

# ***Interactive comment on* “On inclusion of water resource management in Earth System models – Part 2: Representation of water supply and allocation and opportunities for improved modeling” by A. Nazemi and H. S. Wheater**

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## General Comments

The authors describe water supply and allocation issues, modelling approaches and current applications in large-scale models. Challenges and opportunities for improving the representation of water resource management in large-scale models are also presented. Overall, I found the paper to be very useful in summarizing these points.

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Although the paper is focused on water supply and allocation to meet water demands, I feel that the paper would benefit from some description of water "over-supply" and how humans alter the landscape to manage too much water. Reservoirs are often an important component of flood management and are not always built solely for meeting water demands. Voisin et al. (2013) clearly differentiate between reservoirs for irrigation or flood control and a similar distinction would help to make this paper more complete. In addition, landscapes are often altered to facilitate agricultural drainage, either by creating surface drainage channels or installing underground tile-drainage systems. These agricultural drainage systems have important implications for the terrestrial water balance over large areas (Schottler et al, 2013).

It is worth noting the possibility that agricultural drainage could be parameterized in existing models. It would not be necessary to provide a great level of detail regarding water over-supply, but a more formal recognition of how humans alter the landscape as a result of these issues would help the paper to be more comprehensive.

#### References

Voisin, N., H. Li, D. Ward, M. Huang, M. Wigmosta, and L. R. Leung. "On an improved sub-regional water resources management representation for integration into earth system models." *Hydrology and Earth System Sciences* 17, no. 9 (2013): 3605-3622.

Schottler, Shawn P., Jason Ulrich, Patrick Belmont, Richard Moore, J. Lauer, Daniel R. Engstrom, and James E. Almendinger. "Twentieth century agricultural drainage creates more erosive rivers." *Hydrological Processes* 28, no. 4 (2014): 1951-1961.

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