Abstract Details

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Title: The origin of the Straits of Singapore

Abstract: The Straits of Singapore define the southernmost limit of contiguous Southeast Asia, running between Singapore and Peninsular Malaysia to the north and the Indonesian Riau Archipelago to the south. During Glacial periods one of the Mollengraf Rivers is considered to have drained from Sumatra, through the Straits of Singapore to the South China Sea. The Straits flooded most recently about 10,000 cal BP, as global sea-level rose to approximately –25m and flooded sills separating the Straits from the Indian Ocean to the west and the South China Sea to the east 1. Hill (1968)2 first pointed to the presence of an 'overdeepened' basin (up to 204m deep and ~1km in diameter) in the centre of the Straits, called the 'Singapore Deeps'. At this point water flow is constricted to an opening <2km wide, between the bedrock highs comprising St. John's Island and Pulau Sambo. That study concluded that the Deeps resulted from movement along a fault zone that runs South-east from Singapore, to Batam in Indonesia. While the possibility of an impact origin for the Deeps cannot be excluded, tectonism continues to offers the most reasonable explanation. An explanation for the persistence of the Deeps may lie in the Quaternary sediments of Singapore. The oldest marine sequence in Singapore is the 'Lower Marine Clay'. This suggests that the sills to east and west of the Straits were high enough to preclude any marine connection during interglacial periods prior to this time. The upper weathered surface of these sediments is generally 8m or more below modern sea-level. These two observations suggest that the land surface has been lowered by ~8m since the last interglacial or ~25m since the penultimate interglacial. If this lowering was progressive, then rates of 0.06 to 0.1mm/year are implied. Much of eastern Singapore is covered by 'Old Alluvium' and these easily eroded sediments must originally have at least partly filled the Singapore Deeps. When a marine connection was first established through the Straits, it may have been the only connection between the greater Indian and Pacific Oceans north of the main Indonesian Throughflow. It is therefore hypothesized that strong currents, generated by monsoon-driven changes in sea surface height and constrained to flow through the bedrock highs on each side of the Deeps during several discrete intervals since the Last Interglacial, caused scouring to bedrock of unconsolidated sediment previously deposited therein. References [1] M.I. Bird et al., Proc. 'Underground 2003' conf., Singapore, (2003). [2] R.D. Hill, Malayan Nature J. 21, 142-146 (1968).

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