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Climatology of low-level temperature inversions at the Prague-Libuš aerological station

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Temperature inversions (TIs) have been closely studied worldwide, for a variety of reasons. Here, we present an analysis of low-level TIs, based on a dataset of atmospheric soundings from the aerological station at Prague-Libuš (Czech Republic). Measurements have been carried out here since 1974, at all main synoptic hours. Primarily, homogeneity was carefully tested, of both radiosonde data, and inferred time series of TIs frequency and main parameters (depth, strength, and mean temperature gradient). Since several changes in the observation routine were found to have affected homogeneity of the time series, analyses were conducted for a homogenous period of 1992–2012 only. Firstly, diurnal and annual regimes of surface-based (SBTIs) and elevated TIs (ETIs) were described. SBTIs were most frequent at 00 UTC, and in September and October, respectively. Persistent SBTIs often occurred during the autumn, as a result of decreased cyclonicity. Secondly, changes in TIs were evaluated, and some of the trends were compared with a close station in Kümmersbruck (Germany). In the summer, frequency of SBTIs decreased almost identically at both stations at 00 UTC. Although the same trend was apparent at 06 UTC, too, it was considerably more pronounced in Prague; it was also mirrored by a major increase in ETIs. Since no relationship of these trends and the large-scale circulation was found, local factors (urban heat island) are hypothesised to stand in the background of this development.