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Hydrology and Earth System Sciences Discussions

Interactive comment on "Combining satellite radar altimetry, SAR surface soil moisture and GRACE total storage changes for model calibration and validation in a large ungauged catchment" *by* C. Milzow et al.

Anonymous Referee #1

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In general terms the paper represents a sound contribution to the scientific and practical use of hydrological models in poorly gauged catchments. However, there are several issues referred to in the paper that need some attention.

To begin with, the title and the some parts of the text suggest that the Okavango is an ungauged catchment, when it clearly is not. It may be poorly gauged, particularly in the case of rainfall data, but it is certainly not ungauged. This part of the paper (and the title) needs to be modified accordingly. The authors only make passing reference to

the historical data that were available during the 1960s and 1970s. There were many more flow and rain gauges available at that time and if their objective was to establish a hydrological model that properly reflects the physical hydrology of the catchment then I am surprised that they did not make use of these data to improve the confidence in the spatial variation of their model parameter values.

The latter point introduces an issue that I have with the objectives of the study (compared to previous model studies in the basin) relative to the methods used and the interpretation of the results. The authors opt for a daily model that they claim has a more physically-based representation of the soil layers. However, they apply the model at such a coarse scale that the physical basis of the model would be over-ridden by the large spatial variations in soil propeties and other factors affecting hydrological response. I therefore fail to see how this type of approach would address the stated deficiencies of previous modelling approaches (see 4th paragraph of section 2 - 'insufficient in terms of simulated processes'). While the SWAT model may contain all the algorithms required to undergo quite physically-based modelling (more so than the Pitman model used in previous studies), I would question whether it can be applied in a truly physically-based way in a catchment that is as large and lacking in real ground data as the Okavango. The argument that the use of SWAT to assess the impacts of land-use changes will give better results than other models is therefore questionable. This point is also not referred to by the authors in the discussion after the results are presented. Why use a complex daily model if the main assessment of the results is based on the quality of the simulations of the distribution of mean monthly runoff as presented in Figure 7?

There are a number of places in the paper where the remore sensing data are referred to as 'observational' data of such as discharge, water levels and total storage. While it cannot be denied that they are observational data, they are not direct observations of the hydrological information.

I would agree with the overall conclusion that the main problem with simulating the

present day and future hydrology of the Okavango lies in the accurate estimation of the input rainfall (and its spatial variation). This will affect the results of applying any model, whether physically-based or very simple. Many of the other issues raised in the paper about remote sensing observations, model selection, parameter sensitivity, etc. therefore become secondary considerations for the effective management of water resources in the basin.

Minor corrections: Page 9138, Line 1: '..are a little too steep..' Page 9140, Line 11: ' ..reason for this is erroneous..' Figure 3: I think 'uncertitude' should be replaced by 'uncertainty'

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 9123, 2010.