

D-1 Mass Flux from the Coastal Sea to the Open Ocean in Shelf Waters

Contact Person Masataka Watanabe
Director,
Water and Soil Environment Division,
National Institute for Environmental Studies
16-2 Onogawa, Tsukuba, Ibaraki 305, Japan
Phone +81-298-51-6111 (Ext.330), Fax +81-298-51-4732

Total Budget for 1990-1992 59,409,000 Yen

Key Words Shelf Waters, Element cycle, Flux, Foraminifer

Pollutants produced by anthropogenic activity ultimately will be loaded on to the ocean and therefore it is urgent to understand how the ocean responds and what will be the consequence of these change in global scale. Carbonate or nutrients behave differently from hazardous chemical substances under physical and biochemical transport. Therefore it is necessary to understand the flux created by biogeochemical processes and linkage of these processes in the ocean.

By using field observation and controlled experimental ecosystem, the mechanism of element cycle and flux generated by biochemical process will be analyzed.

Estimating method of marine productivity and element cycle in the past will be developed by evaluating the composition of organic matter, trace metals, calcium carbonate and foraminifer in the sediment.

- a) Marine mesocosm (5m in diameter and 18m in depth) was developed and in situ marine ecosystem had shown succession from diatoms to dinoflagellates responding to nutrients enrichment.
- b) Zooplankton showed significant influence on phytoplankton succession.
- c) Carbon tracer experiments were conducted and possible two carbon paths, namely DIC into biogenic POC and DOC into biogenic POC, were observed through the experiments.
- d) Carbon standing stocks; POC was not increased both at the upper layer and the lower layer even after successive phytoplankton bloom, while DOC increasing at both layers.
- e) Carbon transformation rates; the transformation rate of DOC into POC (through the bacterial loop) was 20% of that of DIC into POC (through the photosynthetic loop) at the upper layer in average, but just the same at the lower layer in average.
- f) Methods developed; pigments analysis methods to understand the component of POC and continuous PCO₂ monitoring system were developed.
- g) Sediment core (GC1002) was taken in Enderby Basin in Antarctic ocean. Age of core in 10-12cm depth was 20,000 ±610 years based on ¹⁴C method for planktonic foraminifers.
- h) Biogenic sedimentation flux was composed of calcium carbonate rather than opal based on the correlation analysis of Ca and Al measured by neutron activation method.