Geophysical Research Abstracts
Vol. 21, EGU2019-14741, 2019
EGU General Assembly 2019


# The evaluation of the effectiveness of the irrigation realized by three different irrigation support approaches on maize by means of simulation modelling

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In the Mediterranean area Climate change (CC) is expected to modify water cycle through increases in temperature and by changing seasonal and temporal precipitation patterns, leading to a marked effect on crop soil water availability. In addition to CC, population growth and land use change have significantly increased pressure on global freshwater resources, creating a competition with agricultural systems demand.
In this context, the optimization of water use efficiency in agricultural systems represents the major challenge to face the CC and food security issues. Moreover, irrigation efficiency has a direct impact on the farming communities' resilience.
Irrigation efficiency can be improved through the use of irrigation support systems (e.g Irrigation Advisory Services -IAS and Decision Supporting Systems-DSS) based on proximal sensors, remote sensing and simulation modelling approach of soil-plant and atmosphere system (SPA).
The aim of this work is to evaluate effectiveness of the irrigation realized by three different irrigation support approaches by means the use of a physically based model of SPA system (SWAP) able to solve the soil water balance and scheduled optimal (or in deficit) irrigation through different approaches (e.g. soil pressure head at specific soil depth).
The evaluation has been realized on maize crop during the vintage 2018 in a farm located in southern Italy (Acerra –NA). The experimental field was on Andosols, which soil spatial variability has been evaluated by means of pedological survey supported by geophysical measurements. The soil profile was described and sampled for lab chemical and physical analysis (hydrological properties).
The experimental design was defined by three long plots ($\approx$60 m $\times$ 20 m) were crop, soil water content (at different depths by means of TDR probes) and weather variables were monitored on maize crop (FAO class 700) from 16th April 2018 (sowing) to 2th of August (harvest). The irrigation between the plots was differentiated (based on three approaches: tensiometers sensors measurements, remote sensing and simulation modelling) but oriented to preserve the achievement of optimal crop production. From the data collected in field, SWAP model was calibrated and WP (water productivity) of maize determined in each plot. Afterwards, the calibrated model was used to evaluate the effectiveness of irrigations realized in each plot, and from the analysis of different irrigation scheduling scenarios, the possible gap to improve the irrigation efficiency determined.