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Application of spatial synoptic classification in evaluating links between heat stress and cardiovascular mortality and morbidity in Prague, Czech Republic

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Spatial synoptic classification (SSC) is applied into examining links between weather patterns and cardiovascular (CVD) mortality and morbidity in an extended summer season (16 May–15 September) in Prague, the Czech Republic. As in previous studies, two SSC air masses (AMs) – dry tropical (DT) and moist tropical (MT) – are associated with significant excess CVD mortality, while effects on CVD hospital admissions are small and insignificant. Excess mortality for ischaemic heart diseases is more strongly associated with DT, while MT has adverse effect especially on cerebrovascular mortality. Links between the oppressive AMs and excess mortality relate also to conditions on previous days, as DT and MT occur in typical sequences. The highest CVD mortality deviations occur 1 day after a hot spell's onset, when temperature as well as frequency of oppressive AMs are highest. Following this peak is typically DT- to MT-like weather transition, characterized by decrease in temperature and increase in humidity. The transition phase between upward (DT) and downward (MT) phases is associated with the largest excess CVD mortality, and the change contributes to the increased and more lagged effects on cerebrovascular mortality. The study highlights the importance of critically evaluating SSC's applicability and benefits within warning systems relative to other synoptic and epidemiological approaches. Only a subset of days with oppressive air masses is associated with excess mortality, and regression models accounting for possible meteorological and other factors explain little of the mortality variance.