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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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We appreciate the thoughtful review and constructive comments. The revisions in response to the comments are summarized below.

âĂć Suggested by the reviewer, we have added a short description of the analytical procedures for the determination of 234Th, 210Pb, and 210Po in seawater and trap samples. âĂć Cai et al. (2008) was added in the discussion of the effect of physical transport on 234Th budget in the upper water column. âĂć Two papers by Cai et al. published in 2002 were cited for the eddy diffusion coefficient. âĂć A sentence was added to explain why the trapping efficiency based on 210Po/210Pb disequilibrium is

>1. If 210Po is regenerated from particle remineralization, a lower estimated 210Po based on the disequilibrium would be expected and, hence, results in a higher ratio of measured flux and modeled flux. âĂć We have toned down the representativeness of our estimate of the export production in the South China Sea. âĂć The export productions determined from other regions in the South China Sea were added into Table 4. These results were compared in section 4.4. Please see attached table. âĂć We agree that the errors associated with all measured and calculated parameters should be presented in the figures and tables. Regarding this issue, we have made following revisions: -Error bars showing the uncertainties estimated from the counting statistics are added to depth profiles of 234Th (Fig. 2), 210Pb (Fig. 3), and 210Po (Fig. 4). Please see attached figures. -Error bars based on propagated counting errors were also added to the depth profiles of parent-daughter ratios (Fig. 6) and temporal values of the export fluxes (Fig. 8). Please see attached figures. -The standard deviations of all flux parameters are already listed in Table 1. -Uncertainties of removal fluxes of the three radionuclides were given in Table 2. Please see the attached table. -However, we feel that the table would be cluttered if uncertainties of the inventories and deficiencies of all radionuclides were listed, so no uncertainty of inventories and deficiencies is given. -We also feel that the standard deviations of trapping efficiencies based on the 6 samples listed in Table 3 are better than listing all uncertainties associated with individual trapping efficiency. -Average and standard deviation of various fluxes from this study are added in Table 4.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/8/C4136/2011/bgd-8-C4136-2011-supplement.pdf

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

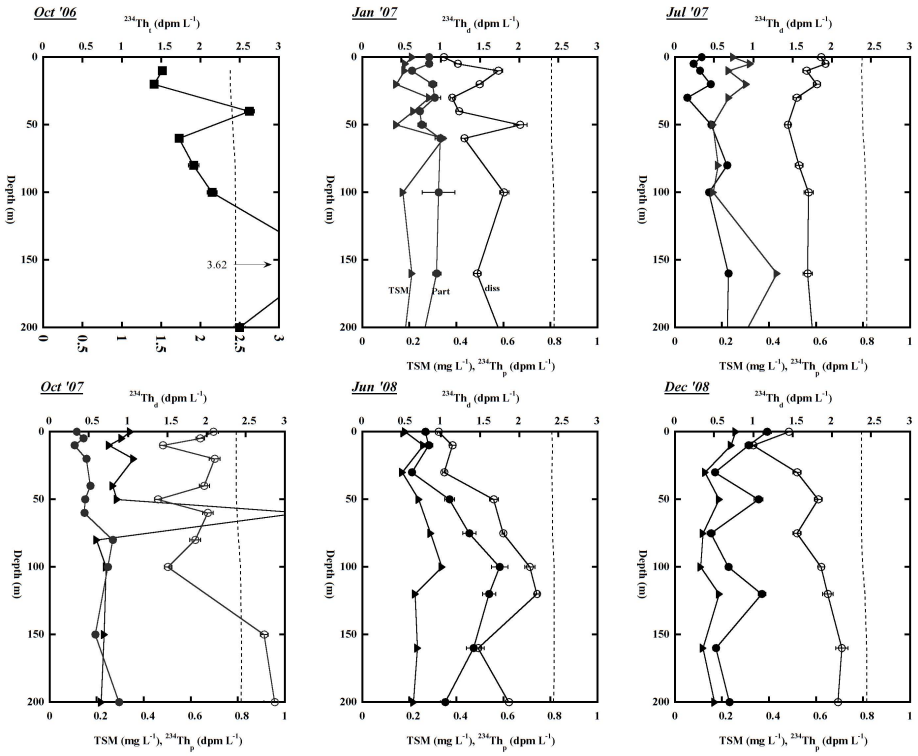
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08
Depth (m)
3.62
TSM
Part
diss
TSM (mg L-1), 234Thp (dpm L-1)

Fig. 1.

