REVIEW OF MANUSCRIPT NHESS-2022-65

The study addresses a drought analysis in the Ebro River basin in Spain by using remote sensing (RS) data of evapotranspiration from MOD16A2ET and soil moisture data from SMOS1km 20 as well as SURFEX-ISBA land-surface model (LSM) data to calculate the Evapotranspiration Deficit Index (ETDI) and the Soil Moisture Deficit Index (SMDI) for the period 2010-2017. Also, SAFRAN data are used to calculate the Standardized Precipitation Index (SPI) at different aggregation time scales. The drought indices are computed both at the monthly and weekly scales. In particular, the study investigates the mechanisms of drought propagation in the land-atmosphere system by analyzing the temporal lags between the drought indices to identify the synchronicity and memory of the anomalies between precipitation, evapotranspiration and soil moisture to interpret factors involved in drought onset.

Overall, the study is interesting and well written. A few comments follow.

1) In the Introduction, the bibliographic review of previous studies on the use of remote sensing products in drought analysis at the weekly scale focused on rainfed agriculture could be extended. I suggest referring to the following study and reference therein:

   https://doi.org/10.5194/nhess-20-471-2020

2) The complex interactions between drought indices, investigated by means of a throughout correlation analysis, highlights feedbacks among the considered variables, with a preeminent role of evapotranspiration in the link between rainfall and soil moisture. The study is carried out by calculating the Pearson correlation coefficients between pair of series of the three drought indices at weekly scale, introducing lags from -104 weeks to +104 weeks. The use of the Pearson correlation coefficient implies that the underlying variables are normal distributed. This is true, by definition, for the SPI, but what about the ETDI and SMDI? ETDI and SMDI series must be first checked for normality and, in case the normal hypothesis is rejected, the Spearman rank correlation statistic must be used instead of the Pearson correlation coefficient.
3) Lag analysis show a remarkable disagreement between RS and LSM for the SMDI - SPI interactions, with SMDI obtained with the LSM showing substantially lower correlations than the ones of RS, while also differing in the timing of the clusters of correlation. The authors state that they expected that the LSM, as being simpler than reality, had stronger SPI – ETDI - SMDI correlations than the RS dataset and justify this result by the accumulation of uncertainties of modelling, inputs and LSM structure. I suggest the authors to better argue this point. Why should the adopted LSM work only for SPI and ETDI? Furthermore, gridded soil moisture datasets are available at the global and European scale (see for instance the Copernicus climate data service). These datasets can be a valid alternative to the LSM soil moisture data and deserve some references in the study.
4) With reference to the feedback mechanisms depicted in Figure 8, the Discussion can be enriched by a comparison with previous studies investigating the same mechanism, such as:

   https://doi.org/10.1038/s41558-018-0154-5

   https://doi.org/10.1038/s41558-018-0138-5

   https://doi.org/10.1038/s41558-018-0114-0

5) Please check Figure 7 since you wrote the same thing for both negative and positive lags.