

Large changes in sediment input based on multi-century sediment record in Bolinao, Pangasinan, Philippines

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Natural and anthropogenic drivers of environmental change can lead to large changes in sediment input. In this study, two sediment cores in the Guiguiwanen Channel in Bolinao, Pangasinan facing the West Philippine Sea, with Lingayen Gulf on the eastern edge, were used to establish changes in sedimentation. Bolinao is a coral reef area but is adjacent to small rivers. Changes in sediment quality were inferred from geochemical and sedimentological proxies. Elemental data were generated using an Avaatech XRF core scanner. Radiocarbon dates and ²¹⁰Pb profiles provided age control. In the oldest section, about 470 AD, carbonate content was at about 20%. This remained fairly constant till about 1000 AD when it started to decline incrementally. In the early 1900s carbonate content was at 12% but within this period it decreased abruptly to 8% and further reduced to 5% in recent decades. This pattern of change is matched by changes in Ca intensities while the Ti and lithics show opposite trends. The changes from 2010 to 1975 are characterized by an overall increase in organic matter, silt, and carbonates and a decrease in lithics, Ti and clay. The incremental increase in lithic components which started about 1000 AD is within a period of a sea level fall. A fall of sea level would have triggered river bed scouring and a seaward extension of river mouths. However an increase in rainfall can also give a similar trend. Recent trends in sediment quality is attributed to massive conversion of mangroves to fishponds which started in the 1970s leaving only 10% of the original primary mangrove cover. In addition, fish cage operations in the past decades have led to a large influx of organic matter in the area.

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