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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Evaluating robustness of dynamic reservoir management under diverse climatic uncertainties: Application to the Boryeong Reservoir in South Korea" *by* Kuk-Hyun Ahn and Young-Il Moon

Anonymous Referee #1

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This paper has presented a framework for the evaluation of reservoir management using streamflow forecasts. The framework consists of a dynamic operation model of water transfer, a weather generator and a hydrologic model for streamflow simulation, and a module to assess system robustness. To demonstrate the use of the framework, a case study of the Geum River Basin in South Korea is presented. In general, the methods and results are clearly presented.

There are overall five comments for further improvements of the paper:

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First of all, the proposed framework is limited to annual operation according to Eqs. (1) and (2) (Lines 200 to 201, Page 9). However, many reservoirs, in particular important ones, have large storage capacity for multi-annual regulation. In other words, large reservoirs can carry-over water from wet years to dry years. For such reservoirs, initial- and ending-storages are important issues for reservoir operation. Initial storage represents water saved from preceding years, while ending storage water saved for subsequent years. It is noted that the reservoir operation model in this paper does not account for the effects of initial- and ending-storages.

Secondly, the proposed framework deals with water transfer but does not explicitly take into consideration the difference in hydrological conditions of the source and sink of water resources.

Thirdly, there is a gap between climate forecasts and climate projections. Climate forecasts are mainly at the monthly and seasonal scales (https://www.cpc.ncep.noaa.gov/soilmst/gcmfcst_jh.html), while climate change projections are at the decadal scale (Lines 254 to 265, Page 12). Reading through the paper, it is observed that what the weather generator and hydrologic model generate are actually “streamflow projections”, rather than “streamflow forecasts”. Please clarify this issue.

Fourthly, the effectiveness of the hydrological model, i.e., SAC-SMA, ought to be thoroughly examined. Its effectiveness plays an important part in determining whether the scenarios generated by this model reflect actual streamflow conditions of the river basin under investigation.

Fifthly, there is a cascade of modelling uncertainties as the framework involves climate projections, weather generator, and hydrological modelling. Can the overall uncertainty to some extent be quantified?

There are also two minor comments:

(1) A flowchart illustrating the procedure of the methods would be helpful to make the proposed framework more accessible.

(2) The introduction is not clear as it mixes climate forecasts with climate change projections.

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