Analyses of agroclimatic indices applied to Croatian grapevine growing regions in the present climate

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Climate is one of the main factors controlling grapevine production and this relationship is usually explored by the agroclimatic indices. In this study these indices were calculated for Croatian territory from measured and simulated data. First, six indices (i.e. Average growing season temperature, Growing degree days, Huglin index, Dryness index, Cool night index and Composite index) and evapotranspiration by FAO Penman-Monteith method were calculated using daily near-surface measurements (minimum, maximum and mean temperature, relative humidity, wind speed and total precipitation) from numerous land-based stations from 1961 to 2016. Due to better comparison, results are shown for two 30-year periods, 1961-1990 and 1987-2016. The aim is to categorize grapevine growing region climates of Croatia and to see changes in present climate comparing with period 1961-1990. Afterwards, simulated data from three CORDEX Regional Climate Models (RCM) (CLMcom-CCLM4-8-17, SMHI-RCA4, CNRM-ALADIN5.3) at 0.11° grid spacing have been explored. All simulations are forced by the ECMWF ERA-Interim reanalysis for three different periods: 1981-2010 for SMHI-RCA4, 1981-2008 for CNRM-ALADIN5.3 and 1991-2008 for CLMcom-CCLM4-8-17. The evaluation has been done for (i) the meteorological variables and (ii) agroclimatic indices using the standard statistical parameters (e.g. bias, RMSD, corelation, etc.). For each approach we show model-measurements in-situ comparison (using the near-neighbors method) and comparison relevant for each region. The second approach was done because of the great variety of climatic characteristics of Croatia. Both approaches revealed good skill of the RCM in simulating bioclimatic characteristics in Croatia. The results also pointed to the categorization of grepevine growing region climates of Croatia and changes in present climate comparing two periods 1961-1990 vs 1987-2016. They are also base for estimating future changes in grapevine growing regions climets of Croatia.