Analysis of a 49 years long agrometeorological historical data-sets for short term programming and multi-year planning of regional and local irrigation.

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Precipitation and temperature are fundamental driving variables for agro-ecosystems. The availability of a **49 years long (1956-2004) data-sets** for a conspicuous number of stations of the Veneto region, gives the chance for a specific agrometeorological analysis describing long-period changes in rainfalls, evapotranspiration and soil water availability at different seasonal and territorial levels. This study aims to produce information useful not only for farmers but also for authorities responsible for short term programming and multi-year planning of regional and local irrigation.

Data series of precipitation and temperature, **previously standardized and homogenized**, were **validated** by means of **"Climatica**" a software for management of climatological and meteorological data sets, developed by the University of Udine (www.dpvta.uniud.it/∼Danuso/docs/Climatica/Climatica_Home.html). Statistical algorithms are useful in order to identify **linear trends** and **change points** in long time series of surface meteorological variables. This is particularly important in mid latitudes where these variables are strongly influenced by the variability of atmospheric circulation at different scales. In particular a large number of European time series show the signal of a climatic change of mid 80's, characterized by the abrupt shift in frequency and persistence of different circulation patterns and by the increase of frequency of positive phases of the North Atlantic Oscillation (NAO) (Werner et al., 2000). For this reason a discontinuity analysis has been realized using the Strucchange library of R software. The results of this work show that the reference period presents a decrease **in rain** amounts and an **increase in ET0** values (Hargreaves). The **mobile average** identifies in the 80's the first negative mean standard deviations for precipitation and the first positive mean standard deviation for ET0. The **discontinuity analysis** show that both rain and evapotranspiration data have a **common break-point in 1981**. Two main precipitation breakpoints (1966 and 1981) where identified with

change point analysis, with an annual average precipitation for the whole area of 1200 mm for the period 1956-1966 and 1030 mm for the period 1981-2004.

Two main evapotranspiration breakpoints (1981 and 1996) where also identified, with an annual average for the whole area of 910 mm for the period 1956-1981 and about 1000 mm for the period 1996-2004. These results show the crucial importance of '80 years in order to evaluate the impact of climate change on agro-ecosystems and irrigation practices in Veneto region. After 80's period we can hypothesize the beginning of a new climatic phase with important consequences on the temperature and precipitation regime and in particular an increase of the frequency and persistence of drought conditions. An analysis of the field water balance referred to different meteorological stations was carried out in order to obtain a local demonstration of this hypothesis. The results show a progressive anticipation of the first summer day with field water reservoir empty and the parallel delay of the autumn date of the refilling of reservoir. This means an increase of the number of days with empty reservoir, with a positive trend. This kind of analysis gives some important evaluations referred to present day situation and gives information useful in order to define future agro-climatic scenarios.

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