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Sediment transport processes and products on the subaqueous Mekong megadelta

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The Mekong River delivers more than >80 Mt/yr of sediment annually to a shallow epicontinental sea, forming one of the world's largest subaqueous deltas. An estimated 120 cubic km of sediment is contained in the modern subaqueous delta (seaward of the shoreline), and is shaped by waves and currents with strong seasonality. In Sep 2014 and Mar 2015 (contrasting monsoon seasons), extensive ship-based surveys yielded 32 gravity cores, time-series measurements of sediment transport processes at three sites, and several transects of water-column velocity. During the high-discharge season, sediments are delivered to the topset and upper foreset; seaward transport is limited by net near-bed landward currents (related to high river discharge) and shelf circulation patterns, and along-isobath transport is limited by weak wave and current energy. During the windy monsoon season, waves and currents drive intense resuspension and advection southwestward and toward shore, creating an elongated but narrow clinoform. Physical structures within the clinoform are consistent with physical reworking of sediment to ∼10 m water depth, and bioturbation at greater depths. Accumulation rates are spatially variable (with water depth and distance along-isobath), and range from ∼0.5 to 8 cm/yr. A 100-yr sediment budget reconstructed from cores yielded a burial rate of 140 million ton/y, similar to historic estimates of Mekong sediment discharge. Approximately half of this sediment accumulates in distal areas, tens to hundreds of kilometers south of the Mekong distributary channels. These results offer a comprehensive modern characterization of a delta facing rapid changes in sediment supply, sea level, and ocean energy.