Geophysical Research Abstracts
Vol. 13, EGU2011-9003, 2011
EGU General Assembly 2011

The climate signal on crop production: the interplay of irrigation strategies and crop responses at farm scale

Antonello Bonfante (1), Francesca De Lorenzi (1), Paul Di Tommasi (1), Nunzio Fiorentino (2), Angelo Basile (1), and Massimo Menenti (3)

(1) ISAFoM, National Research Council of Italy(CNR), Ercolano (NA), Italy (antonello.bonfante@gmail.com), (2) Department of Agricultural Engineering and Agronomy, University of Naples Federico II, (3) Delft University of Technology, Delft, The Netherlands

The adaptation of irrigated crop systems to future climate change can be evaluated by means of simulation of irrigation strategies and resulting soil water balances, estimated by physically-based models.
An increasing trend of potential evapotranspiration has been observed in the last 20 years in some Italian regions and the same trend can be expected to occur in the future.
Irrigation strategy determines whether and how climate signal is observed. When water availability is not limited, and crop water requirements can be fully met by irrigation, the influence of a (moderately) warmer and drier climate on production can be offset by irrigation. Therefore climate signal translates into higher water consumption.
In a more realistic situation water availability will be limited and a sub-optimal quantity of water will be delivered to crops, therefore the signal of climatic conditions on crop production will be retained.
In water shortage conditions irrigations are scheduled according to the constraints of irrigation schemes: the signature of climatic conditions on crop production will depend on the matching between irrigation strategy and crop water requirements. Moreover inter-variety differences in crop water requirements and resistances to stress will influence the response to climate.
The interaction between irrigation strategies and crop responses to water availability (maize, fennel and tomato) was examined in the present work. Simulation studies were performed in Sele plain, (Southern Italy) at different spatial scale (land and farm) by means of two hydrological simulation models (CropSyst and SWAP). Two scenarios were considered, current climate (1961-1990) and future climate (2021-2050), the latter from a statistical downscaling technique applied to GCMs. Different irrigation schedules, designed to meet in full and partially water requirements, were simulated. Crop production and nitrate leaching determined by different climatic scenarios and irrigation management were analyzed.