



Two-dimensional numerical modelling of dissolved and particulate pollutant transport in the Three Gorges Reservoir

W Hu (1), L-J Wang (2), H Chen (2), A Holbach (1), B-H Zheng (2), S Norra (1,3), and B Westrich (4)

(1) Institute of Mineralogy and Geochemistry (IMG), Karlsruhe Institute of Technology (KIT), Adenauerring 20b, 76131 Karlsruhe, Germany, (2) Chinese Research Academy of Environmental Sciences (CRAES), No.8, Dayangfang, Anwai Beiyuan, Chaoyang District, Beijing, China, (3) Institute of Geography and Geoecology (IfGG), Karlsruhe Institute of Technology (KIT), Kaiserstr. 12, 76128 Karlsruhe, Germany, (4) Institute of Hydraulic Engineering (IWS), University of Stuttgart, Pfaffenwaldring 35, 70569 Stuttgart, Germany

After impoundment of the Three Gorges Reservoir (TGR) in 2003, hydrological regimes of the Yangtze River, upstream and downstream of the Three Gorges Dam, have been changed enormously, leading to significant environmental, ecological and social impacts. Nutrients and pollutants from agriculture, industry and municipalities are of concern due to their impact on the aquatic environment and hence, transport behavior of sediment associated pollutants must be modeled and analyzed to establish a sustainable water reservoir management.

As part of the Chinese-German Yangtze-Project [1], two-dimensional numerical model TELEMAC is applied to study the dissolved and particulate pollutant transport at different locations of concern in the TGR. In-situ measurement campaigns for morphology and water quality data using mobile measuring device (MINIBAT) are carried out to provide detailed information for the different water bodies at different time. Additional morphological data are taken from cross-section profiles in the literature, the digital elevation model (DEM) of Shuttle Radar Topography Mission (SRTM) from CGIAR. Daily and hourly water level and discharge, suspended sediment concentration and pollutant loads are obtained from the authorities and extracted from literature. The model describes the spatial-temporal flow field, transport and dispersion of sediment associated pollutants with emphasis on the dynamic interaction and mutual influence of the river Yangtze, its major tributaries and adjacent lagoon-like dead water bodies due to the 30 meter annual reservoir water level fluctuation. Since algae bloom, especially in the tributaries and side arms of the mainstream, is one of the major issues occurred after 2003, the results of the numerical modeling together with the statistical analysis of the MINIBAT measurements are used for the eutrophication status analysis.

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References

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