

D-1 Effects of Environmental Pollution Load Through Large Rivers on Marine Ecosystem in East China Sea

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In order to understand the effect of the Changjiang River on the marine environment and the marine ecosystem in the East China Sea, a field investigation and mesocosm experiments were conducted offshore from the Changjiang River in both October 1997 and May 1998.

- 1) The Changjiang water plume (below 30‰ salinity) flows in the surface layer (less than 10 m depth) and reaches as far as long 123°E in autumn and long 124°E in spring. The N/P atomic ratio of nutrients in the coastal area was as high as 32 in autumn and 47 in spring, which indicates that there is an excess of nitrogen supplied from the river.
- 2) The microbial diversity was analyzed using flow cytometry system and PCR method. In sites far from the coast, cyanobacteria were observed. The surface layer indicated different microbial pattern from the middle and the bottom layers in all sites.
- 3) The concentration levels of trace elements were almost similar to other coastal waters, implying no significant effect of pollutant loading through the Changjiang River.
- 4) The higher C/N ratio of sinking particles in autumn than in spring suggests high biological productivity in autumn and high frequent resuspension events in spring in spite of the high biological productivity.
- 5) From sediment core analyses, the increase of sediment discharge for the last 1000-2000 years was shown due to human activities in their drainage areas. Sediment cores taken from sea bottom offshore Changjiang also showed anthropogenic changes in coastal environment. Some cysts of red-tides causative dinoflagellates such as *Lingulodinium polyedrum*, *Scrippsiella trochoidea* and *Polykrikos kofoidii/schwartzii* complex occurred in the upper part of the gravity core G-1, which dates to after about 1970.
- 6) The mesocosm experiment with phosphorous enrichment revealed that phytoplankton blooms could be easily raised by the addition of only phosphorous.
- 7) The mesocosm experiment with oil enrichment showed that photosynthetic activity was clearly affected by the oil. Ciliates and noctiluca drastically decreased after the oil enrichment.
- 8) Expressing phytoplankton succession of diatom and dinoflagellate, grazing by zooplankton, nutrient dynamics, bacteria and photosynthetic pathways was included. The model was described by vertically one dimensional mass conservation equation with 15 independent variables including N, P, Si in dissolved matter and particulate biota of phytoplankton, picoplankton, bacteria and zooplankton. The model was validated by measured data of marine mesocosm experiment in Changjiang estuary.