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Zambezi continental margin: allocyclic and antecedent controls on sediment transport in the Mozambique Channel.

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Sediment delivery to the abyssal regions of the oceans is an integral process in the source to sink cycle of material derived from the hinterland. How sediments are transported down-slope, and where they are deposited has implications for the mass balance of the upper lithosphere, hydrocarbon reserves, climate archives and sequence stratigraphic models. The Zambezi River, the largest in southern Africa, delivers vast amounts of material to the continental shelf, submarine Sofala/Zambesia Bank. The Sofala/Zambesia Bank acts as a staging area for this riverine input prior to its redistribution toward the abyssal plains of the Mozambique Channel. Much of this material is said to be directed into the submarine Zambezi Valley and Channel. Until this study, however, the sediment transfer routes between the Sofala/Zambesia Bank and abyssal plains of the Mozambique Channel have been quite poorly understood and remain unconstrained. The aim of this contribution is to better constrain sediment transport pathways to the abyssal plains using the latest, regional, high resolution multibeam bathymetry data available, taking into account the effects of bottom water circulation, antecedent basin morphology and sea level change. Results show that sediment transport and delivery to the abyssal plains is discreetly partitioned into southern, central and northern domains. This sediment partitioning is primarily controlled by changes in continental shelf and shelf break morphology under the influence of a dynamic anticyclonic inshore circulation system. However, changes in base level have an overarching control on sediment delivery to particular domains at various sea levels. A direct consequence of these controlling factors is limited sediment delivery to the submarine Zambezi Valley and Channel under present-day conditions, with increased activity envisaged during regression. Furthermore, the “on-off” switching of discrete domains along strike is a sequence stratigraphic concept generally not previously considered in the shelf-slope-abyssal continuum. The proposed sediment transport routes, under varied sea level scenarios, provide a framework which relates shallow to mid depth studies with those focused on the deep regions of the Mozambique Channel providing the first inclusive account of shelf to abyssal sediment transport in the region.