Indian Ridges Tectonic Accretion in the Andaman Sea and Southern Myanmar: A New Tectonic Process Active during the India/Sunda Hyper-Oblique Convergence

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Abstract

The Sumatra Trench is classically interpreted an active subduction extending supposedly northward along the Western Andaman Sea and Indo Burma Ranges in Myanmar and Bangladesh. The “accretionary wedge” related to this subduction of the Bengal “oceanic” basin below Sundaland is interpreted supposed to extend from the Arakan Belt in Myanmar to the Andaman-Nicobar Ridge (ANR) southwards. The Alcock/Sewell Rises (ASR) generally interpreted as the volcanic arc related to this subduction extends in the North Andaman Sea in the Yadana platform but also in the Ayerawaddy Delta basement offshore South Myanmar.

Comparison of the 90°E Ridge basement imaged by a recent academic seismic cruise conducted offshore Myanmar; with the PGS data acquired in the Andaman Sea reveals the same seismic stratigraphy below the Cenozoic sedimentary cover. Seismic calibration tentatively implemented by available drilling results suggests the presence in both units of the same Cretaceous volcanic basement disconformably covered by thin Late Cretaceous pelagic to hemi pelagic sequence.

On PGS MultiClient seismic data the gently domed ANR basement can be traced rather continuously westward towards the offshore 90°E Ridge across the so-called Andaman Trench. Numerous NS trending right lateral wrench faults and a regional decollement of the Cenozoic sequence above its basement were observed on all seismic lines crossing the ANR. This suggests a minor amount of shortening across the ridge. However no clear duplex or piggyback basin are observed as per a subduction wedge. We interpret the ANR as a long sliver platelet detached from the 90°E Ridge and transferred to the Eastern Andaman Sea by collage and wrench faulting. Seismic images across the ASR are not clear and dredging data are scarce. Compared to the Yadana platform, the ASR acoustic basement is blanketed by the same thin Cenozoic veneer of sediments. Presence of a carbonate reservoir cannot be excluded on these rises.

The Andaman Rift opened in the middle of the ASR shows the same basement seismic stratigraphy than the ANR. On the PGS seismic lines crossing this narrow basin, various Cenozoic rifting events were observed, separated by clear unconformities incompatible with a continuous spreading process. This Andaman rift is generally interpreted as a recent oceanic spreading center floored by oceanic crust. On the PGS data, it appears as an old rift basin reactivated episodically by various Cenozoic-rifting episodes. Same type of basins was observed along the 90°E Ridge and on the Yadana platform area.

We interpret the ASR as the southern extension of the Yadana platform. In this case, it could be interpreted as another Indian Ridge sliver terrane accreted to the Sunda Western Margin extending in the Eastern Andaman Sea and identified on seismic lines. These accreted exotic

Indian ridge sliver plates identified along the ANR and the ASR is a new challenge for the oil industry. If these Mesozoic terranes were drifted northward with India, the accreted to Sunda during the Late Cretaceous their source has to be found in Gondwanaland, a Mesozoic continental injected by rift volcanism during the Early Cretaceous during its fragmentation by rifting. This view is more promising for oil and gas exploration in Myanmar and the Andaman Sea than a classical subduction system.