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Hydrology and Earth System Sciences Discussions

Interactive comment on "Monitoring temporary ponds dynamics in arid areas with remote sensing and spatial modelling" *by* V. Soti et al.

Anonymous Referee #3

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Dear authors,

Please find here below my comments on your manuscript entitled 'Monitoring temporary ponds dynamics in arid areas with remote sensing and spatial modelling'.

Content/subject/title : The paper investigates the potential for an approach combining remote sensing of both rainfall and surface water and hydrological modelling to assess the spatio-temporal variability of ponds in the Ferlo region (Senegal). The structure of the manuscript consists of an introduction that sets the overall framework of the study in an area with obvious data scarcity, a section that describes the study area and available data sets (meteorological, hydrological, topographic, remote sensing images), a methodology section where a daily water balance model and a volume-area-depth model are described, results and discussion sections, as well as a general conclusion.

The title of the paper appeared somewhat misleading, in the sense that ponds dynamics are said to be monitored a.o. via remote sensing and spatial modelling. I would suggest to clearly distinguish between monitoring and modelling. As I understand, the main issue in this paper is the data scarcity, which calls for the use of innovative approaches that will in the end allow for a better quantitative and qualitative management of water resources in the area under investigation. The title should thus highlight the potential for remote sensing and hydrologic modelling to assess the spatio-temporal dynamics of ponds in the Ferlo Region (Senegal).

Study area/data/methodology : While the interest of the study is quite obvious in the area under investigation, the description and discussion of the available data sets appears to be somewhat too superficial at this stage. The authors rely for example on rainfall measurements obtained both through ground based measurements and satellite-borne remote sensing (TRMM). It would be very useful to further discuss the accuracy of those measurements, i.e. the scarcity of the raingauges, the precision of the TRMM data, differences between the two measurement series, etc. One interesting information in this context is also the spatial variability in the area of interest ; some additional information on that would definitely be useful. Most important would be a description of the type of rainfall events that occur in the region. The authors refer to 'usual' rainfall events, without clearly stating what such a standard rainfall event represents in terms of intensity, total precipitation, return period, etc. When stating that 'we assumed that the rainfall is uniformly distributed over the study area', the authors need to explain why this is the case in their opinion. More precise information on rainfall measurements would also be of highest interest for a discussion on the hydrological conditions that prevail in the region of interest. What are the dominating hydrological processes ? This would in turn serve in the definition and description of the concept retained for the hydrologic model (a difference being made between runoff fed and solely rainfall fed ponds). The paper could certainly benefit from a more detailed discussion on the accuracy of the datasets that are available (meteorological, hydrological, DEM, etc.), given both the scarcity of the available datasets and the statement that 'the quality of

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the catchment area delineation is very important for the model'. A general discussion on data uncertainty/resolution would certainly shed some light on the choices made by the authors, e.g. for the determination of pond extensions or water height estimations. The discussion of the results would also be much more reliable. Nash coefficient values do not say much about the real model performance. There is no discussion on either data uncertainty, model parameter sensitivity, etc. A final remark concerns the extraction of the pond maps from the two Quickbird images. There is no information on how this extraction is done ; I guess there is more that just the images that is required (e.g. in combination with a DEM).

Language : The overall quality of the English language is satisfactory, even though some improvement could certainly be expected for a revised version of the manuscript (e.g. by the assistance from a native English speaker).

General remarks : In section 2.1 the authors refer to a network of ponds. Since it is also stated that they are not connected, it would probably be more appropriate to refer to an ensemble of ponds. In section 2.4, I do not understand what is meant by 'with a total station for two ponds'. It would be good to have some additional argumentation on the 'arbitrarily' fixed runoff surface in section 3.2.2. Reference Diop et al. (1968) appears in the text (introduction), but not in the ref. list. Reference Puech et al. (1998) in the introduction corresponds probably to Puech & Ousmane (1998) in the reference list. Reference Hayashi et al. (2000) in section 3.1.2 corresponds to Hayashi & Van der Kamp (2000) according to the reference list (idem for section 5). Reference Nilsson (2009) appears in section 3.2.1 but not in the reference list.

Conclusion : Given on the remarks and comments made above, the manuscript can be stated as having a good scientific significance, i.e. it represents a truly useful and interesting contribution in terms of applying modern approaches (i.e. remote sensing) to areas with only little available datasets. At this stage, the scientific quality of the paper certainly needs to be largely improved. Dealing with reduced datasets always is a considerable challenge and requires an even more careful appreciation of its quality

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and relevance for the studied questions. The overall presentation is of decent quality, but will certainly gain from a review through a native English speaker.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 103, 2010.