

**Late Quaternary evolution of the northeastern Australian Margin: determining the response of a tropical mixed siliciclastic/carbonate margin to fluctuations in eustatic sea level**

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Eustatic sea level fluctuations exert the major influence on the evolution of passive continental margins. According to widely accepted paradigms, off-shelf sediment flux along mixed siliciclastic/carbonate margins will be (1) dominated by carbonates during highstands, due to flooding of the shelf and maximisation of accommodation space, (2) dominated by siliciclastics during lowstands, due to exposure of the shelf and the progradation of fluvial systems to the continental slope, and (3) minimised during transgression, due to the landward retreat of rivers and variable reinitiation rates of the 'carbonate factory'.

The northeast Australian margin is the largest modern example of a mixed siliciclastic/carbonate depositional system. Up to 28 Mt/yr of siliciclastic sediment is discharged onto a carbonate shelf that includes the Great Barrier Reef. Radiocarbon dating, bulk carbonate, and XRD analysis of six sediment cores, has revealed that maximum off-shelf flux of both siliciclastic and carbonate sediments over the last 25 ky occurred during transgression ca. 12 – 7 ka. Mass accumulation rates on the slope were up to six-times higher than during lowstand or highstand. Seismic imaging has revealed that fluvial progradation during the Last Glacial was restricted due to the barrier reef system, resulting in siliciclastic deposition on the outer shelf, which was most likely reworked and transported off-shelf during transgression. The cause of increased carbonate productivity during this period of enhanced siliciclastic flux remains unclear. Nevertheless, the depositional response of the margin to the most recent fifth-order variation in eustatic sea level is wholly inconsistent with widely accepted models for mixed system evolution.