Geological Development of the Straits of Makassar, Indonesia*

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Abstract

The Straits of Makassar, lying between the islands of Borneo and Sulawesi, have been of interest to the scientific community since Alfred Russell Wallace published his famous red line on a map in 1863 differentiating the "Indo-Malayan" and "Austro-Malayan" biogeographic regions. As subsequently noted by Wallace, his line also differentiates contrasting geological realms of the two islands, now known to comprise the complex continental geology of Borneo and the tectonic collage of continental and oceanic blocks of Sulawesi.

Discussion

The question of the nature of the basement underlying the Makassar Straits has long been debated. Although there has been a general consensus on an early Tertiary age, authors have suggested various combinations of oceanic-, continental- or thinned continental-derived crust. New 3D seismic data and recent exploration drilling suggests an origin resulting from mid-Eocene (42 Ma) extension, a typical Sundaland scenario of grabens and half-grabens in a continental or marginal marine setting (Figure 1).

In the central part of the Strait, up to four kilometers of sedimentary infill are present above the Late Eocene (~36 Ma) top syn-rift unconformity (Figure 1 and Figure 2). The sedimentary section comprises pelagic and hemipelagic oozes and muds, sands of turbidite origin, mass transport complexes and carbonates.

Turbidite sediments are both W- and E-directed, the major Borneo-derived pulse taking place in early and middle Miocene times with sediments being derived from Sulawesi during latest Miocene and Pliocene times.

Conclusion

While classic turbidite sedimentation has occurred in response to tectonic events in adjacent Borneo and Sulawesi, it is suggested that hyperpycnal flow from tropical river floods has contributed substantially to the fill of the Makassar Strait.

