Simultaneous Determination of $^{234}Th/^{238}U$ and $^{210}Po/^{210}Pb$ disequilibria in a Hydrothermal Vent Region Along the Southwest Indian Ridge System

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Vertical profiles of naturally occurring particle-reactive radionuclides (^{234}Th, ^{210}Po and ^{210}Pb) present in seawater were measured at two stations in submarine hydrothermal vent region along the southwest Indian ridge system, in November 2015, as a part of the Indian GEOTRACES program, to estimate the POC export flux and to identify the role of hydrothermal plumes in regulating the $^{234}Th/^{238}U$ and $^{210}Po/^{210}Pb$ activity ratios in this region. The ^{234}Th activity varied from 1.94 ± 0.05 to 3.41 ± 0.07 dpm L^{-1}. The deficit of ^{234}Th from ^{238}U was low in the surface followed by ^{234}Th excess from 75 to 800 m, 1200 to 2000 m and 3000 m to sea bottom. The POC/^{234}Th ratio on filtered particulates was 1.14 ± 0.07 and 1.80 ± 0.11 μmol dpm^{-1}, the depth integrated ^{234}Th deficit flux was negligible and 271 ± 91 dpm m^{-2} d^{-1} and the ^{234}Th based POC export flux was negligible and 0.5 ± 0.2 mmol m^{-2} d^{-1} for Sta. 4 and 24, respectively. On the other hand, continuous deficit of ^{210}Po with respect to ^{210}Pb was found from surface to sea bottom. However, an increase in ^{210}Po and ^{210}Pb activity was recorded in the intermediate depth (1200 to 2000 m). The POC/^{210}Po ratio was 279.6 ± 29.7 and 291.9 ± 23.7 μmol dpm^{-1}, the depth integrated ^{210}Po deficit flux was 20 ± 1.2 and 31 ± 1.2 dpm m^{-2} d^{-1} and the ^{210}Po based POC export flux was 5.5 ± 0.6 and 9.1 ± 0.7 mmol m^{-2} d^{-1} for Sta. 4 and 24, respectively. The role of remineralization, hydrothermal plume intrusion, resuspension of solids from seamounts and sea bottom in regulating the activities of these nuclides will be discussed.