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Is growing persistence of atmospheric circulation conducive to increasing incidence of heat waves?

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Heat waves are among the natural hazards with severe consequences for human society, including pronounced mortality impacts in mid-latitudes. Recent studies have hypothesized that an enhanced persistence of atmospheric circulation (observed over Europe since the mid-1980s) may affect surface climatic anomalies, particularly the frequency and severity of heat waves. In this contribution, we study relationships between the persistence of circulation patterns conducive to heat waves and air temperature anomalies, using the Hess-Brezowsky catalogue of circulation types and long-term temperature series at stations over the European continent. The analysis covers the period 1901-2000. We identify circulation types significantly conducive to the incidence of heat waves and relate the temperature anomalies to the circulation persistence. We demonstrate that more persistent circulation enhances the severity of heat waves; recent sharply rising trends in warm temperature extremes over Europe may be related to a higher persistence of circulation types. In the global warming context, the effects of a future climate change on the frequency and severity of heat waves may be exacerbated by more persistent circulation patterns. If similar changes towards enhanced persistence affect other regions, analogous consequences and implications for the occurrence of temperature extremes may be expected. The work on this contribution was supported by the Czech Science Foundation, contract 205/07/J044, Grant Agency of the Czech Academy of Sciences, contract IAA300420506, and the Ministry of Education, Youth, and Sports of the Czech Republic, contract OC115.