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Projection of extreme temperature conditions for the Carpathian region

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Human health is very likely affected by the regional consequences of global warming. One of the most severe impacts is probably associated to temperature-related climatological extremes, such as heat waves. In 2015 six heat waves occurred in Hungary, which is exceptionally high considering the recorded measurements from the beginning of the 20th century. Similar conditions might occur more frequently in the Carpathian region in the coming decades. In order to develop adaptation and mitigation strategies on local scale, it is essential to analyze the projected changes related to warming climatic conditions including heat waves. For this purpose, the simulations of RegCM4.3 regional climate model adapted at our research group, are used with 10 km horizontal resolution, taking into account a moderate (RCP4.5) and a high (RCP8.5) radiative forcing change scenario. As a reference period 1981-2000 is used, and the target periods are the coming 2-decade-long periods (2021-2040, 2041-2060, 2061-2080, 2081-2100). As a Heat Health Watch System was developed in 2004 in Hungary (on the basis of a retrospective analysis of mortality and meteorological data), the three levels of heat wave warning are used in our analysis. The definitions of these levels are associated to the daily mean temperature values, defined as follows: Warning level 1 (advisory for internal use) is issued when the daily mean temperature exceeds 25 °C. Warning level 2 (heat wave watch) is issued when the daily mean temperature for at least 3 consecutive days exceeds 25 °C. Warning level 3 (heat wave alert) is issued when the daily mean temperature for at least 3 consecutive days exceeds 27 °C. The results can serve as a sound basis for local and national level decision-makers to initiate necessary health protection policy and regulations.