**Hydrology and
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Discussions**

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Interactive comment on "SWAT use of gridded observations for simulating runoff – a Vietnam river basin study" *by* M. T. Vu et al.

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REFEREE #1 COMMENTS Thank you very much for your very detail and constructive comment. We have tried our best to reply to your questions as below 1. Before describing their work, the authors should definitely discuss and cite additional relevant studies in the introduction. Especially, they have to present how the 6 different data-sets have been used in their region in the past and what were the conclusions derived from their use (if any). As I mentioned above, the interesting point in the study is the comparison between the different rainfall datasets and the stations data as well as between the different hydrological catchment responses caused by their use with SWAT. Therefore, this point should be clearer in the introduction and emphasis should be given on what

differentiates this work from other similar works.

Authors' Response:

Changes have been added accordingly in Section 1

2. Regarding the gridded rainfall data: Can the authors cite other works which have used the 6-different source data-sets (or some of them) either in their region or elsewhere? In section 4 for example, they discuss the similarities/differences between the gridded data and the measured rainfall. Are there other studies which evaluate the accuracy of the gridded rainfall data and agree or disagree with the findings of this paper?

Authors' Response: Added accordingly. Few case studies have been added and cited for satellite rainfall data. Ashraf et al., (2011) has done some comparison work between gridded observation satellite data in term of spatial and temporal distributions and some correction has been made in order to generalize the difference between station and gridded data. Overall, that study also agrees with the findings of this paper to the end that gridded data could be used to replace station data over sparse data area.

3. Regarding the SWAT model and its use on basin hydrology: The authors provide some related works (all from HESS) but they do not adequately support their choice of using this model in their study. A more thorough description of SWAT capability in simulating flows is needed in the introduction. Apart from the studies mentioned, there are many SWAT papers in other journals, which focus on the quality of rainfall information (source, density, time-step etc) and its importance in SWAT hydrological predictions. Those studies could be more relevant to the work presented in this paper. A journal with such studies is for example the 'Hydrological Processes' journal, where the largest number of SWAT papers is published each year.

Authors' Response: Some more references (from Hydrological Processes) have been cited. SWAT is a semi-distributed rainfall runoff model and has been widely used by

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the hydrological modeling community in generating runoff, sedimentation as well as water quality. Our recent that has been published in HP, also been cited. 4. Regarding Section 3 'the SWAT modeling presentation of the catchment in Vietnam': The authors follow an appropriate approach to model their catchment. They firstly identify the most sensitive parameters and then, they calibrate the model using the auto-calibration tool. However, I think that it is always interesting for the reader to have an insight into the 'best' values identified by the algorithm, which reveal the catchment behavior. Thus, an additional table could be included summarizing the autocalibration results (percentage or absolute changes) along with the initial values of the 11 most sensitive parameters. Also, what was the catchment division in this study?

How many sub-basins (and HRUs) were created? Actually, this plays an important role on the total rainfall amount falling on the basin (calculated by the model according to the proximity of each subbasin to each station). Therefore, the authors should justify their preferences and explain if the catchment division is appropriate for the rainfall data used in the study.

Authors' Response: Updated Table 2 accordingly. 9 sub-basins have been delineated with single dominant HRUs per sub-basin. Updated in section 2.1

5. In the introduction, page 10682 - lines 10-20 of the discussion paper, I cannot understand why the weather generator of SWAT (a distribution code as the authors say) is the reason that interpolation is needed. As I understand, interpolation is done in this paper in order to generate rainfall values from the gridded data for the specific locations of the 3 rain-gauges. The weather generator uses statistical averages (calculated by the user and assigned to the model) of each station to produce time-series data for the same station (and only this station). Then, these data are assigned to the closest sub-basins, as exactly happens when completed time-series exist. So, even if the sentence was accurate (it is not), I cannot really understand how it could be connected to the following statements. The reason that interpolation is done should be very clear and a justification should be provided on why the authors follow this approach and do not

directly use the original gridded data instead of using them just for transferring data to the 3 rain-gauge locations. I think that the direct use of gridded data (more locations – more dense information) seems to be a more rational approach to test model performance and compare it with its performance when only the measured data of the 3 stations are used.

Authors' Response:

The comment is right. In fact, the best way to input rainfall from gridded dataset to the hydrology model is the direct use. However, unlike other models (like MIKE family with the use of dfs2 dataset), SWAT is a semi-distributed model which inputs precipitation through its rain gauge network then uses its own method of interpolation to calculate the area average rainfall. Hence, in order to make an input for SWAT model, we need to find the way to compensate this which is the use of bilinear interpolation from gridded to local data.

From gridded dataset, there are 2 typical ways to insert the time-series data into SWAT model: (1) based on spatial distribution of gridded model (27km x 27km TRMM for example) the whole catchment might be covered by 2560 km2/(27x27) = 3.5 grid boxes. Each grid box will have one time-series value located at its center and assigned to the nearest sub-basins as a surrogate rain gauge (see Ashraf et al., 2011). (2) Bilinearly interpolation to rain gauge location (3 also in this case) then use the built in SWAT distribution code. The latter has been applied because we also want to compare the different rainfall datasets from gridded data with data observed at the station. This, infact, could be recommended to SWAT modellers to make use of the input gridded data. 6. In section 2.1 (study area) the authors say that runoff prediction is very important for the agricultural economy of the study region. In general, one could say that this is always true but can the authors better explain and support this statement? Why is surface water important? Is agriculture irrigated in the region? Precipitation is very high (up to 3000 mm/y), so is irrigation really needed? On the other hand, river floods may be of concern in the area. Explain in detail the situation in the region;

especially justify why predicting rainfall-runoff is 'extremely' important, as written in lines 21-22 of page 10683.

Authors' Response: Changed accordingly in section 2.1

7. Firstly, I think that the last 2 paragraphs of the introduction form a short summary of the whole paper. I would delete everything after line 20 of page 10682 and I would only keep a short sentence describing clearly the aim of the paper without providing details on methods and tools here.

Authors' Response: Changed accordingly in section 1

âĂć Some references in the text do not appear in the list and vice-versa. For example, Stehr et al. at the end of the first paragraph in the introduction is not found in the list. The same happens with Silvina et al. mentioned in section 4.

âĂć Also, the references of Aleksey, Gewex, Raghavan and Tukey in the list do not appear within the text. Check carefully.

Authors' Response: Changed/removed accordingly

âĂć In Figure 1 the catchment outlet should be indicated. Now, the reader cannot easily understand where the catchment flows.

Authors' Response: Changed accordingly âĂć Page 10682 lines 15-18: A reference is needed.

Authors' Response: Added accordingly âĂć Page 10683 line 17: Include the upstream area (km2) for the flow station. Line 24: correct ° to °C

Authors' Response:

Changed accordingly

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