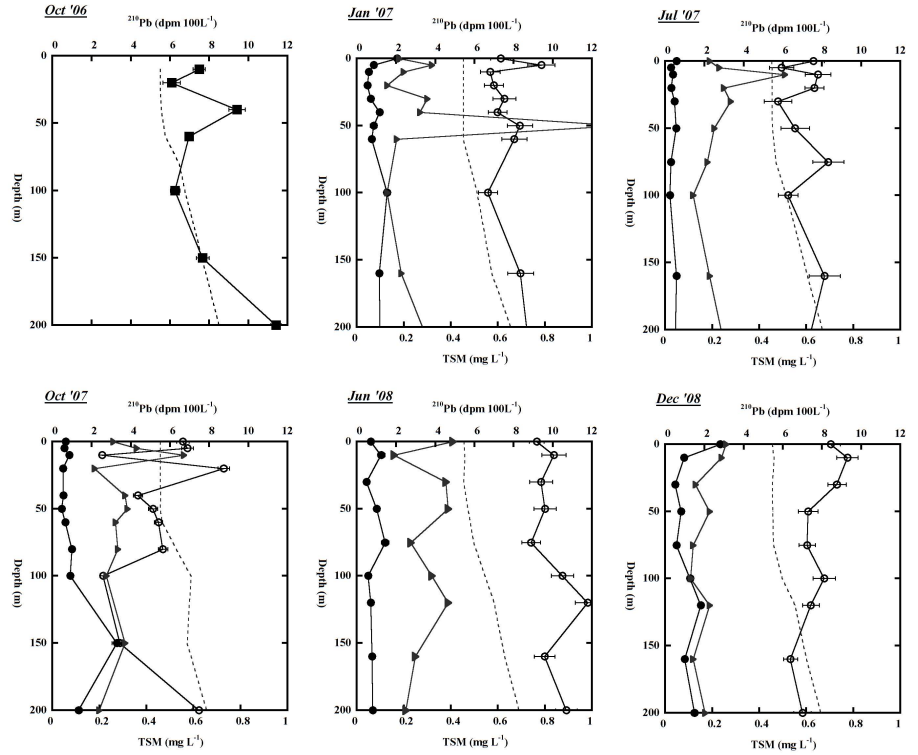
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08
Depth (m)
210Pb (dpm 100L-1)
TSM (mg L-1)

Fig. 2.

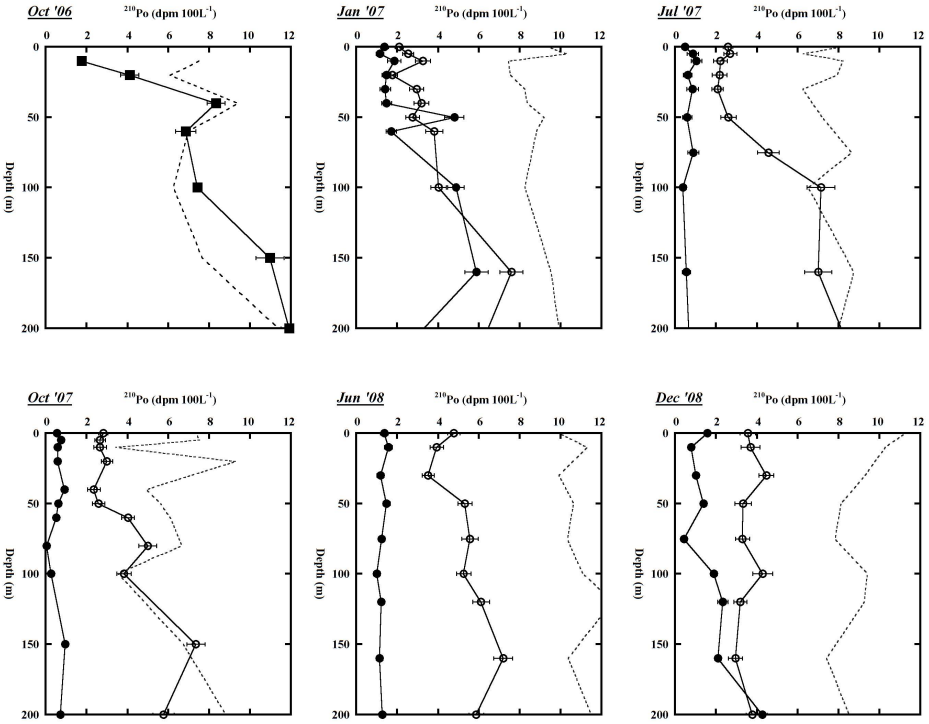
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08
^{210}Po (dpm 100L^{-1})
Depth (m)

Fig. 3.

