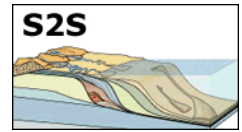


Developing A Quantitative Understanding Of Clinoform Formation, Gulf Of Papua



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High-resolution seismic profiles and sedimentological data from grab samples and long cores provide an unprecedented picture of the structure, sedimentology, and late Quaternary development of two Gulf of Papua (GoP) clinothems. The upper 100 m of the Gulf of Papua Shelf comprises two stacked clinothems---an older deeply eroded clinothem forming the middle and outer shelf, and a superjacent younger clinothem extending from the coast offshore forming the inner shelf. The older, partially eroded clinothem was built during Stages 4 and 3, sculpted into a series of northwest-southeast-trending paleo-valleys and mesas during Stage 2, and partially covered by a younger clinothem during Stage 1. The younger clinothem downlaps onto the erosional surface etched into topsets of the older clinothem. It consists of at least three lobes or depocenters: a central lobe that is downlapped both to the north and south by younger lobes, indicating that the locus of sedimentation has shifted along strike over the last 10,000 years. The central lobe is made up of three major stratigraphic units that are separated by two surfaces of erosion or bypass or correlative surfaces of down/up/on/off-lap termed S1 and S2. An early phase of clinothem growth below S1 occurred by oblique progradation of acoustically high-amplitude, well-bedded reflectors on the clinoform face. Since formation of S1, the clinothem has grown vertically by an average of 16 m and advanced shelfward an average distance of 6 km, yielding a mean clinothem vertical sedimentation rate of about 1 to 5 mm/yr. Clinoform

foresets from rollover to toe average 60 m in thickness and dip from 0.2-0.3°. These geometries and facies record a complex response to climate, tectonic, and sea level forcing, the details of which are not completely understood. They also provide a valuable modern analog for interpreting ancient examples, as for example, during hydrocarbon exploration.

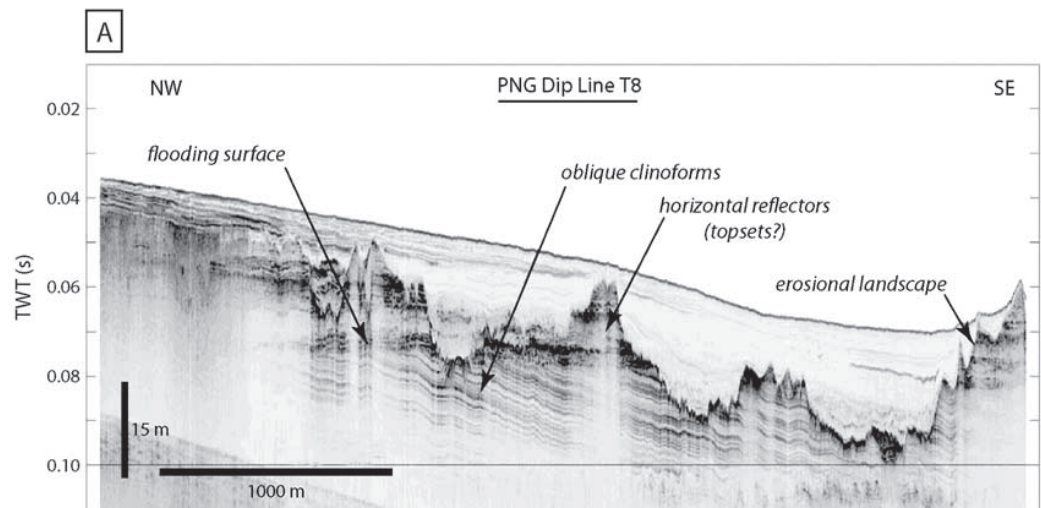
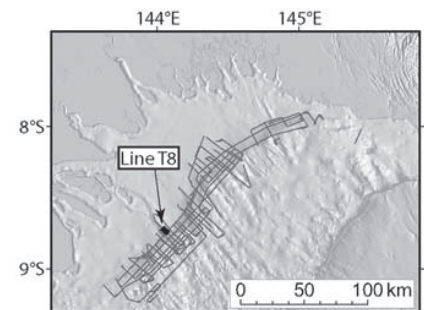


Figure: CHIRP sub-bottom profiles showing two clinothems in the Gulf of Papua. (Top) The older clinothem consists of oblique clinoforms mantled by flat-lying strata above a flooding surface. Above a significant erosional unconformity lies the modern clinothem, here represented by seaward dipping reflectors. (Bottom) Location map.



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