High resolution climatology
- towards climate change services

Climate change scenarios of temperature and precipitation over five Italian regions for the period 2021-2050 obtained by statistical downscaling models

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Climate change scenarios of seasonal maximum, minimum temperature and precipitation in five Italian regions, over the period 2021-2050 against 1961-1990 are assessed. The regions selected by the AGROSCENARI project are important from the local agricultural practises and are situated as follows: in the Northern Italy - Po valley and hilly area of Faenza; in Central part of Italy- Marche, Beneventano and Destra Sele, and in Sardinia Island – Oristano.

A statistical downscaling technique applied to the ENSEMBLES global climate simulations, A1B scenario, is used to reach this objective. The method consists of a multivariate regression, based on Canonical Correlation Analysis, using as possible predictors mean sea level pressure, geopotential height at 500hPa and temperature at 850 hPa. The observational data set (predictands) for the selected regions is composed by a reconstruction of minimum, maximum temperature and precipitation daily data on a regular grid with a spatial resolution of 35 km, for 1951-2009 period (managed by the Meteorological and Climatological research unit for agriculture – Agricultural Research Council, CRA – CMA).

First, a set-up of statistical model has been made using predictors from ERA40 reanalysis and the seasonal indices of temperature and precipitation from local scale, 1958-2002 period. Then, the statistical downscaling model has been applied to the predictors derived from the ENSEMBLES global climate models, A1B scenario, in order to obtain climate change scenario of temperature and precipitation at local scale, 2021-2050 period.

The projections show that increases could be expected to occur under scenario conditions in all seasons, in both minimum and maximum temperature. The magnitude of changes is more intense during summer when the changes could reach values around 2°C for minimum and maximum temperature. In the case of precipitation, the pattern of changes is more complex, different from season to season and over the regions, a reduction of precipitation could be expected to occur during summer.

The temperature and precipitation projections from hilly area of Faenza are then used as input in a weather generator, in order to produce a synthetic series of daily data. These series feed a water balance and crop growth model (CRITERIA) to evaluate the impact of climate change scenario in irrigation crop water needs, for 2021-2050 period. As reference crop the kiwifruit, which is characterised by high water need and widespread in this area, has been selected.