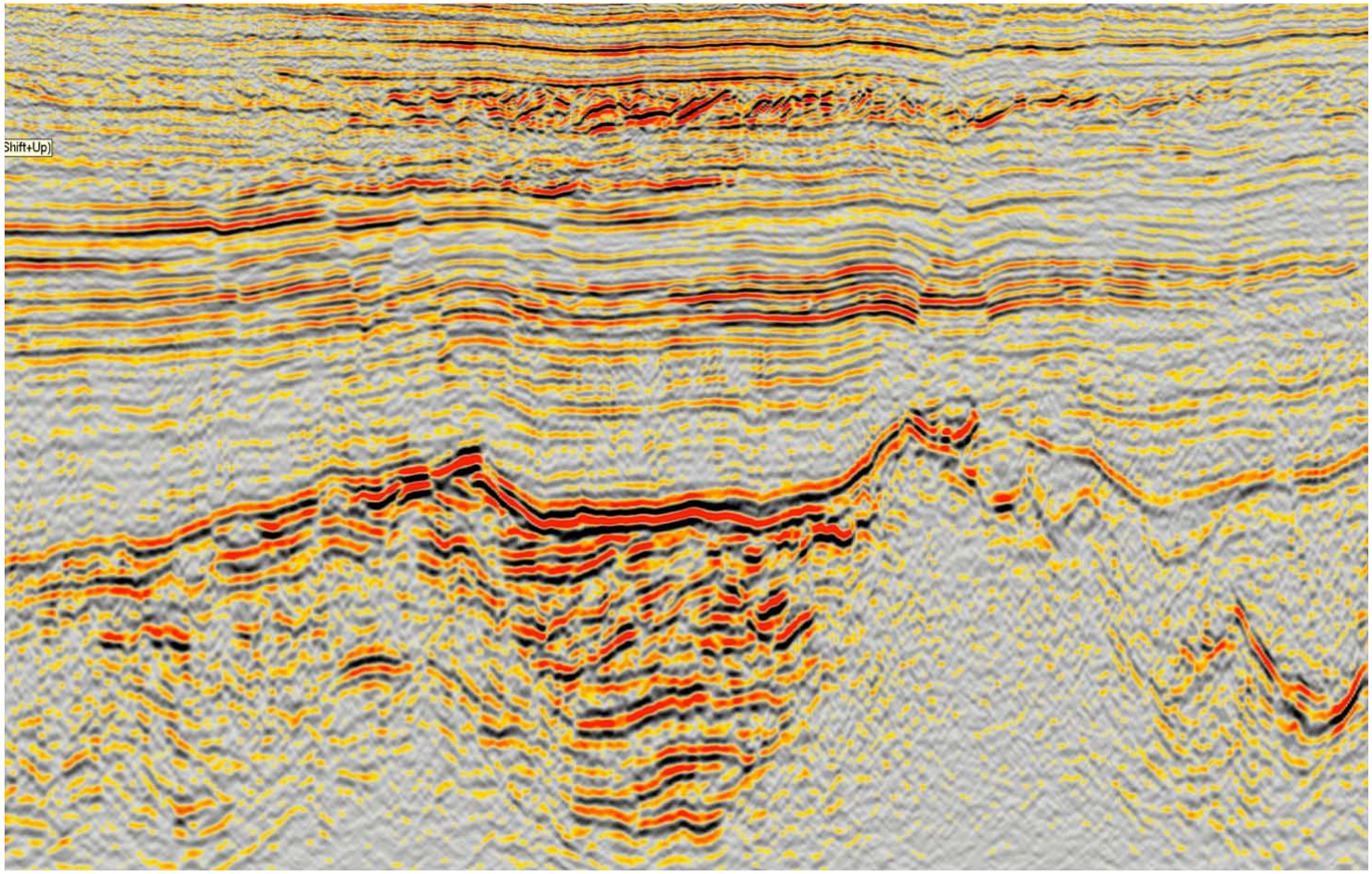

Figure 1. Seismic section showing sedimentary section developed in graben below Late Eocene unconformity.

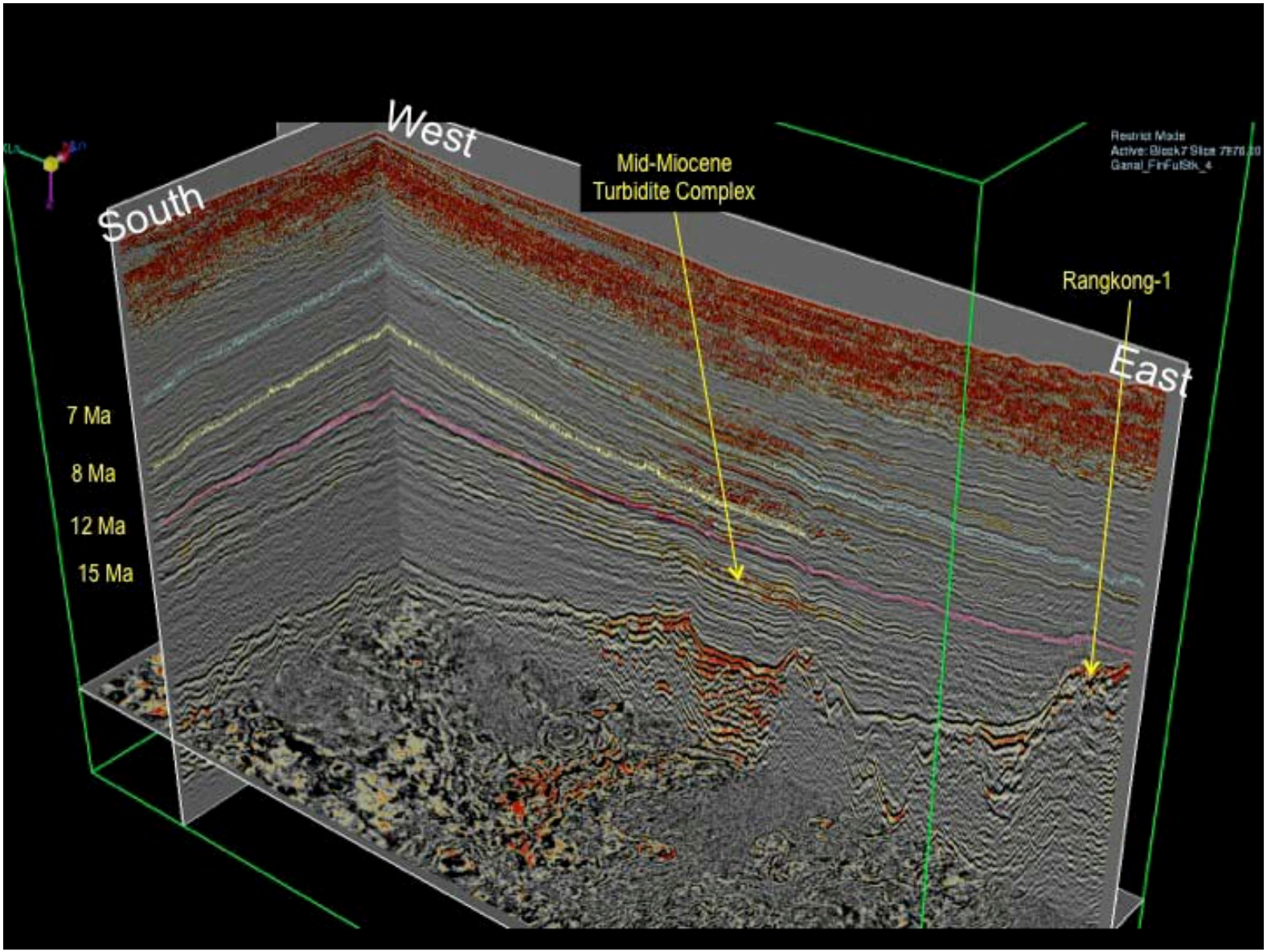

Figure 2. Composite seismic section showing sedimentary infill in central basin and nature of “basement”.