

Interactive comment on “Operational river discharge forecasting in poorly gauged basins: the Kavango River Basin case study” by P. Bauer-Gottwein et al.

Anonymous Referee #2

Received and published: 6 November 2014

Summary

This study addressed a very interesting topic since it presents an operational river discharge forecasting system. This system employs meteorological forcing data from a weather forecast model (NOAA-GFS) and uses a data assimilation technique to update river discharge in real time. Although the runoff routing scheme (i.e., the Muskingum routing) and the data assimilation approach (i.e., the Kalman filter) are very simple, this study made a good attempt to combine weather forecasting output and data assimilation for flood forecasting. This operational river discharge forecasting system is successfully applied in the Kavango River, and shows the potential to assimilate remotely

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sensed observations. However, the manuscript may need more detailed description about forecasting experiment setups and parameter estimation.

Therefore, I suggest this paper could be published after a few minor revisions.

Comments

(1) The authors reported results for the open-loop run without assimilation, the assimilation run, and the 1–7 day ahead forecasts. I think these scenarios use different meteorological forcing data. Please correct if I miss some information. In the scenarios of 1–7 day ahead forecasts, Are the discharge observations from Rundu assimilated in real time in the forecasting system? Is the simulated discharge at the outlets of all 12 subbasins updated in the data assimilation?

(2) Table 4 shows performance indicators of the forecasting system. Did you set the other scenarios of removing some observations in the data assimilation? I invite the authors present some more information about these scenarios.

(3) Real-time discharge observations are assimilated into the Muskingum routing scheme, and Kalman filter is used in the data assimilation. Certainly, this is very simple and efficiency. But the authors also state that the TIGER-NET project has the plan of using satellite earth observations (e.g., soil moisture), not only the in-situ observations, so the routing scheme and the Kalman filter may not meet such a big plan.

(4) There are three parameters in the Muskingum scheme (MAK_X, MSK_CO1 and MSK_CO2, see the routing process in SWAT). They should be prescribed or estimated before simulations, because they may be influential to runoff routing in data assimilation. But the manuscript does not give any information about their estimates in Table 1.

(5) The original meteorological forcing data from NOAA-GFS are six hourly, but the SWAT model is run at a daily time step. Did you integrate the six hourly data to daily?

(6) I found the computation of persistence index (PI) in Eq. (6) is different from the

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expression in Bennett et al., 2013). Please check it. What is the latest available observation (Qlast) ?

(7) I suggest all figures, especially Figures 5, 6, 7, 8 and 9, should be redrawn before submission. The size of the text in figures looks too small.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 11071, 2014.

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