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Interactive comment on "Real-time reservoir flood control operation enhanced by data assimilation" *by* Jingwen Zhang et al.

Anonymous Referee #2

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This manuscript presents a method called ROMEDA which integrates simulation, optimization and data assimilation to operate a reservoir in real-time. The main contribution is the development of a human-machine interactive method for real-time reservoir operation. Actually, especially for a complex operational problem, an operator uses a decision support system as a tool to find the possible optimal solutions and chooses a solution based on his/her experience for the actual implementation. Thus, it is not a novel concept in the field of the decision support systems. The specific comments are as follows:

Simulation model

As the Saint-Venant equations are used to simulate the stream flow along a long channel (658 km), it is required to explain how to consider the inflow into each cross-section

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from a large catchment (5600 sq-km). Instead, inflow hydrographs at the reservoir are shown in Figure 7 and 8.

Reservoir routing or flood routing is usually used in the reservoir operation study. This study uses unsteady flow routing for a long and narrow reservoir. The reason to use unsteady flow routing is described in Line 308-311. As the reservoir releases are controlled for two objectives (one control point), the simulation model could be simplified by using a mass balance equation and the area-capacity curve.

Optimization model

As two objectives are considered, there may be more than a single optimal solution and how to choose a solution in PADDS should be explained.

ROMEDA

In general, an optimization-simulation approach is used to operate a reservoir or a reservoir system and the operators choose a solution based on their experiences when there exists a number of possible optimal solutions. ROMEDA highlights the effectiveness of the human-machine interactive method for real-time reservoir operation. It is demonstrated with a way that the operator accepts or rejects the model result according to the storage threshold. This demonstration is very sample and does not present a human-machine interaction practically.

Case study

It is very strange for me to see a bed-profile of a natural river behind a reservoir. The river bed levels are up and down in many places and the bed level is very close to -50 m between section 10 and 11 (Figure 6). Therefore, a brief explanation is required to understand the bed-profile of this river. The unit of the longitudinal distance (km) should be mentioned in Figure 6. In addition, the area-capacity curve should be provided to show how the water stores in on-channel reservoir.

I have no major issues with the results, discussions and conclusions. However, the

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most important problem is that ROMEDA does not involve a novel formulation for real-time operation of a reservoir. It will be more interesting to the readers if the authors emphasize on how the decision-maker's experience or behavior can be effectively integrated into a decision-support system to solve a real-time control problem.

Therefore, I suggest that a major revision is required to improve the methodology and to investigate the new experiment for further consideration.

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