

Present seafloor condition based on grain size and organic geochemical properties of surface sediments in Manila Bay, Philippines

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Manila Bay is semi-enclosed bays and progressive urbanization and industrialization occurred. As a reason, high anthropogenic inputs have made these places highly susceptible to eutrophic and anoxic conditions, as well as chemical pollution. Meanwhile these topographic conditions also allow sediments to hold a record of the spatial and temporal variations of those inputs. This study focused on grain size and organic geochemical properties of surface sediments and determined the factors associated with their variability. Forty one surface sediment samples were collected in June and November 2008. Silt and clay sediments with 8-8.5 phi were mainly distributed in Manila Bay. Silt sediments below 7-8 phi did in the eastern and bay mouth areas. On the other hand, swell laminae in the surface sediments were observed in the eastern part of the bay. Villanoy et al (2006) calculated hydrodynamics in Manila bay using model and measured data, and these results show that waves from the South China Sea exposure at the northeast part of the bay. These results in sediments indicate that benthic region in the interior of Manila Bay is stagnant. However, increase in grain size and lamina formation of sediments in the eastern part suggests that bottom areas are affected by waves from the South China Sea. Total organic carbon (TOC) and Total nitrogen (TN) concentrations were relatively high at western part of the bay and decreased toward the northern and eastern parts. And the ratio of TOC to TN concentrations (C/N ratio) and organic carbon and nitrogen stable isotopes are indicators of the origin of organic matter in sediments. From the northern and eastern parts toward the bay mouth in Manila bay, C/N ratios decreased and organic carbon and nitrogen isotopes increased. Villanoy et al (2006) showed bottom current velocities from southeast monsoon which this is counterclockwise at the west part. These results indicate that organic material originated in plankton were swept together and deposited in the western part by the current from southeast monsoons. Meanwhile, in the eastern and northern coastal area of the bay, terrestrial organic matter were deposited. And wave activity affected water column in the northeastern part, and as a result, grain size increased and concentrations of organic matter were diluted with coarser clastic sediments. Total sulfur (TS) concentration and the ratio of TOC to TS concentrations (C/S ratio) are useful tools for reconstructing paleo redox conditions. TS concentrations decreased and C/S ratio increased from the eastern and northern parts toward the western and southern parts of the bay. These results mean that the seafloor environment in the interior of Manila Bay was under anoxic conditions, and became relatively oxic toward the bay mouth.