Paper 23

Development of the Sorong Fault Zone region, Eastern Indonesia

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The Sorong Fault Zone (SFZ) is a major left-lateral system separating Australia from the Philippines Sea Plate and the Molucca Sea. The fault zone juxtaposes continental, ophiolitic and arc rocks of Australia and Pacific origin. New

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The FMI log, in conductive muds, provides electrical images almost insensitive to borehole conditions and offers quantitative information, in particular for analysis of fractures.

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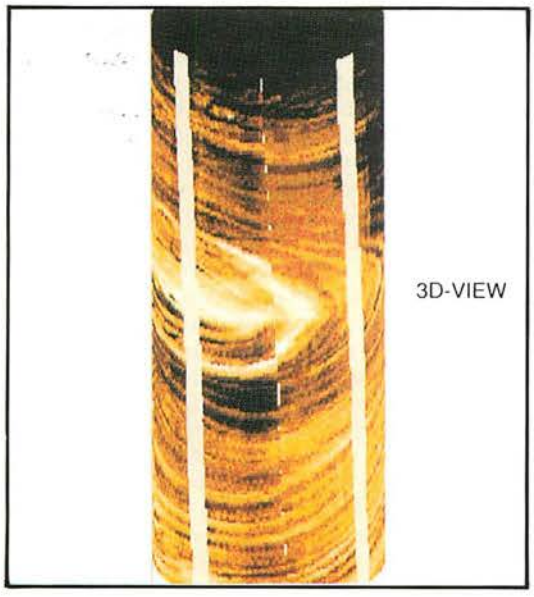
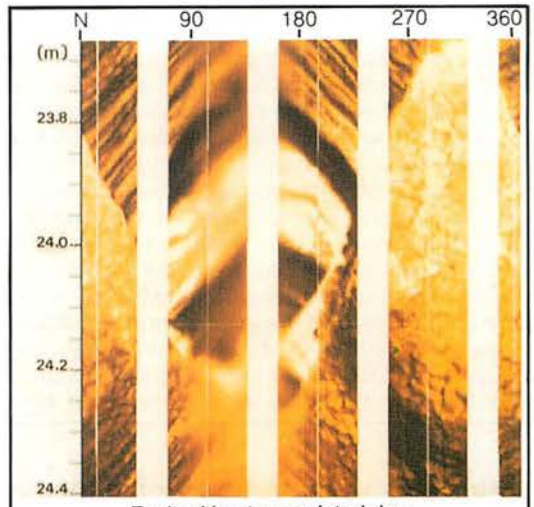
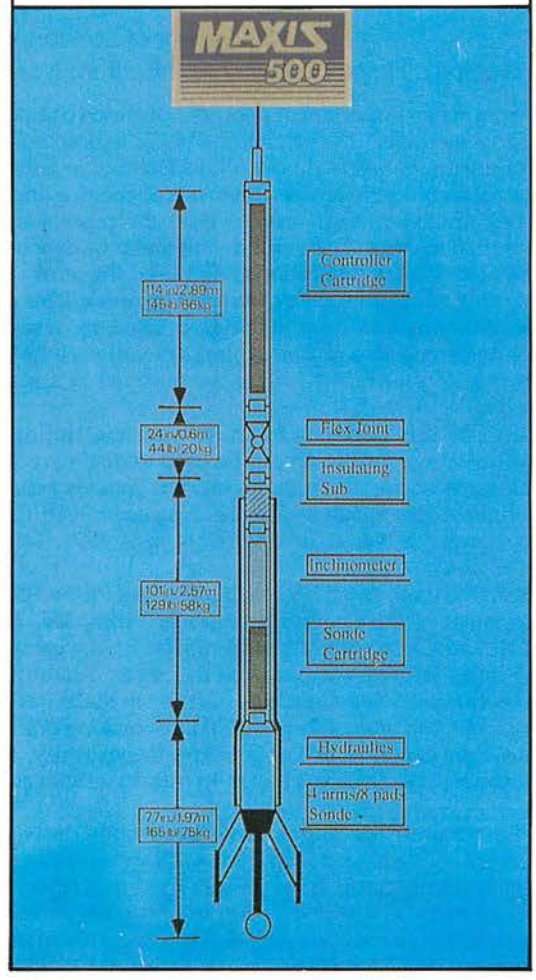


"Bullseye" structure



Fault without associated drag



Schlumberger

palaeomagnetic and geological results provide evidence of the history of their amalgamation.

Continental crust in the SFZ was derived from the Australia margin. Many reconstructions show westward translation of fragments from New Guinea by strike-slip faulting but an alternative possibility is separation from Australia by Mesozoic rifting. Cretaceous rocks from Sula record counter-clockwise rotations with palaeolatitudes suggesting that microcontinental fragments were far north of the Australian margin in the late Mesozoic. Tertiary movements of Australia northwards has caused accretion of these fragments to the SE Asian margin.

Pacific crust has a basement of ophiolitic and arc rocks. Ophiolites are remnants of an early Mesozoic intra-oceanic arc rather than Pacific ocean floor. They are overlain by, and imbricated with arc volcanic and sedimentary rocks of Late Cretaceous-Eocene age; arc plutonic rocks intrude the ophiolites. This arc is correlated with the Paleogene arc of New Guinea, parts of the eastern Philippines, and ridges of the north Philipines Sea. A regional unconformity at ~45 Ma corresponds to Pacific Plate reorganization event. Older rocks are overlain by shallow water Eocene limestones and an Oligocene extensional sequence including basaltic pillow lavas and volcaniclastic turbidites. Fragments of Australia and Pacific origin have a common stratigraphic history after the early Miocene.

Rocks of Pacific origin formed at low latitudes. Our data suggest southward translation until ~25 Ma and northward translation during the Neogene. Areas north of the SFZ show clockwise rotation with the Philippines Sea Plate. Rotation appears discontinuous: we interpret a total rotation of ~90 since ~50 Ma as ~45 at ~45 Ma with a further ~45 after ~25 Ma. Composite islands within the SFZ include continental, arc and ophiolitic rocks recording latitudinal shifts similar to the Philippines Sea Plate and both counter-clockwise and clockwise rotations interpreted as block movements in the left-lateral SFZ.

These results indicate Pacific-Australia arc-continent collision at ~25 Ma and creation of the SFZ. Subsequent Neogene convergence north of the SFZ occurred by subduction. In contrast, Neogene movement of Australia northwards has occurred without subduction although accompanied by movements of small fragments and local 'collisions'. This implies northward movement of the plate boundary in the SFZ region at a similar rate to that of Australia.