Kerala khondalite belt also indicate Pan-African high grade metamorphism and widespread pan African magmatism manifested as charnockites. There are three prominent shear zones associated with KKB. It will be worthwhile to undertake a study to evaluate the comparable crustal evolutionary processes involved in both the region through detailed geological studies. The main aspect of these studies could be involving:

1. Geochronological, Isotopic, Petrochemical characterization of the Pan African-intrusives in both the regions. This aspect could highlight the co genetic aspects of these intrusive and also comment upon the factors involved in the initiation of the magmatic event during Pan-African Tectonic event. We could also spatially characterize the magmatic event associated with Pan-African activity as observed in parts of Kerala through Sri Lanka, parts of Lutzow-Holm Bay, Antarctica and CDML, Antarctica.

2. Constraining the Pan-African metamorphism through PT paths supplemented by geochronological inputs. This could enable us to comment on the nature of high-grade metamorphism which primarily involved preexisting Grenvillian rocks in CDML. Apparently the highgrade metamorphism has obliterated the visible imprints of earlier metamorphism which could be commented upon through detailed geochronological studies involving zircons, garnets, biotite.

3. Detailed evaluation of Calc-silicates from both the regions for comparable processes.

**Work proposed during IPY**
Joint field work in Kerala Khondalite Belt, India and Selected areas of Wohlthat ranges exposing Charnockites, granites and Metamorphic units like Metapelites, Migmatite gneisses and granulites for collection of samples.

**Inputs from Indian Researchers**
Petrological studies of metamorphic and magmatic rocks. Generation of petrochemical analysis of both selected intrusive units and metamorphic units and carrying out whole rock geochemical analysis.
Inputs required from Japanese Collaborators
Petrological analysis of rocks. Carrying out geochronological studies of metamorphic and magmatic rocks. Generation of Isotope data of magmatic rocks and carrying out trace element and REE analysis of the samples collected.