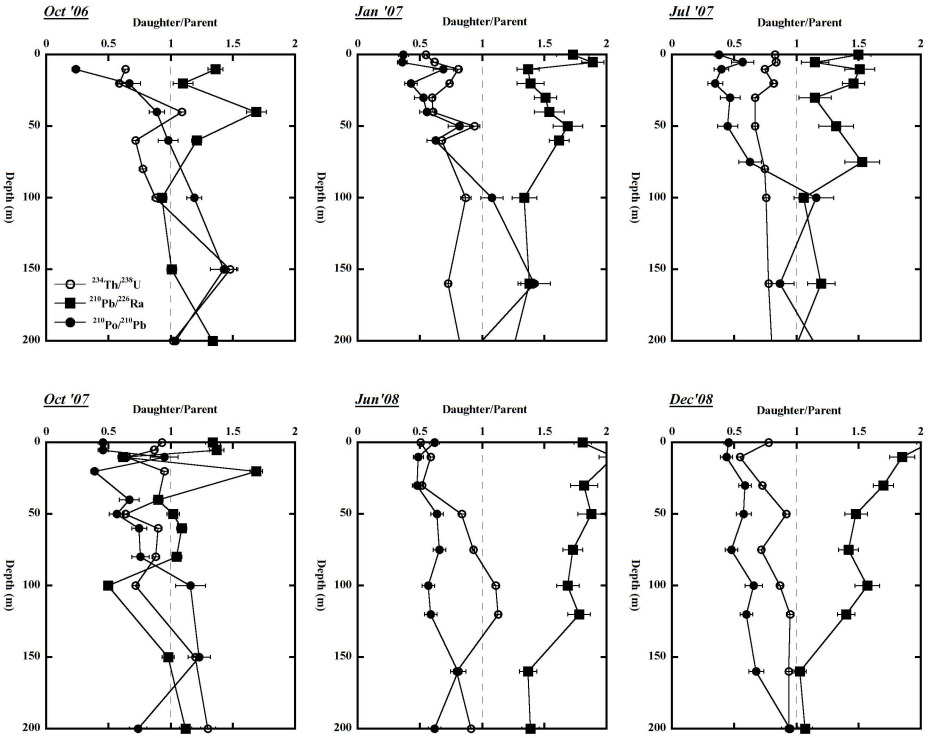
Oct '06
Jan '07
Jul '07
Oct '07
Jun'08
Dec'08
Daughter/Parent
Depth (m)
^{234}Th/^{238}U
^{210}Pb/^{226}Ra
^{210}Po/^{210}Pb

Fig. 4.

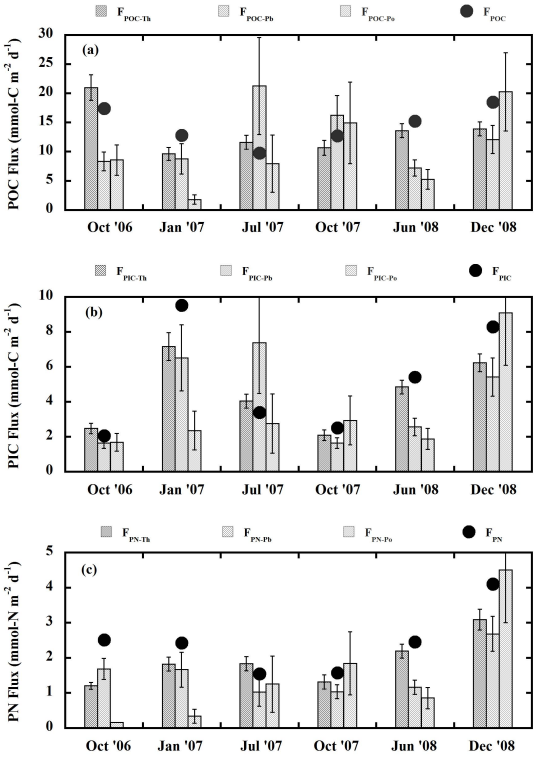
F POC-Th
F POC-Pb
F POC-Po
F POC
(a)
POC Flux (mmol-C m-2 d-1)
30
25
20
15
10
5
0
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08
F PIC-Th
F PIC-Pb
F PIC-Po
F PIC
(b)
PIC Flux (mmol-C m-2 d-1)
10
8
6
4
2
0
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08
F PN-Th
F PN-Pb
F PN-Po
F PN
(c)
PN Flux (mmol-N m-2 d-1)
5
4
3
2
1
0
Oct '06
Jan '07
Jul '07
Oct '07
Jun '08
Dec '08

Fig. 5.