

An Indian-Australian research partnership

Project Title: **A Thermo-mechanical Study of the southern Red Sea – Afar Triple Junction region: Implications on the Rift Evolution**

Project Number **IMURA0484**

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IITB Department:

Earth Sciences

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

The Red Sea rift region provides a unique opportunity to understand the continental rift-drift processes and the structure of the incipient ocean basins because of the close proximity of the conjugate rift segments. However, from the morphological and geological point of view, the southern part of Red Sea rift basin (south of 18°N) has distinct character due to close proximity of the Afar plume, and also southern most part of the Red Sea rift is characterized by the presence of Afar Triple junction that separates Nubia, Arabia and Somalia plates. Therefore, the southern Red Sea rift region is an ideal candidate for a thermo-mechanical investigation through detailed modelling of geophysical signatures such as the gravity, magnetic and seismic data.

Project aims

The salient objectives of this study are:

- i) *To model the flank uplift topography of the conjugate rift segments,*
- ii) *To study rheological characteristics and continental rift evolution, and understand the competing tectonic /*

magmatic processes during the basin formation.

Expected outcomes

*Better understanding of continental breakup processes and plume-lithosphere interactions
A model for Tectonic Evolution of southern Red Sea rift basin*

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 has also scope for detailed analogue modelling experiments. Through the detailed data integration several existing hypotheses can be tested through modelling and simulation

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.

A Masters degree M.Sc / M.Sc(Tech) in Applied Geophysics, Geophysics, Marine Geophysics from a recognized university / Institute.

Candidates with skills in algorithm development and computer programming with some previous experience are desirable.

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.

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

Continental margins
Geophysical modelling
Gravity and magnetic
Seismic Reflection
Basin modeling