Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "A past discharges assimilation system for ensemble streamflow forecasts over France – Part 1: Description and validation of the assimilation system" *by* G. Thirel et al.

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1) Some references have been added. (a) J. R. Miller, L. G. Russel and G. Caliri, Continental scale river flow in climate models, J. Clim., 7, 914, 928, 1994 R. Benoit, P. Pellerin, N. Kouwen, H. Ritchie, N. Donaldson, P. Joe and E. D. Soudis, Toward the use of coupled atmospheric and hydrologic models at regional scale, Mon. Weather

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Interactive Discussion

Discussion Paper

Rev., 128, 1681-1706, 2000 F. Habets, A. Boone, J. L. Champeau, P. Etchevers, E. Leblois, E. Ledoux, P. Lemoigne, E. Martin, S. Morel, J. Noilhan, P. Quintana Segu'Äś, F. Rousset-Regimbeau and P. Viennot, The SAFRAN-ISBAMODCOU hydrometeorological model applied over France, Journal of Geophysical Research, 113, D06113, doi:10.1029/2007JD008548, 2008 (b) M. Ghil and P. Malanotte-Rizzoli, Data assimilation in meteorology and oceanography, Adv. Geophys., 33, 141-266, 1991

2) It would be technically possible to use the discharge observations in order to modify the aquifer levels over longer assimilation windows. But the link between discharge and aquifer levels might be highly underdetermined. This point can be investigated in the future, depending on the impact of the assimilation of water levels on discharges. However, we would like to assimilate the observed piezometric heads to improve the initial state of the groundwater.

3) SIM has a very small number of free parameters (such as the subgrid drainage, or parameters for the exponential profile of saturated hydraulic conductivity, or the exchange coefficient between rivers and aquifer layers). Several important changes are being done in SIM now (new physiography, soil maps), a retuning will be done in the future.

4) It seems to us that keeping unchanged the adjustment factor (increment) over two days is not appropriate. A way to evaluate the impact of the assimilation over two days can be to run the assimilation every two days with a one day window. This test has not been performed.

5) We don't have basins where snowmelt governs runoff generation in spring, because these basins contain hydroelectric dams that are not accounted for in SIM, and so we decided not to assimilate the observed discharges of these basins. One can guess that because soil moisture is not anymore a relevant variable for discharge production for such cases, the assimilation system becomes less efficient. To modify the snow water equivalent variable in the model would be more efficient.

Technical Issues: The quality of Figure 4 and 6 should be improved. The difference in grey-level between IS5/IS6 and REF is not very clear. Response: These figures will be published with colors, the curves will easily be seen. Legend and labels of figure 6 have been improved.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 2413, 2010.

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