Hydrology and
Earth System
Sciences
Open Access
Discussions

Interactive comment on "Integrated water system simulation by considering hydrological and biogeochemical processes: model development, parameter sensitivity and autocalibration" *by* Y. Y. Zhang et al.

A. Slaughter (Referee)

a.slaughter@ru.ac.za

Received and published: 19 August 2015

Abstract Some errors with Grammar: Line 2 of the abstract: 'crises' plural. Line 6 of the abstract: use 'obtained' rather than 'gotten'. Line 21 of the abstract: NH4 is ammonium, not ammonia. Introduction Change first line to: Severe water crises are global issues that have emerged as a consequence of the rapid development of the social economy, and include flooding, water shortages, water pollution and ecological degradation. Line 11: The integrated river basin management paradigm... Line

16 page 5001: 'As a result, these models generally show satisfactory performance in simulating major hydrological processes.' Line 25 page 5001: You mention QUAL2E but not QUAL2K which is the updated version of QUAL2E. In the introduction, it may be worth mentioning that there is a conflict of temporal scales when considering an integrated water system model: It is common for hydrology and flow to be simulated at a monthly time scale, as in most cases, this is considered a sufficient resolution for water resource planning and management. However, water quality must be simulated at a daily time scale or less, as water quality is affected by transient flow events such as rainfall-runoff events. There are some major issues with grammar in the introduction Materials and methods A better description of the parameter analysis tool is required. Is this a parameter estimation tool? How does it work? You refer to nonpoint pollutant sources. Why not just call them diffuse sources? It is not clear how baseflow separation is achieved: i.e. how surface flow, interflow and baseflow are calculated. You say: 'The interflow and baseflow are considered as linear relationships between storage and outflow', but I am not sure what this means. Is there a specific method that was used to separate flow fractions? I have done this in the past using a statistical baseflow separation method. You mention various decomposition, denitrification and nitrification processes simulated. How do you account for the temperature effects on the rates of these processes? Do you simulate or read in temperature (both air and water)? In the WQM what is the time resolution at which water quality is simulated? You describe using QUAL2E for water quality in rivers, but why not QUAL2K which is the updated model? Not enough description is provided of the method for representing water quality variable fate in dams. Processes affecting water quality in dams and lakes are very complicated and must consider stratification, sedimentation and algal uptake. In that respect, how does the model account for uptake of nutrients by algae and macrophytes? In regards to landuse units considered, does agriculture consider rain-fed agriculture as opposed to irrigated agriculture, or is this not relevant to the catchment studied? In regards to parameter analysis and calibration, it would be good to discuss equifinality as well as the need for independent calibration and valida-

tion (confirmation) data sets. This paper requires editing by a professional copy editor. There are just too many grammatical mistakes. What concerns me about this paper is the description of a large model has been condensed into one publication. Consequently, conceptual descriptions of the model components are too brief and don't provide sufficient information. A common strategy for publication of this sort of work is to write several publications, with later publications building on the earlier publications. So for example, one could start with a discussion of the hydrological modelling, and in a later publication deal with the water quality modelling within the same catchment.