**Project Title:** Geophysical Constraints on the India-East Antarctica Reconstruction of the Gondwana

**Project Number:** IMURA1050

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**Research Clusters:**

| 1 | Material Science/Engineering (including Nano, Metallurgy) |
| 2 | Energy, Green Chem, Chemistry, Catalysis, Reaction Eng |
| 3 | Math, CFD, Modelling, Manufacturing |
| 4 | CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control |
| 5 | *Earth Sciences and Civil Engineering (Geo, Water, Climate)* |
| 6 | Bio, Stem Cells, Bio Chem, Pharma, Food |
| 7 | Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng |
| 8 | HSS, Design, Management |

**Research Themes:**

| 1 | Artificial Intelligence and Advanced Computational Modelling |
| 2 | Circular Economy |
| 3 | Clean Energy |
| 4 | Health Sciences |
| 5 | Smart Materials |
| 6 | Sustainable Societies |
| 7 | Infrastructure |
The research problem

Define the problem

Earlier reconstruction models of the Eastern Gondwanaland place the east coast of India against the Enderby Land (a sector lying between Gunnerus Ridge and Lambert Rift) of East Antarctica (Bastia and Radhakrishna, 2012). Previous geophysical studies along the conjugate margin segments revealed double breakup history of India and east Antarctica, the first breakup around ~130 Ma between combined India-Sri Lanka-Elan Bank and East Antarctica, and separation of Elan Bank from India during the second breakup. The reconstruction scenario is partially masked by the lack magnetic anomaly identifications in western Bay of Bengal (BOB) and several contracting age identifications along the Enderby Basin. Despite the fact that both Pranhita-Godavari graben and Mahanadi graben have their counterpart correlating structures in East Antarctica, very little work has been done to understand the geological domains of both the margins from the point of view of reconstructions. The present study aims to synthesize all available geological, geochronological and geophysical datasets across these two conjugate margins segments to bring out a unified reconstruction model that is robust and more accurate. For this purpose, both 2-D and 3-D modelling procedures will be adopted based on the needs and requirements.

Project aims

Define the aims of the project

Delineate the lithosphere structure across the conjugate margin segments from constrained potential field modelling
To bring out a unified reconstruction model of India and East Antarctica through integrated interpretation of geological, geochronological and geophysical data.

What is expected of the student when at IITB and when at Monash?

Highlight how the project will gain from the students stay at IITB and at Monash

The student will compile all required geophysical datasets, carry out analysis and prepare composite maps of the east coast of India.
During the Monash stay, student will compile all Antarctica datasets (from Geoscience Australia) and carry out preliminary reconstruction work using GPlates.

Expected outcomes

Highlight the expected outcomes of the project

A revised and much robust reconstruction model
Better understanding of the rifting and breakup dynamics between India and East Antarctica

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

The proposed project is computationally intensive and involves large geophysical datasets. Hence, it falls under the above-mentioned Theme 1 on Artificial Intelligence and Advanced Computational Modelling.
Potential RPCs from IITB and Monash

Dr. Prabhakar Naraga Department of Earth Sciences, IIT Bombay
(He is a metamorphic petrologist with experience in past geological correlations and geodynamic models)

Dr.Robin Armit Department of Earth, Atmosphere and Environment, Monash University
(He is a specialist of structural geology and geochronology with experience in structural geophysics, geodynamic models and large-scale tectonic processes)

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

M.Sc/M.Sc (Tech) in Geophysics/Applied Geophysics/Marine Geophysics degree from any recognized University in India

Desirable: One-year relevant research experience and knowledge of computer programming will be preferred.

Necessary Courses

Name three tentative courses relevant to the project that the student should complete during his/her coursework at IITB (the student will require to secure 8 point in these courses)

- Global Tectonics
- Tectonics and Crustal Evolution
- Computational Geophysics
- Geodynamics
- Seismic data processing and sequence stratigraphy

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Dr Robin Armit (expert in geophysical analysis)

Select up to (4) keywords from the Academy's approved keyword list (available at http://www.iitbmonash.org/becoming-a-research-supervisor/) relating to this project to make it easier for the students to apply.

- Geo Science, geotechnical, geomechanics
- Modelling and Simulation
- Signal Processing