

An Indian-Australian research partnership

Project Title:	Geophysical signatures of craton-mobile belt interactions: additional constraints of India's position in Rodinia Supercontinent	
Project Number	IMURA0464	
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Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. **Advanced computational engineering, simulation and manufacture**
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

Many of the Earth's ancient craton's have been subjected to significant crustal reworking and modification during major episodes of continental amalgamation during supercontinent cycles. Mobile belts formed during these events have complex geometries and crustal architecture that may involve mixing of cratonic crust and accreted juvenile material caught up in the orogen/mobile belt. On the Precambrian Earth these mobile belts form complex orogenic systems that

can be used as piercing points for tight fit continental reconstructions and can be used to test and modify supercontinent reconstruction. Within these mobile belts are sutures bounding crustal fragments of different petrophysical properties, which makes magnetic and gravity data an excellent tool for mapping the architecture of ancient crustal boundaries (e.g. Williams et al., 2010).

This project will compare and contrast the geophysical expression of the Eastern Ghats Province with the North Australian Craton and East Antarctica to test Supercontinent configurations. This will include matching crustal boundaries in the context of Paleomagnetic constraints, including geometry and kinematic constraints at interpreted piercing points.

The research will provide insights into supercontinent configuration as well as constraints on the processes responsible for the amalgamation of the Supercontinent Rodinia.

Project aims

The project aims are:

1. *To test configuration of the India's position in the Supercontinent Rodinia using the Eastern Ghats province as a major piercing point.*
2. *Characterise the geophysical expression of the Eastern Ghats mobile Belt and compare this with contemporaneous and correlated orogenic systems in the North Australian Craton.*
3. *Determine the 3D architecture of the orogenic systems using combined forward modelling and inverse modelling techniques.*

Expected outcomes

Tight fit configuration of the India during the formation of Rodinia.

Improved understanding of the processes responsible for the amalgamation of India, Australia and Antarctica in the formation of Rodinia.

Development of 3D model of the crustal geometry of ancient orogenic belts.

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.

This project fits under the theme 1 as the objectives envisaged above involve significant amount of geophysical model generation (in 2D and 3D) to test various geodynamic scenarios of Supercontinent assembly. It is a computational intensive project.

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.

Minimum qualification:

Must have MSc/MSc(Tech) in Geophysics/Applied Geophysics/Marine Geophysics with a combination of Geology and Geophysics training

Additional qualification:

Adequate knowledge of computer programming. Candidates with some experience in regional potential field data interpretation and modelling or have detailed training in structural analysis of geophysical data are preferred.

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.

Prof.S C Patel – on metamorphic aspects of Eastern Ghats orogeny

Prof.E Chandrasekhar – on electrical conductivity structure across the craton-mobile belt boundaries

Please provide a few key words relating to this project to make it easier for the students to apply.

Regional geophysical studies

Precambrian Tectonic Evolution

Supercontinent

Eastern Ghats

North Australian Craton