Statistical downscaling of sub-daily (6-hour) temperature in Romania, by means of artificial neural networks

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The role of statistical downscaling is to model the relationship between large-scale atmospheric circulation and climatic variables on a regional and sub-regional scale, making use of the predictions of future circulation generated by General Circulation Models (GCMs) in order to capture the effects of climate change on smaller areas.

The study presents a statistical downscaling model based on a neural network-based approach, by means of multi-layer perceptron networks. Sub-daily temperature data series from 81 meteorological stations over Romania, with full data records are used as predictands. As large-scale predictor, the NCEP/NCAD air temperature data at 850 hPa over the domain 20-30E / 40-50N was used, at a spatial resolution of 2.5×2.5 degrees.

The period 1961-1990 was used for calibration, while the validation was realized over the 1991-2010 interval. Further, in order to estimate future changes in air temperature for 2021-2050 and 2071-2100, air temperature data at 850 hPa corresponding to the IPCC A1B scenario was extracted from the CNCM33 model (Meteo-France) and used as predictor.