

Interactive comment on “Estimation of 1 km Grid-based WATEM/SEDEM Sediment Transport Capacity Using 1 Minute Rainfall Data and SWAT Semi-distributed Sediment Transport Capacity Results for Han River Basin of South Korea” by Chung-Gil Jung et al.

Anonymous Referee #1

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General comments:

In the submitted paper authors combined the WATEM/SEDEM and SWAT models. The main objective of this study was to estimate the transport capacity parameter that is used in the WATEM/SEDEM model to determine the maximum amount of sediments (annual transport capacity) that can be transported through each grid cell. The parameter was estimated based on the SWAT model results. As part of the study high-frequency rainfall data (1-minute time step) was used to determine the rainfall erosivity

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in the investigated Han River Basin in South Korea. The SWAT model was calibrated using flow, evaporation, suspended sediment and soil moisture data.

The paper is in the scope of the journal and the presented topic could potentially be interesting for the society. However, there are several major drawbacks related to the submitted paper. Thus, I must suggest rejecting the paper in the current form due to the following reasons:

1) The paper structure is a bit confused, the main objective of the study or the scientific question is not clear enough. Further, what are actually the main conclusions of the study, what is the take home message of this paper? Moreover, the language should be significantly improved (grammar, overall style and structure because some sentences are not clear). In its current form the paper is not suitable for the Hydrology and Earth System Sciences journal.

2) The paper is a bit short and from my point of view there is nothing wrong if the paper is short, in case that all the steps are correctly explained. In the presented paper a lot of steps are not explained, for example: how was the rainfall erosivity determined based on the 1-minute rainfall data, what method was used to determine the spatial distribution of rainfall erosivity, how was the calibration of SWAT model carried out, more details about the data (sediment, soil moisture,..) used should be provided. Thus, I believe that the study is not reproducible.

3) The discussion of the results is poor and should be improved (e.g., what transport capacity parameters were used in previous WATEM/SEDEM model studies).

Specific comments and technical corrections:

Page 1, line 27: Which soils are susceptible to rill erosion? Please add more details.

Page 2, line 4: Some references should be added to confirm this statement.

Page 2, lines 4-5: I would suggest replacing “will” with “may”, “might” or “could”.

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Page 2, line 18: Why is only Ethiopia mentioned here? These kinds of models were also used in other countries.

Page 2, line 33: This sentence should be rephrased because the TC equation is defined on the next page of the manuscript.

Page 3, line 8: Which spatially semi-distributed model?

Page 3, line 9: Replace “TC equation given” with “TC equation is given”.

Page 3, lines 14-15: This modification of the algorithm should be described.

Page 4, line 21: Replace “stations locate” with “stations are located”.

Page 5, first paragraph of section 2.4: This paragraph should be rewritten because it is not clear.

Page 5, lines 9-10: How does the SWAT model verify measured suspended solids? Please rephrase this sentence.

Page 6, line 5: Replace “The yearly” with “the yearly”.

Page 6, line 5: It should be described how was the rainfall erosivity calculated (which equations were used, how was the data measured, was 1-minute data really used or was the data aggregated, . . .).

Page 6, second paragraph of section 3.1: This part should also be rewritten because several things are not well explained, for example: what is meant by yearly distributed sediment delivery? When you are referring to sediment delivery, is this the sediment delivery ratio or something else because the sediment delivery ratio should not have any units? The TC parameter in the WATEM/SEDEM is the transport capacity parameter of each grid cell? How did you take into account the fact that the WATEM/SEDEM model should be used with grid resolution of 20 by 20 m and using different resolutions may cause problems (e.g., LS factor)? How was the LS factor calculated? How did you determine the soil erodibility factor?

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Page 7, Fig. 3: How was spatially distributed rainfall erosivity calculated?

Page 7, Fig. 4: The TC parameter defines the maximum amount of sediments that can be transported through each grid cell.

Page 8, line 2: How was the calibration carried out?

Page 8, lines 6-7: NSE and PBIAS acronyms should be defined.

Page 8, lines 10-11: More information should be provided about the soil moisture data. It is stated that detailed results are available in the paper that is currently under review, but this paper is publically not available.

Page 8, line 15: What is meant by “eight days intervals”? Please explain.

Page 8, line 18: “indicates a satisfactory simulation”. This is very subjective and I would suggest avoiding this kind of statements.

Page 9, Fig. 5: I would suggest using different colours for observed and simulated data (one could be red and the other one grey or black; or something similar).

Page 10, Fig. 6: I would suggest using different colours for observed and simulated data (one could be red and the other one grey or black; or something similar).

Page 11, Fig. 7: Are these really daily suspended solids because the density of points is a bit low (e.g., c) case). How were suspended solids measured and how reliable are measurements?

Page 12, first paragraph of section 3.3: This section should be better explained.

Page 14, lines 2-3: Why is it difficult to estimate the KTC and what is the uncertainty related to this estimation?

Page 14, lines 3-4: Please rephrase this sentence.

Page 14, lines 9-10: Please rephrase this sentence, because it is not clear.

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Page 15, lines 15-16: This is subjective (what is high and what is low?).

Page 17, section 3.6: This section should be moved before the results and discussion part. From my points of view this should go into the methodology. More information about the software could be provided (e.g., is it publically available, . . .).

Page 17, line 17: "The KTC was traced" this is not clear, please rephrase.

Page 20, lines 7-8: This reference is not mentioned in text.

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