**Title:** Comparison of performance of tile drainage routines in SWAT 2009 and 2012 in an extensively tile-drained watershed in the Midwest

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**Review:**

In this study the old tile drainage routine in SWAT2009 (Rev.528) and the new tile drainage routine in SWAT2012 (Rev.615 and Rev.645) are used in the simulations to evaluate the performance of both tile drainage routines.

Based on this review, the following comments are made:

1) From the reader's point of view, the current version of the manuscript does not have a scientific merit. This manuscript is yet another research work from SWAT community on calibration, validation, and application of SWAT. The following questions are raised:

   a) Does this manuscript develop/devise a new methodology?
   b) Does this manuscript develop/devise a new tool?
   c) Does this manuscript develop/propose a new theory?

2) From the reader's point of view, it is hard to understand the motivation of this paper. As per the current version of the paper, referring to line number 27 on page number 18, in this study the old tile drainage routine in SWAT2009 (Rev.528) and the new tile drainage routine in SWAT2012 (Rev.615 and Rev.645) were used in the simulations to evaluate the performance of both tile drainage routines. The following questions are raised:

   a) Did the developers of SWAT release a revision (645 or 615) without evaluating the model outcome?
   b) Did the developers of SWAT release a revision (645 or 615) with an anticipation of getting poor model outcome?
   c) Why did the developers include new routines (Rev.615 and Rev.645)?

3) In the current version of the paper, the authors state that SWAT2012 revision 645, which "improved" the soil moisture based curve number calculation method, has not been fully "tested". Why did the developers improve the soil moisture based curve number calculation method? Was it to get poor model outcome? Did the developers improve the method without testing?

4) From the reader's point of view, the introduction of the manuscript needs to re-written. In the current version of the manuscript, the introduction is built with many equations. From the reader's point of view, a section with all these equations need to be introduced after

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the introduction. This will help the authors to have an introduction to highlight the need of the research.

5) From the reader's point of view, some of the paragraphs in the introduction are not coherent.

6) From the reader's point of view, the conclusions need to be re-written. Some of the words (e.g., site B, site E, and R5) in the current version of the paper need to be deleted. The actual locations of the sites need to be mentioned in the conclusion.

7) In the abstract, the authors claim that both the routines provided reasonable but unsatisfactory uncalibrated flow and nitrate loss results. The authors should clearly state the meaning of "reasonable but unsatisfactory". Moreover, the authors need to state the temporal scale of their statement.

8) In the abstract, the authors claim that the new routine provided acceptable simulated tile flow and nitrate in tile flow for both field sites with **random** pattern tile and **constant** tile spacing. However, in the current version of the paper, the reader is unable to find more detail about the random pattern. Moreover, it would be more meaningful if the authors relate these patterns to the adopted equations shown in equations (3-5).

9) In the current version of the paper, it is understood that there exists a coefficient named "drainage coefficient" (**DC** in equation-5) in SWAT 2009 and SWAT 2012. The authors also state that a coefficient named "drainage coefficient "(**DRAIN_CO**) was included in the new tile drainage routine in SWAT2012. Does SWAT2012 in its tile drainage routine have two drainage coefficients?

10) The authors need to clearly state the difference between SWAT2012 Rev.615 and SWAT2012 Rev.645.

11) As per the current version of the paper, a coefficient named drainage coefficient (**DRAIN_CO**) was included in the new tile drainage routine in SWAT2012 to "control "**peak drain flow.** However, in the current version of the paper, the old tile drainage routine in SWAT2009 (Rev.528) and the new tile drainage routine in SWAT2012 (Rev.615 and Rev.645) were used to simulate monthly tile flow, nitrate in tile flow, surface runoff, and sediment and nitrate in surface runoff at field sites, and monthly flow, sediment and nitrate in flow at a river station. Therefore, it is unclear about the motivation of this research work. Moreover, it would be meaningful if the authors show the equation that uses **DRAIN_CO.**

12) The Fig 1 needs to be checked by a GIS professional. From the reader's point of view, the Fig 1 is meaningless. Moreover, there is an asterisk within the IL boundary. This asterisk should be related to the main figure. The abbreviation "Co." is not understood. The caption of the figure needs to be self-illustrative. The county borders also need to be checked. Do they intersect orthogonally?

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13) In Fig 1, is the river station R5 shared by both the counties (i.e., Vermillion and Champaign counties)?

14) The authors need to state few lines about the methodology used to get the drainage areas of subsurface stations and surface runoff stations.

15) As per the current version of the paper(line number five on page number six), daily nitrate and sediment load was computed by multiplying water discharges with nitrate concentration (Yuan et al., 2000). How did the authors compute the daily sediment load?

16) As per the current version of the paper (line number eight on page number six), nitrate and sediment loads were computed by multiplying the concentration at a specific time by half the flow volume since the last concentration measurement plus half the flow volume from the concentration measurement to the next concentration measurement (Kalita et al., 2006; Yuan et al., 2000).The authors also state that nitrate and sediment concentration data were not available for "every day" that water discharge occurred. Therefore, the adopted methodology is not understood. Do the authors have nitrate and sediment concentration data every two days?

**Signed**

**Editor-in-chief**
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