

## Reply to referee 1

**Overview:** We would like to thank the reviewer for his/her dedication in reviewing the manuscript. We are also thankful for their considerate and constructive suggestions and comments.

**General Comments:** Overall this paper reports a new approach to the use of an existing hydrological model to better represent African cropping patterns. With water resources (the use and availability of) an important current and future issue for tropical regions, highlighting and documenting a method for improving model outcomes is of use. The paper is well presented, and the methods documented satisfactorily.

**Specific Comments:** Whilst the paper reports the differences between the static and dynamic method in terms of the RMSE and NSE, I would like to have included whether the difference between the two methods results in a statistically significant difference in ET. This would help in showing the magnitude of the difference between the methods. For example, this could be included in the paragraph starting at line 286 where the static, dynamic, and remote sensing methods are compared. Also, line in 371 the authors state "Our study shows a **significant** impact of the representation of seasonal land-use in the SWAT+ model by reducing the errors in water consumption estimations." whereas this has, in fact, not been proven statistically.

**Authors Response:** The point of the reviewer is well taken. During the revision of the manuscript, the statistics results showing whether the ET from the static or dynamic methods will be provided. Also, line 371 in the revised manuscript will be modified based on the statistical results

**Comment:** Were any of the default setting for the land use codes (e.g. PAST) changed in SWAT to better represent African growth? - or are the defaults representative? It would be good to have a sentence relating to this.

**Authors Response:** The setting for static and dynamic models were different. We used the same codes eg PAST as default SWAT+. However, in the dynamic model, the setting for the trajectories didn't mean the default SWAT+ setting. For instance, a placeholder SWAT+ land-use code MIXC signifies trajectory CORN→AGRL→AGRL or MIGS signifies CORN →AGRL →BSVG. This

is explained in line 182 to 183. We will add a detailed explanation to differentiate the two models (Static and dynamic).

**Technical Comments:**

**Comments:** Line 19 (Abstract) The abbreviation for ET has already been defined earlier in the abstract, do not need to do this twice.

**Authors Response:** Line 19, Abbreviation for ET for the second time will be deleted in the abstract.

**Comments:** Line 26 LULC abbreviation is not defined.

**Authors Response:** Line 26, LULC abbreviation will be defined in the revised manuscript.

**Comments:** Line 37 Nitrogen does not need a capital 'N'.

**Authors Response:** Line 37, The comment is well taken. The capital N will be replaced with 'n' in the revised manuscript.

**Comments:** Line 38 LAI abbreviation is not defined (unless I missed it).

**Authors Response:** The LAI abbreviation will be defined in the revised manuscript.