Relation between Th-234 and organic matter in the Suruga Bay

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Th-234 (Half-life = 24 days) has been used to study particle dynamics on time scales ranging from days to weeks in surface mixed layer. However, the relations between Th and particulate organic carbon (POC) are not well understood. An incubation experiment was carried out using the seawater in order to clarify the quantitative relation between organic matter and natural radionuclides.

The deep water was taken from the 400 m depth of Suruga Bay on November 2002. This system was installed in the open air, and the mouse of tank was covered with the transparent acrylic board. Measured parameter were salinity, nutrient, POC, PON, chlorophyll a, plankton, and radionuclides.

The chlorophyll a concentrations remarkably increased between fifth and seventh in the day of experiment, and it greatly decreased on the twelfth. However, the concentrations of POC and PON began to increase to seventh, and these showed the peak of concentrations on the twelfth.

The initial activity of the total Th-234 was 1.4 dpm/l and the ratio of Th-234/U-238 was 0.58 in the tank. The dissolved Th-234 was not detected during this experiment. The decrease of Th-234 activities was earlier than that by the decay of Th-234. As a result of the size fractionation, it is possible to largely divide the size into this two groups, i.e., the over 500um and 0.6-500 um fractions. The Th-234 activities in the small fraction remarkably decreased rather than these in the large fraction. There was not large decrease in the period that observed the remarkable increases of chlorophyll a concentrations during the fifth and seventh.

The POC/Th-234 ratios remarkably increased when the organism activity increases, and the ratio of the small fraction increased further than of the large fraction. It is considered that the different variations of Th-234 activities and POC concentrations were attributed to cause by the compositions of particle matter.