Long-term monitoring of sedimentation in Sagami Bay

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Continental margins are active areas of sedimentation and potential sinks for potential carbon. Sediment particles are transported not only from the sea surface but also from land areas. Therefore some tracer of human activities may reach the deep-sea floor at continental margin systems. The aims of the study are to monitor sedimentary processes, both organic and inorganic materials, in marginal seas along arc-trench systems since 1991, we have been observing carbon cycling and sediment particle transportation processes in Sagami Bay, Japan. We have succeeded in documenting in detail dynamic sedimentary processes from the ocean surface through the water column to the seafloor. Distinct spring blooms have been observed, even though mass fluxes deposited in sediment traps did not show distinct signals for spring blooms due to the influence of re-suspended materials. Dense clouds of suspended particles were observed only in the spring in the near-bottom nepheloid layer. This phenomenon corresponds well with the increase of phytodetrital matter after the spring bloom. A phytodetrital layer began to form on the sediment surface about two weeks after the start of the spring bloom. Chlorophyll-a was detected in the top 2 cm of the sediment only during the presence of the phytodetrital layer. Protozoan and metazoan meiobenthos increased in density after phytodetrital deposition. In-situ feeding experiments revealed that most benthic foraminifera responded quickly and fed fresh phytodetrital particles. Benthic ecosystems should respond to seasonally sinking phytodetritas. Benthic-pelagic coupling was certainly observed, even in this marginal sea environment with an undulating bottom topography.

Our observations also revealed that sediment particles derived from adjacent land areas sustain high rates of sedimentation within the marginal seas. Sediment transportation is strongly controlled by vertical settling and by hyperpycnal flow processes. Shallow inner bay areas, such as Tokyo Bay, act as effective sediment traps for fine terrestrial sediment. These sediments are moved into the near-bottom layer by tidal pumping, transported downward along submarine canyons, then finally deposited on the deep seafloor. Anthropogenic artificial chemical compounds are directly transported from Tokyo Bay to Sagami Bay. Deep-sea environments adjacent to land areas, thusfar, appear to be influenced by human activities on land.