The influence of particle concentration and composition on the sorption and fractionation of ^{210}Po and ^{210}Pb along the North Atlantic GEOTRACES transect GA03

YI TANG[1,2], GILLIAN STEWART[2,1]

[1]Department of Earth and Environmental Sciences, the Graduate Center, City University of New York, New York, NY 10016, USA. Ytang2@gradcenter.cuny.edu

[2]School of Earth and Environmental Sciences, Queens College, City Unviersity of New York, Flushing, NY 11367, USA. Gillian.Stewart@qc.cuny.edu

The particle concentration and composition effect on the adsorption behavior of ^{210}Po and ^{210}Pb were investigated by comparing dissolved (< 0.45 μm) and particulate (small: 1-51 μm; large: > 51 μm) radionuclide activity with size-fractionated major particle composition from the GEOTRACES GA03 zonal transect cruises. We observed inverse relationships between partition coefficients (K_d) for the radionuclides and the concentration of suspended particulate matter, known as the "particle concentration effect". Details of this relationship indicated more colloidal ^{210}Pb in the open ocean and ^{210}Po in the coastal waters, respectively. Principal component analysis suggested that production and respiration/degradation were important for particle composition, and the activity of radionuclides in the small particles. Further, a six-end-member mixing model was developed to estimate K_d for ^{210}Po and ^{210}Pb from pure end members. The model predicted the observed K_d(Pb) reasonably well, showing that $CaCO_3$ and MnO_2 are the major contributors to K_d(Pb). The model, on the other hand, was unable to predict the observed K_d(Po), suggesting possible still missing end members for scavenged ^{210}Po. There is nonetheless a significant trend showing a preference for scavenging ^{210}Po by organic carbon and a preference for scavenging ^{210}Pb by lithogenic/inorganic material.