EGU21-5383
https://doi.org/10.5194/egusphere-egu21-5383
EGU General Assembly 2021

Local sensitivity analysis of Satellite Monitoring of Irrigation software (SAMIR) over Semi-Arid climate of Morocco

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Nowadays, the assessment of agricultural management is based mainly on the good management of water resources (i.e., to estimate the crops water consumption and provide their irrigation requirements). In this context, several agro-environmental models, (i.e., STICS, AQUACROP, TSEB, ...) have been developed to assess the agricultural needs such as grain yield and/or irrigation demand prediction. These models are mainly based on the remote sensing data which contribute highly to the knowledge of some key-variables of crop models, in particular their time and space variations. The study area is the Haouz plain located in central Morocco. The climate of the plain is semi-arid continental type characterized by strong spatiotemporal irregular rains (mean annual precipitation up to 250 mm).The region relies mainly on the agricultural activities. Therefore, about 85% of available water is used for irrigated crops within the plain. The irrigated area is covered by 25% tree plantations and 75% annual crops. However, the annual crops extent depends strongly on the water availability during the season. Hence, for sustainable monitoring and optimal use of water resources (using physical modeling, satellite images and ground data), SAMIR software is developed in order to spatialize the irrigation water budget over Haouz plain. SAMIR (Simonneaux et al., 2009; Saadi et al., 2015; Tazekrit et al., 2018) is a tool for irrigation management based mainly on the use of remote sensing data. It estimates the crop evapotranspiration (ET) based on the FAO-56 model. This model requires three types of data: climatic variables for calculation of reference Evapotranspiration (ET0), land cover for computing crop coefficient Kc, and periodical phonological information for adjusting the Kc. SAMIR offers the possibility to calculate the ET of a large agricultural areas, with different land use/ land cover types, and subsequently deduce the necessary water irrigation for these areas. This model has been calibrated and validated over R3 perimeter (Diarra et al., 2017). In the present work, we studied the sensitivity (local sensibility analysis) of SAMIR software to the variations of each input parameter (i.e., ET0, precipitations, soil parameters, and irrigation configuration “real or automatic”). The simulations were made using the ground truth observations and irrigation dataset of the agricultural season of 2011/2012 over an irrigated area of Haouz plain. For the climatic variables, the obtained results showed that the effect of the ET0 is more significant compared to the effect of precipitations. It led to large shifts of the actual ET simulated by SAMIR compared to all tested parameters. For soil parameters, the sensitivity analysis illustrates that the effect is almost linear for all parameters. But the proportion of total available water, P, is the high sensitive parameter (Lenhart, et al., 2002). Finally, the

comparison between the simulation of real evapotranspiration using automatic irrigation or real irrigation configuration offers an interesting result. The obtained ET values are similar for both configurations. Thus, this result offers the possibility of using only automatic irrigation configuration, in case of non-availability of the real irrigation.