

CERAMAH TEKNIK TECHNICAL TALK

The Northwest Sabah Overthrust System: In outcrops and in regional context

H.D. Tjia (Universiti Kebangsaan Malaysia)

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Department of Geology, University of Malaya

Professor Emeritus Dr. H.D. Tjia presented the talk at the Lecture Hall of the Department of Geology, University of Malaya. The talk was well attended by faculties and students of the Geology Department and geologists from the industry.

Abstract: The structural grain of northwestern Borneo changes drastically across the West Baram Line and northward beyond the Balabac Line. These two tectonic lines form the southwestern and northeastern limbs of a regional overthrust sheet named Northwest Sabah Overthrust System or NWSOS. Its leading edge in the South China Sea is marked by the Northwest Sabah Trough, currently representing the boundary with the over-ridden Dangerous Grounds microcontinent. The other side of the NWSOS is partly ill-defined and partly defined by the Kinabalu Suture Zone (Figure 1). Recognition of the NWSOS was triggered by outcrops of duplexes in the Crocker Formation at Tamparuli, Mengaris stone quarry, and the presence of the “Lower Tertiary Thrust” in the Outboard Belt. Similar structures have now been studied at other outcrops, while re-examination of (published) regional seismic sections (Figure 2) supports large-scale overthrusting of Paleogene Trusmadi, Crocker and equivalent formations of northwestern Borneo. The major tectonic event terminated at the beginning of Middle Miocene. Seaward thrusting of Neogene sequences has continued, but as result of gravity sliding driven by spasmodic rising of Borneo’s hinterland. Renewed sliding is imminent as the uppermost 600 ms (equivalent of deposition during the past 600k years) of the Sabah Trough sequence is undisturbed, while uplift of the onshore is documented by Quaternary terraces and average annual rates in the order of 5 mm/y. In plan and structural pattern, the NWSOS is analogous with the somewhat smaller Cumberland Overthrust of the Appalachian Mountains of North America.

The NWSOS has unexplored implications for hydrocarbon potential in terms of sourcerock distribution and trapping style. Seismic resolution is probably inadequate to directly discriminate the comparatively thin flake duplexes, nor most of the mylonite intervals that separate the flakes. Integrated analysis of selected seismic attributes and time slices in the offshore in tandem with detailed field observations and re-examination of well logs are practical options.

