

Particle Removal with ^{234}Th in the Shelf Edge of the East China Sea

Tatsuo Aono (t_aono@nirs.go.jp)¹, Masatoshi Yamada¹ & Kou Harada²

¹ Research Centre for Radioecology, National Institute of Radiological Sciences, 3609 Isozaki, Hitachinaka, Ibaraki, 311-1202, Japan

² National Institute for Resources and Environment, 16-3, Onogawa, Tsukuba, Ibaraki, Japan

^{234}Th ($t_{1/2} = 24.1$ day) is especially useful for studies on material transport scavenging processes within relatively short time and on the mechanism of material transport from coastal zones to the open sea, because it is highly reactive to particulate matter and its rapid removal from the water column. In this paper, we present the activities of total ^{234}Th in seawater and the calculated removal rates of this nuclide from the water column in the shelf edge of the East China Sea. Seawater samples were collected using the 23 L - Niskin sampler with a CTD and a rosette multi-bottle array system at various depths from the surface to the bottom. All the chemical procedures and measurements of thorium isotope were carried out on shipboard using 5 l of unfiltered seawater samples. Thorium was quantified according to Harada's (1995) procedure using an on board alpha liquid scintillation counter system. As seawater samples were not filtered, ^{234}Th concentration was the mean total concentration of ^{234}Th in seawater. The concentration range of ^{234}Th was from 1.1 to 2.0 dpm/l in the shallow layer, and ^{234}Th concentration relative to ^{238}U was almost at equilibrium in the middle layer. But, ^{234}Th decreased and a deficiency in ^{234}Th concentration relative to

^{238}U was obtained in the bottom layer. Based on the disequilibrium between total ^{234}Th and ^{238}U in the seawater, the removal fluxes and times of total ^{234}Th were calculated. The mean removal times of total ^{234}Th ranged from 47 to 325 days in the shallow layer and 34 to 92 days in the bottom layer. And, the removal fluxes of total ^{234}Th ranged from 140 to 4820 dpm/m²/day in the shallow layer and 430 to 783 dpm/m²/day in the bottom layer. As the deficiency of total ^{234}Th relative to ^{238}U were observed in the shallow and bottom layers, the removal factors of total ^{234}Th using some particle inventories in the water column were considered. The removal fluxes of total ^{234}Th are related to suspended particulate matter (SPM), POC and biogenic silica in the shallow layer. But, no correlation of the removal fluxes of total ^{234}Th with inventories of SPM and lithogenic silica excluding POC and biogenic silica inventories is recognized in the bottom layer. Thus, total ^{234}Th in seawater is not removal by large amounts of SPM, but it is controlled by particles relevant to biological activities in the East China Sea.

Harada K, *Shigen to Knakyo*, **4**, 36-41, (1995).