

## **Reply on RC2**

General comments:

This is an interesting modeling study performed in a context where many in situ observations are available (dam releases, river discharge, irrigation withdrawals, crop emergence dates). Two river discharge models including a representation of crop growth and irrigation are intercompared over a small watershed in southern France. One of the models is driven by satellite NDVI data.

The paper is reasonably well written but I think a separate Discussion section should be added.

**Answer:** Separating the discussion from the results would require a major restructuring of the document, which in our point of view would not bring any major improvement in understanding. Moreover, this request was not made by the first reviewer.

The Table and Figure captions are often incomplete.

**Answer:** Captions pointed out above on the “particular comments” will be modified.

Code availability is mentioned but nothing is said about in situ and satellite data availability. Are the various datasets used in this study available? Where?

**Satellite data from Sentinel-2:** we suggest to add, line 116:

*“These data were obtained through the Theia platform of the French Spatial Agency (<https://theia.cnes.fr/atdistrib/rocket/#/home>)”*

**Landuse data (rpg):** we suggest to add, line 112:

*“...available for free on the French geographic institute (IGN - <https://geoservices.ign.fr/rpg>)”*

**PKGC and Dams data:** we suggest to add, line 126:

*“PKGC and Dams management data were obtained through research agreements with the CACG and governmental services, and cannot be made public.”*

**Particular comments:**

**All comments with no specific answer will of be taken in consideration and modify in the manuscript**

- L. 42: A few more details should be given. For example, can emergence dates be determined from space? **This is the point of references cited in the subsequent paragraph or example “Rolle et al.2022 for sowing date”**

- L. 97: Unclear. Looks like you mean "winter sunflower". I would suggest adding another sentence explaining which crop is sown in winter.

**We suggest to add “...sunflower during summer”**

- L. 161: frPHU is undefined. Is this variable related to the growing degree-day concept? **We suggest to add line 163 “frPHU is the fraction of PHU from sowing date to day d”**

- L. 173: I suggest replacing "Hnet" by "Rn".

- L. 174: wrong units. Replace kg m3 by kg m-3.

- L. 179: Is Zr constant in time? If not, what are the drivers of Zr?

We suggest to add line 179 “Zr is the root depth at day d”.

- L. 187: What is the difference between ET0 and PET?

PET already considers the land use, but no stress coefficient. It is the ET that would occur if an unlimited amount of water was available in the soil.

In the 1st setup, PET is given in equation (3), and ET0 would be calculated with the same formula with a standard “rc” constant. In the 2nd setup,  $PET = (Kcb + Ke) * ET0$

- L. 218: Are these parameters those listed in Table 3? Should be written here.

Yes, it is. We suggest to add a reference to table 3 at line 218

- L. 241: Caption of Fig. 2 is not complete. What are the boxplot percentile limits? What is the meaning of dots? Percentile limits are classically 25%/median/ 75%. Dot are the values used to plot the box. This information will be added to the caption

Why plotting a "relative change" for Ksat and Cn2? Why not using a logarithmic scale for example?

Because this is the classical approach to calibrate SWAT, the values of Ksat and Cn2 are different for each HRU so the calibration is performed by relative change in percent to keep the specificity of each HRU

- L. 242: 6 mm/year of change in storage. Does this mean that the soil is continuously storing more water?

This 6mm/year change in storage means that the SWC at December 31, 2021 (end of period) was 60mm (6mm/year \* 10years) higher than the SWC at January 1, 2012 (beginning of period). We could say it means that the soil is stocking up water during the period. However, this is far from being a regular increase of the soil water content: the soil water content undergoes high and rapid variations of about 110 mm of amplitude (soil depth of 1m with AWC~1.1mm/mm) throughout the year, depending on the weather conditions.

- L. 249-251: description of BFI should be made in Section 2. Not here.

- L. 260: This should be indicated in the caption of Table 5.

- L. 261-264: the Moriasi classification should be described in Section 2. Not here.

- L. 270-274: move to a Discussion section.

- L. 289: why "-1"? That an error it will be removed

- L. 290-299: move to a Discussion section.

- L. 304-307: move to a Discussion section.

- L. 312: Figure caption is not complete. I can see 5 lines in these Figures: black, orange, light-orange, blue, light-blue. Only 3 are defined in the Figures, none in the Figure caption. I would replace "water meters" by "observations".

We suggest to add in the caption of figure 5: “Light-orange and light blue zones represent the minimum and maximum values obtained with the 4 runs. It indicates the uncertainty of the simulation results.”

- L. 321-322: Is SWAT-O more realistic than SWAT-NDVI for this time period?

- L. 323: Start a new section 4 (Discussion) here. End section 3 here.

Editorial comments:

- L. 18: accounts

- L. 20: extent

- L. 22: extent

- L. 44: have been

- L. 56: soil water balance calculation

- L. 81: take into account agricultural practices

- L. 94: the average yearly precipitation amount

- L. 103: delete the end of the sentence (unclear),  
We suggest to modify” ...and has little to do with hydrological processes” by “and hydrologic regime is not driven by natural processes”
- L. 109: French
- L. 166: when all the conditions
- L. 220: allowed
- L. 222: delete “indeed”
- L. 246: sensitive
- L. 295: lead
- L. 328: Figure 6 compares
- L. 348: 7-Up? Will be changed by “upper part of table 7”
- L. 376: approach.