



Predictability study of summer Tmax interannual variability over Italy: an application of the EUROSIP seasonal forecast system

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The EUROpean multi-model Seasonal to Inter-annual Prediction (EUROSIP) seasonal forecast system run operationally at ECMWF is used to carry out a predictability study of summer heat waves over Italy, using as a proxy summer averaged Tmax over the whole Italian territory. For the purpose, the multi-model global seasonal forecasts are calibrated to the Italian climate using a Model Output Statistics (MOS) scheme applied in cross validation mode to the period 1987 to 2008. The scheme uses as predictand the most relevant Principal Component of Tmax over Italy and as predictors the geopotential height at 500 hPa (Z500) and temperature at 850 hPa (T850) over areas extending over the Euro-Atlantic region. The skill of the forecast system obtained applying the calibration scheme to the EUROSIP forecast, evaluated objectively using correlation coefficients and Brier Score, indicates the presence of substantial predictability for the predictands and the possibility to predict the 2003 summer heat wave up to three months before the start of the 2003 summer season.

An analysis of the results and a comparison with observational data from ERA40 and ECMWF analyses indicates that both models contributing to the forecast system have substantial problems in maintaining Tmax anomalies over Italy and that one of them is actually producing opposite large scale circulation anomalies over the Euro-Atlantic with respect to those observed. An interpretation of the physical mechanisms forcing the large-scale anomalies is investigated in the course of the analysis, and it is suggested that the large-scale circulation anomalies over the Euro-Atlantic region associated with summer heat waves over Italy maybe the orographic response of atmosphere to the Rockies.