



## Assessing two operational systems for monthly and seasonal climatic anomalies forecast in Italy.

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The multi-model ensemble system for long term predictions over Italy organised by the National Civil Protection Agency is described. The system has been designed in technical support of decision making at national level in issues related with water management, and, in general, with mitigation of impacts on population and production activities of intense climate anomalies over Italy.

Two separate systems have been developed: a multi-model monthly prediction system and a seasonal (three months) prediction system. The final products for these two systems consist of the probability of occurrence of events for specific indices obtained from two surface climate fields: mean temperature and cumulated precipitation. The indices are obtained averaging the values of these fields over the Northern, the Central (plus Sardinia) and the Southern (plus Sicily) Italian regions. The events considered are defined on the ground of the three terciles (lower, medium and upper) of the probability distribution of the values of these indices over a long period (namely from 1987 to 2009) or using the 15th or the 85th percentile over the long period of the same indices, so as to identify the probability of occurrence of possible intense events.

Several different Institutes collaborate to the system, but in the present work are analysed only the skill scores of a subset of these products: two separate products of the CNR-IBIMET for the monthly and the seasonal time-scale, and the product of ARPA-SIMC for the seasonal time scale.

The two products produced by CNR-IBIMET, namely the monthly and the seasonal predictions, are obtained using a statistical model in which the probabilistic predictions are the predictands of a multi-regressive statistical scheme using as predictors the observed values of selected large-scale atmospheric indices and sea surface anomalies.

The seasonal predictions of ARPA-SIMC are obtained applying a Model Output Statistics (MOS) calibration scheme, also based on multiple linear regression method, accepting as predictors the time series of selected predicted large-scale indices, obtained from the EUROSIP multi-model seasonal prediction system and including the ECMWF and the Meteo France operational coupled general circulation models (CGCM).

The analysis presented includes a description of skill scores of each product and of the multi-model system over the period from 1987 to 2009 using as reference two different datasets: the ECA&D and the CRA-CMA Analysis data-set. This last set of data consists of an objective analysis produced by the Meteorological and climatological research unit for agriculture – Agricultural Research Council (CRA – CMA) covering the whole Italian territory with a regular 35Km grid. It covers the period from 1951 to present and includes daily minimum, maximum temperature and precipitation.