

## **Application of GSTARS3 to Xiaolangdi Reservoir Sedimentation and Flushing**

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**Abstract.** Xiaolangdi Reservoir is located at 40km north of Loyang and 128km downstream of the Sanmenxia Reservoir on the main stem of the Yellow River. Due to high sediment load, Xiaolangdi Reservoir should be operated with yearly draw down flushing to recover reservoir capacity. Near the reservoir delta, 20 ~ 30 m of aggradation occurs in a year due to high sediment input from the upstream Sanmenxia dam and the large amount of deposited sediment in the reservoir are scoured out by a draw down flushing. Deposition and scour pattern occurs periodically in the reservoir. GSTARS3 model has been applied to river and reservoir morphologic change studies and the results were reasonable for most cases. However, due to complexity of Xiaolangdi Reservoir sedimentation and flushing mechanism, some of assumptions made for GSTARS3 original version are no longer valid. Therefore, GSTARS3 model was modified to be applicable to Xiaolangdi Reservoir sedimentation. Non-equilibrium sediment transport equation was used to consider time and spatial delay effects of sediment entrapment and deposition. Unit stream power equation for hyper-concentrated sediment flows was used to compute sediment transport capacity. The simulated results with the modified GSTARS3 model are in good agreement with measured bed profiles, channel geometry, bed material size distribution, and flushed sediment volume.