

## Extraordinary Insights Into The Workings of Planet Earth From Timor

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Myth has it that the island of Timor is the body of a giant crocodile. Geologists see the Timor 'crocodile' as a fragment of the Earth's crust recently (in geological terms) emerged from the sea, pushed up by the forces arising from the collision of two great tectonic plates (the Indo-Australian plate to the south and the Asian plate to the north).

While we understand the nature of the forces that drive plate motion, we have much to learn about how these forces cause the deformation that creates lands like Timor once plates collide, or how the resulting changes in landforms impact on the dynamics of our oceans and atmosphere and hence our climate. Because the 'crocodile' provides access to a fragment of crust temporarily frozen in the early stages of plate collision, it provides a unique and extraordinary record that will help us in our quest for understanding several crucial aspects of the behaviour of our planet. This paper

will use two examples to demonstrate the potential impact of the unique geological record of Timor:

(1) As tectonic plates collide, stress builds up between those deep parts of the system that drive plate motions such as subducting slabs, and the surface plates. Once a continent arrives at a subduction zone something must give. Eventually, the subducting slabs of old ocean crust extending deep into the Earth's interior must tear from the surface plates, with the release of stress causing uplift of the surface. The implications of the process of slab-tearing are poorly understood, but are probably crucial to the way many metal



deposits are generated and emplaced into the crust. The beautiful terraced coral reefs of eastern Timor and Atauro provide a unique testimony to the uplift resulting from such slab-tearing.

(2) As tectonic plates collide, ocean seaways are disrupted, producing changes in the dynamics of our climate. Flow of water from the warm western Pacific Ocean to the colder Indian Ocean through the eastern Indonesian Archipelago is a crucial part of the global oceanic circulation. As the 'crocodile' has emerged, the Indonesian ocean, through flow, has become less efficient, further cooling the Indian Ocean.

The cooling of the Indian Ocean is of great significance – causing drying of surrounding

continents. Therefore, it could be that the 'crocodile' is partly responsible for the crucial drying of Africa several million years ago which lead to the opening of the African savannahs and the emergence of *Homo Sapiens*.

Over the next few years, the process of slab-tearing is going to be one of the crucial issues in the solid earth sciences, while the question of global-change is of crucial importance to the future of humanity. Understanding these issues will help us in our quest to understand how the earth resources, such as metals and hydrocarbons, are formed and preserved, and

the reasons behind long-term global change. The remarkable record of Timor provides a unique insight into these processes. It is my hope that in seeking to understand these fundamental questions of global significance, the international research effort will contribute to the more local and timely issues relevant to the Timorese people as they seek to build a new independent nation, through both knowledge transfer (training) and knowledge generation, the development of infrastructure (geotechnical and geohazard estimation), and the search for earth resources (metals, energy) ■