



## **Changes in summer thermal stress index in Romania using a statistical downscaling model**

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A statistical downscaling model to estimate a summer thermal stress index (THI, temperature-humidity index) at 87 stations (predictand) in Romania from large-scale predictors is presented in this study. The statistical downscaling model is based on canonical correlation analysis (CCA), is calibrated over the 1961-1990 interval and validated over the independent data set 1991-2010. It was found that the highest model skill is obtained by considering as large-scale predictor the combination between the air temperature at 850 hPa and specific humidity at 700 hPa. The connection between the predictor and predictand is very strong and is mainly given by the first three CCA pairs. The model skill is very high, explaining an important fraction of the observed THI variance and reproducing the main characteristics of variability (such as linear trend). This model was further used to project future ITU changes using large-scale predictors simulated by some CMIP5 GCMs (CNRM-CM5, MPI-ESM-LR) under rcp45 scenario for the periods 2021-2050 and 2071-2100. The results show an increase in THI values with highest values for the period 2071-2100 but the magnitude of change is dependent on the GCM driver. The highest magnitude of change was obtained with the large-scale predictor simulated by the MPI-ESM-LR model. These results show the uncertainty related to the GCM driver. More CMIP5 GCMs will be considered and the work is in progress. To show the uncertainty related to the downscaling technique, the comparison with the results obtained directly from some regional climate models (RCMs) with 11x11 km spatial resolution, driven by the GCMs presented above, will be presented.