Biogeosciences Discuss., 8, C4496–C4497, 2011
www.biogeosciences-discuss.net/8/C4496/2011/

Biogeosciences Discussions

Interactive comment on "Particle-reactive radionuclides (^{234}Th, ^{210}Pb, ^{210}Po) as tracers for the estimation of export production in the South China Sea" *by* C.-L. Wei et al.

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Received and published: 19 November 2011

We are grateful for the comments given by the anonymous referee, who also offered helpful suggestion for the revision. All suggestions of syntax changes were adopted. The changes are not itemized here. The responses to specific comments or suggestions are summarized below. The comparison of export production in various oceanic environments has been given in the extensive review by Dr. Buesseler (1998, Glob. Biogeochem. Cycles, 12, 297-310). In the revised manuscript, as suggested by referee #1, Dr. Cai, the export productions estimated by various approaches in different regions of the South China Sea were summarized and compared in Table 4. As dis-

cussed in the manuscript, existing literature data shows that the trapping efficiency of floating traps deployed in the dynamic surface layer was highly variable with a large range ranging from 0.1 to 20. In this study, the trapping efficiencies of 1.06±0.2 and 3.99±3.23 based on 234Th and 210Po data, respectively, were considered comparable when compared with the literature data. Indeed, PIC only represents the carbon content in carbonate component and PIC/234Th is the concentration/activity ratio of inorganic carbon and 234Th of the sinking particles instead of "PIC particles and 234Th of PIC particles". Similar temporal and vertical variation among the ratios of POC, PIC, and PN to 234Th implies that 234Th is not preferentially scavenged by specific component of particles. Intrinsic differences, i.e., half-life, source and sink functions, and geochemical behavior, among the three radionuclides were briefly given in the introduction. The application of naturally-occurring radionuclides in marine scavenging processes is based on the mass balance between the long-lived parent and short-live daughter. For 226Ra-210Pb system, we would not be able to derive removal rate if the loss of 222Rn from the surface layer was considered. The situation of no equilibrium (ïĄňRn-222»ïĄňPb-210) would prevent us to establish meaningful relationship between 222Rn and 210Pb to reveal geochemical rates. In addition, as found in many literatures, the input of 210Pb from the radioactive decay of 226Ra is negligible comparing with the input from the atmospheric deposition in the surface layer of the ocean.

Interactive comment on Biogeosciences Discuss., 8, 9671, 2011.