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Study on the complexity reduction of the input data for 3D numerical modeling of the hydrodynamics and sediment transport in a Brazilian reservoir

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The importance of water reservoirs has been increasing with population growth and the need of water supply. Understanding the environmental processes in these water bodies is essential for the correct management performed by stakeholders. In this context, numerical models appear as a great tool for simulating hydrodynamics and sediment related processes and presenting them in way easy to understand. However, a wide range of data is required as input for a good performance of these models and its quality have a direct influence on the simulations results. Long term high resolution input data is the ideal case for simulations, but in developing countries this is usually not the case due to the absence of measured or simulated data to be used as input. The main objective of this research is to understand how the reduction of input data resolution and/or use of wrong datasets may influence final results of the processes taking place in reservoirs regarding the hydrodynamics, water temperature and sedimentation. Passaúna reservoir located in Curitiba, Brazil, is used as a study case with high resolution measured and simulated datasets which will be implemented as input data for numerical simulations using Delft3D. For the simulation of the horizontal velocities and the water temperature, parameters related to heat flux calculations showed the strongest influences on the results. A specific important parameter was the secchi depth, which is a single value used as input data and shows great differences for the reproduction of periods with mixed or stratified water column. On the other hand, sediment simulations showed sensitivity to the main river flow discharge temporal resolution and its corresponding sediment concentrations. Reanalysis data used as heat flux parameters and wind presented great differences from the use of measured datasets, but in cases where measured data is not available, this source may be the best choice for users.