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Variations of Hydrological Regime in the Jingjiang Reach of the Yangtze River after Operation of the Three Gorges Project

Y-H Zhu (1), X-H Guo (1), W Hu (2), G Qu (1), and G-S He (1)

(1) Changjiang River Scientific Research Institute (CRSRI), Huangpu Street 23, 430010, Wuhan, China. Email: yhzhu75@yahoo.com, (2) Institute of Mineralogy and Geochemistry (IMG), Karlsruhe Institute of Technology (KIT), Adenauerring 20b, 76131 Karlsruhe, Germany. Email: wei.hu@kit.edu

The Three Gorges Project (TGP) of China has been in operation since 2003. In October 2010 the water level at the Three Gorges Dam (TGD) rose to the normal storage water level of 175 m, indicting the realization of the integrated targets of the TGP in terms of flood protection, electricity generation, navigation, etc. The operation of the TGP has changed the flow and sediment conditions (i.e. the hydrological regime) of the river channel downstream. The 347.2 km Jingjiang Reach, part of the middle reach of the Yangtze River, is very closely dowstream of the TGD and is affected relatively earlier and significant by the project operation. Based on the measured prototype hydrological data from 1950 to 2010, variations of the hydrological regime in the Jingjiang Reach after operation of the TGP are analyzed. The results showing that the runoff of the river is of no clear variation tendency during the last 60 years. However, after the operation of the TGP, the sediment concentration of the flow in the Jingjiang Reach decreased by 75%; coarsening of the suspended load and bed load in the river is evident; the water level at the same flow rate has a tendency to decline, with the margin of decline of the upper Jingjiang Reach being larger than that of the lower Reach, and that at smaller flow rate being larger than at larger flow rate. The flow and sediment diversion from the Yangtze River to the Dongting Lake via the three outlets also has a tendency to decrease; the degree of dcrease of the sediment diversion is much larger than that of the flow diversion. After the operation of the TGP, except the 2006 is a special low flow year, in which the decrease of the ratios of flow and sediment diversion are relatively large, the ratios are of no clear unidirectional variation tendency in the other years. Due to the operation of the TGP, within one year, the flow diversion in October is decreased comparing with that before the operation.

Keywords:
The Three Gorges Project, the Yangtze River, the Jingjiang Reach, hydrological regime