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For a long period, the dispute about the effects of the Three Gorges Dam (TGD) on the Yangtze River and East China Sea never stops. The results of recent studies emphasized the variation of nutrients and further effect on the coastal ecosystem based on limited observations, which may mislead our understanding of real situation in some extent. In our case, we use continuous observation data from anchor station located at the lower reach to obtain temporal variation, at the same time, we also collected the sample from the whole drainage basin to present spatial distribution of various parameters, such as nutrients, POC, DOC, stable isotopes and biomarkers etc. The obtained knowledge will be helpful to elucidate the effect of TGD on the biogeochemistry of Yangtze River and adjacent East China Sea.

The comparison of monthly water discharge at Datong in 2001-2005 does not show significant change before and after impoundment of TGD. The concentration of dissolved nutrients showed a slight increase except Si from 1997 to 2005. The N/P ratio also has similar tendency but not so significant change. DOC concentrations averaged 105 M C in 1997 and 108 M C in 2003 in the main stream. POC% ranged from 0.5% to 2.5%. The dominant vegetation in the tributaries are C3 plants. The predominant source of organic matter in the river is from the soil. The increase of DOC flux is observed from 2 10^6-3 10^6 t/yr in 1960-80 to 10 10^6-12 10^6 t/yr around 2000. POC fluxes decreased from > 5 10^6 t/yr in 1960-80 to about 2 10^6 t/yr in 2000. Such fluctuation could be explained by the decrease of sediment load in the Yangtze, which is partly trapped by TGD.

In extreme drought year of 2006, The POC content in suspended particles (POC%) are particularly high in the middle and lower reaches of the Changjiang drain basin, which may be derived from the primary production of the phytoplankton in river. A dramatic drop of the POC fluxes as well as a sharp increase in the ratios of DOC fluxes to POC fluxes was showed during the observed period after the completing of Three-Gorges Dam, which could have significant effects on the trapping and degradation of POC. Elevated OC%, decreased lignin yields and higher degradation state were found in the SPM of 2006. The differences could be explained by the changes of grain sizes of SPM and particle compositions with different size-fraction, which was caused by less water discharge and sediment load in 2006. So the hydrodynamic sorting was a major factor controlling the transport of TOC in Changjiang. Climate change such as precipitation and dam building maybe were primary drivers behind. Under such extraordinary drought in 2006, the particulate lignin flux entering ECS decreased 1.5 times than that in 2003. The great reduction of TOC would great influence the carbon cycle in Yangtze-ECS region.

Application of linear programming method based on response field in the total load allocation

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Total load control is an important strategy of water pollution control in china. Most of the problems of total load allocation can be regarded as optimization of the allocation target under some constraints, so they are the optimization problems with constraints. When the linear programming method based on response filed is adopted to solve the total load allocation problems, the concept is clear, the computation is rapid, and the optimum value is sure to be found. It is much superior to the optimization method based on nonlinear methodology. The linear programming method based on response filed was adopted to calculate the total load allocation in the Yangtz estuary and ambient marine area, it shows that the linear programming method is probably the sole method to seek the optimum value because the time to complete single hydrological and water quality calculation reaches to the temporal level of hours.

A numerical modeling study of nutrient budget in a shallow water system Lynnhaven River

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By quantifying nutrient inputs and transformations in estuaries, a nutrient budget is an important scientific and economic implement to assess potential effects of estuarine systems responses in terms of all sources and sinks. There