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Supporting Information for

Carbon System Simulation in the Pearl River Estuary, China: Mass Fluxes and Transformations

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**Additional Supporting Information (Files uploaded separately)**

Text 1. Source code of RCA carbon cycle Model.

Text 2. Files for Figure 1 in manuscript.

Text 3. Files for Figure 2 in manuscript.

Text 4. Files for Figure 3 in manuscript.

Text 5. Files for Figure 4 in manuscript.

Text 6. Files for Figure 5 in manuscript.

Text 7. Files for Figure 6 in manuscript.

Text 8. Files for Figure 7 in manuscript.

Text 9. Files for Figure 8 in manuscript.

Text 10. Files for Figure 9 in manuscript.

Text 11. Files for Figure 10 in manuscript.

Text 12. Files for Table 2 in manuscript.

Text 13. Boundary conditions for DIC and TA in manuscript.

Text 14. Correlation Coefficients between carbon materials and salinity

**Introduction**

The supporting information mainly includes: (1) source codes of RCA carbon cycle model used in manuscript that are written in Fortran; (2) validation data and simulating results at corresponding observing time point that are saved in a MATLAB matrix file; (3) simulating results that used for data visualization in manuscript, codes of each figures in manuscript that are written in MATLAB or Origin. The detail information and directions for using codes in each folder are listed below:

* Text S1.
* Source codes of carbon cycle model.
* Text S2.
* Pearl River Estuary and 1-3D coupled hydrodynamic model: (a) the Pearl River Delta with the Pearl River network and the Pearl River Estuary, (b) the computational cross-sections for the 1D river network model, and (c) the model grid for the 3D estuary model.
* Text S3.
* Conceptual framework of the RCA carbon system (RCACS), including the water column and sediment carbon cycles.
* Text S4.
* Validation Data and simulation results of TA, pH, DIC, pCO2, salinity and temperature are stored in a mat file (use MATLAB to open it) named ‘***Compare\_06Jul\_1202.mat***’. A MATLAB Code file named ‘***PlotCompare908.m***’ can be used to plot the Taylor diagram as shown in Figure 3. The validation data was collected during 15th July 2006 to 24th August.
* Text S5.
* Validation Data and simulation results of TA, pH, DIC, pCO2, salinity and temperature are stored in a mat file (use MATLAB to open it) named ‘***Compare\_06Jul\_1202.mat***’. MATLAB Code files named ‘***Plot3D\_SigmaLayer\_PRE\_Veritifi\_pH.m***’ and ‘***Plot3D\_SigmaLayer\_PRE\_Veritifi\_Talk.m***’ can be used to plot the Taylor diagram as shown in Figure 4. The validation data was collected during 15th July 2006 to 24th August.
* Text S6.
* Monthly averaged simulation results of pCO2 of August 2006 and February 2006 are listed as ‘***matfile/Aug\_pCO2.mat***’ and ‘***matfile/Aug\_pCO2.mat***’. They can plot Figure 5 in manuscript by operating ‘***RCACarbon.m***’ in MATLAB.
* Text S7.
* Monthly averaged simulation results of DIC, DOC, POC of August 2006 are listed as ‘***matfile/Aug\_DIC.mat***’, ‘***matfile/Aug\_DOC.mat***’, ‘***matfile/Aug\_POC.mat***’. They can plot Figure 6 in manuscript by operating ‘***RCACarbon.m***’ in MATLAB.
* Text S8.
* Monthly averaged simulation results of DIC, DOC, POC of February 2006 are listed as ‘***matfile/Feb\_DIC.mat***’, ‘***matfile/Feb\_DOC.mat***’, ‘***matfile/Feb\_POC.mat***’. They can plot Figure 7 in manuscript by operating ‘***RCACarbon.m***’ in MATLAB.
* Text S9.
* Simulating results of accumulated materials fluxes and consumption.
* Text S10.
* Monthly averaged simulation results of POC deposition flux, DIC exchange flux, POC burial flux of January, March, May, July, September, November 2006 are listed as ‘***matfile/Jan\_JPOCN.mat***’, ‘***matfile/Jan\_JDIC.mat***’, ‘***matfile/Feb\_CHDIC.mat***’. They can plot Figure 9 in manuscript by operating ‘***Plot3D\_SigmaLayer\_PRE\_Burial\_1.m***’,’ ***Plot3D\_SigmaLayer\_PRE\_Burial\_2.m***’, ‘***Plot3D\_SigmaLayer\_PRE\_Burial\_3.m***’, ‘***Plot3D\_SigmaLayer\_PRE\_Burial\_4.m***’ in MATLAB.
* Text S11.
* In ‘***Fig10(a)to(d).xlsx***’, sheet ’***Fig 10(a)***’, monthly averaged fluxes of RPOC, POC, RDOC, DOC transported through four boundaries of PRE are listed. An Origin Code named ‘***Fig10(a)\_plot.otpu***’ can be used to plot Figure 10 (a) in manuscript. In ‘***Fig10(a)to(d).xlsx***’, sheet ’***Fig 10(b,c)***’, monthly averaged fluxes of river input, estuary output and net loss RPOC, POC, RDOC, DOC are listed. An Origin Code named ‘***Fig10(b,c)\_plot.otpu***’ can be used to plot Figure 10 (b, c) in manuscript. In ‘***Fig10(a)to(d).xlsx***’, sheet ’***Fig 10(d)***’, monthly averaged river discharge, south-west wind direction frequency and north-east wind direction frequency of PRE are listed. An Origin Code named ‘***Fig10(d)Riverdischarge.opju***’ can be used to plot Figure 10 (d) in manuscript.
* Text S12.
* MATLAB source code for calculating simulated pCO2 and ASF in table 2. Model simulated August and February pCO2 and ASF are saved in mat format. ‘***ASFandpCO2.m***’ can be directly used to get the results listed in table 2.
* Text S13.
* Boundary conditions for DIC and TA at eight outlets and open sea.
* Text S14.
* Correlation Coefficients between carbon materials and salinity.