

Passive Margin Collision With An Island Arc: A Comparison Between East Timor And Taiwan

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This talk compares the process of collision in Taiwan with that of East Timor. In both cases an island arc collides with a continental passive margin, and passive margin sedimentary rocks are thrust back, towards the continent, to form the two islands. In Taiwan the process of collision between the Chinese passive margin and the Luzon arc (Philippines) is oblique and can be followed from advanced stages in the north, where the arc has been amalgamated to the passive margin to form the Coastal Ranges, to incipient stages, where volcanism stops, and the fore-arc gets intensely shortened.

Taiwan is comprised of several terranes thrust together and separated by major faults. From west to east these change from passive margin sediments, to accretionary prism rocks, to a wedge of underthrust Eurasian metamorphic continental rocks, and finally to the collided island arc itself. By contrast, our current view of East Timor is that it is comprised of thrustured passive margin sediments, and that the island arc is in the incipient stages of collision, where volcanism offshore East Timor, in the island of Atauro, has become extinct (when?) and the fore-arc region is now reduced from its regional 150 km width to the mere 30 km that separate Dili from Atauro.

By comparison to Taiwan, we should expect a continental metamorphic basement emplaced within the arc-trench gap in East Timor. This may be the low- to high-grade metamorphic rocks of the Aileu Formation, which include lherzolites, serpentinites and partially molten supracrustal amphibolites. Better age constraints and sourcing of these rocks will help clarify this hypothesis. Like the Bobonaro Scaly Clay of East Timor, Taiwan has the Lichi Melange composed of exotic ophiolite and sedimentary blocks, metric to kilometric in size, and coherent turbidite beds, embedded in a sheared scaly clay. The melange separates the island arc sequence of the Coastal Ranges

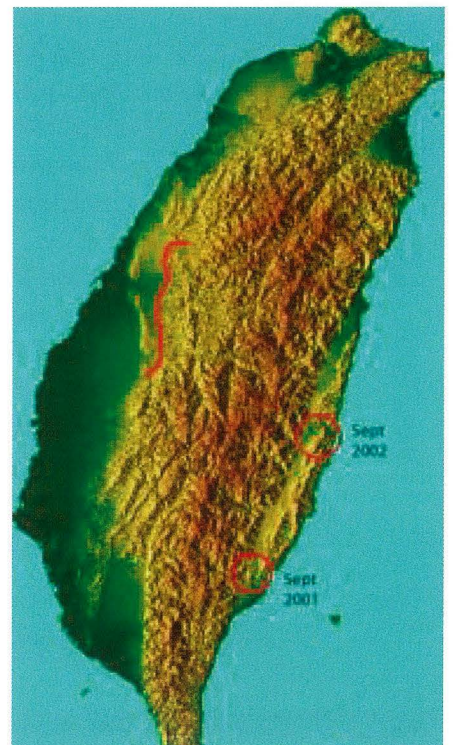


1, 2. Atauro: andesites and limestone

3. Aileu should be subdivided
a, b. High-grade supracrustal mafic-calc-silicate
c. Lherzolite/serpentine
d. Low-grade sand-pelites

of Taiwan from an underthrust slice of metamorphic Asian continental crust. In contrast to the Bobonaro, the Lichi Melange is a well-defined boundary between different geological terranes. The nature of the rock sequences separated by the Bobonaro Scaly Clay is still unclear, and the first step towards solving that is to clearly define the extent of the Bobonaro Scaly Clay and the nature of the rocks that it separates.

From comparison to Taiwan, are we missing any sign of the accretionary prism and fore-arc basin in East Timor? Could it be that the arc-trench gap was simply shortened to 30 km width without the fore-arc being exposed? Was some of the fore-arc removed along a sinistral strike-slip fault to form Sumba, or have we so far failed to recognise a fore-arc sequence in East Timor, south of the Aileu formation, as would be expected from comparison to Taiwan?



Timor Leste-Taiwan: a collisional comparison