

An Indian-Australian research partnership

Project Title: Structure and Deformation of Lithosphere along the Java-Sumatra- Andaman Subduction Zone in the Eastern Indian Ocean

Project Number IMURA0214

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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

The Java-Sumatra-Andaman trench/arc region is a tectonically active convergent plate margin in the eastern Indian Ocean where the Indian and Australian plates are subducting below the Eurasian plate. While normal subduction prevails in the Java arc region, the subduction becomes progressively more oblique towards Sumatra and Andaman arc. Due to this oblique subduction, the tectonic deformation significantly varies in different segments of the arc-trench system. Further, the variation in depth, dip and age of the subducting slab complicates the geodynamic setting in the region. After the 26th December 2004 megathrust earthquake and subsequent large seismic activity, the region has drawn the attention of international geoscientific community for detailed understanding of the ongoing deformation and geodynamic studies. Therefore, detailed analysis of geophysical data combined with numerical modelling is important to understand the tectonic processes, deformation and geologic evolution which will provide valuable insight with regard to future seismic hazard assessment of the region.

Project aims

We aim to gain an understanding of the dynamics and inherent surface deformation in the Java-Sumatra-Andaman Subduction Zone. We will address some fundamental questions of the tectonics of the area:

- What is the deformation of the subducting lithospheric slab and its relation to increased obliquity of plate subduction towards north?
- What is the role of collision or subduction of major ridges and plateaus (e.g., Ninetyeast Ridge, Investigator Ridge etc) below the trench/arc and what are their effects on subduction dynamics?
- Can we delineate a 3D structure and flexural rigidity along various segments of subduction zone to understand along and across arc variations in subduction parameters?

The geophysical models will allow formulating hypotheses, which will be validated through numerical modelling of the subduction system.

Expected outcomes

Understanding the interactions between plate structures and subduction dynamics allows to a better assessment of the state of stress of plate margins. These outcomes will further the way we understand the physics behind earthquakes and tsunami, and seismic hazard assessment.