



Climate change impact on future heating and cooling needs in Gospić (Croatia)

Lidija Cvitan, Mirta Patarčić, and Renata Sokol Jurković

Meteorological and hydrological service, Research and development division, Zagreb, Croatia (cvitan@cirus.dhz.hr)

Gospić is the biggest town in Croatian mountainous region with the climate more severe than elsewhere in Croatia. Impact of climate change on heating and cooling needs in Gospić in future is investigated by the commonly used degree-days method. Only heating degree-day (HDD) for the whole heating season (October-April) and cooling degree-day (CDD) for the whole cooling season (May-September) were analyzed. For two future periods, 2011-2040 (P1) and 2041-2070 (P2), mean daily temperature input data were achieved by means of a subset of nine regional climate models from the EU FP6 ENSEMBLES project. Horizontal resolution of each model was 25 km and models' projections were performed under the assumption of A1B greenhouse gases emission scenario. Future projections of heating and cooling parameters for Gospić station were determined by using simulated 2-m air temperatures from the model grid point which is closest to the station.

As heating and cooling degree-days are temperature parameters, it is important to know how well the simulated temperature compares against observation data. For that reason nine temperature biases (model minus observations) averaged over three periods over the year (January-April, May-September and October-December) for the 1961-1990 (P0) control period were determined. For the same control period, nine simulations of heating and cooling degree-days were also calculated. Comparison of the degree-day simulations with temperature biases over the control period helped in detecting the simulations that are closest to the observations (i.e. the most realistic simulations). For P1 and P2 future climates, projected degree-day trends are shown. For both future periods the most realistic simulations show decreasing HDD trends and increasing CDD trends. The magnitudes of negative HDD trends are mostly three times greater in P1 than in P0 and mostly 30-60% greater in P1 than in P2. While the positive CDD trend is very low in P0, the magnitudes of projected future CDD trends show much higher CDD increase. The magnitudes of CDD trends in P2 are mostly 3-4 times greater than in P1.