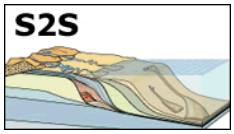
Geochemical Core Logging of Gulf of Papua Sediments for Source-to-Sink Studies



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The overarching goal of our MARGINS work in the Papua New Guinea (PNG) Focus Area has been to quantify the masses, compositions, and fluxes of the mixed siliciclastic and carbonate sediments deposited from the regional shelf edges to the slope and basin floors of Ashmore, Pandora, and Moresby Troughs in the Gulf of Papua (GoP). These troughs represent the final depocenter for much of the shelf-derived material and their study is required if one is to achieve a complete sediment budget for the PNG focus area. Carbonate and siliciclastic sedimentation patterns are being documented using a large suite of piston cores with oxygen isotope stratigraphies and high-resolution elemental records measured with an X-Ray Fluorescence (XRF) Core Scanner. XRF data allow quantitative changes in carbonate and siliciclastic sedimentation to be determined based on changes in carbonate (Ca, Sr) and terrestrial (Fe, Al, K) sourced elements. Pelagic and neritic carbonate accumulation generally increase during interglacials, while Sr-rich carbonate (aragonite) peaks occur during transgressions and reflect reactivation and shedding of neritic carbonate from the shelf and isolated platform reefs. Siliciclastic delivery to the GoP, especially Pandora and Moresby Troughs, was much higher during glacial periods due to proximity of river mouths to the shelf/slope edge. Though sea level exerts the dominant control on sedimentation, seafloor bathymetry, distance from sediment source, neritic production area size, and oceanographic and climatic condition are also proving important.

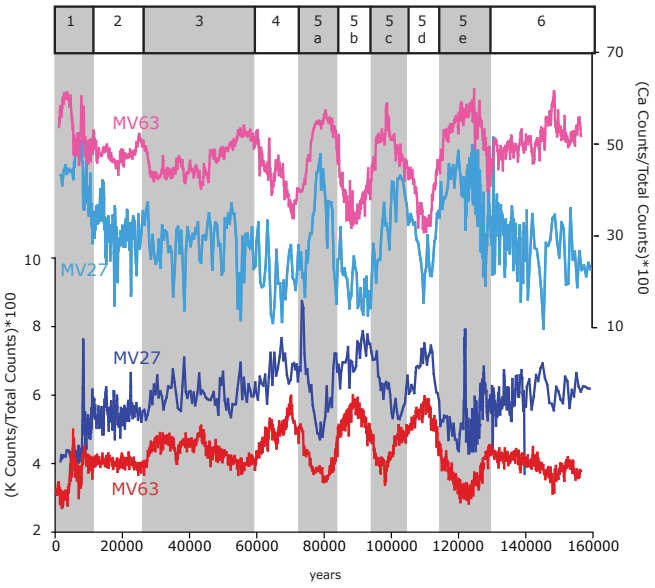

Figure: Example of Late Quaternary carbonate (represented by Ca) and siliciclastic sedimentation (represented by K) in two cores from the deep GoP based on XRF core scanner results. Numbered boxes indicate Marine Isotope Stages. Grey shaded areas mark interglacial Marine Isotope Stages 1 and 3 and Stage 5 interstadials. The two cores show clear evidence of "reciprocal sedimentation", with higher carbonate contents during interglacial highstands and higher siliciclastic inputs during sea level lowstands on the Eastern Plateau (MV63) and Moresby Trough (MV27).

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