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The influence of sequences of air circulation types on air temperature diversity over the Sudety Mountains

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Everyday changes of pressure systems over the midlatitudes influence the direction and pace of transformation of air masses flowing over the Sudety Mountains. In specific air circulation conditions the spatial diversity of air temperature over mountainous area could be various because of influence of topoclimatic processes among others foehn effect, forced ascent of air or Venturi effects. The intensity of this processes change in various thermal and humidity conditions of air and vertical equilibrium of atmosphere. Because of this the identification of air temperature diversity over mountains should be done with taking the influence of characteristic sequences of air circulation types into consideration.
The main aim of this study is to select and present the sequences of air circulation types with significant influence on air temperature differentiation over the Sudety Mountains and what seasonal characteristic does it depend on. This analysis includes also the identification and description of spatial air temperature differentiation in days ending the most frequent three-day sequences of air circulation types.
The analysis is done with the use of daily averages of air temperatures measured at meteorological stations from the period of time between 1981 and 2010.The sequences of air circulation types are prepared with the use of an own automatic classification system of air circulation types for specifically Sudety Mountains, based on data from the Weather Research and Forecasting model running in reanalysis mode. The daily averages of air temperatures in the most frequent sequences of air circulation types are separately for every months taken into comparison in correlation equations with morphological variables connected with topoclimatic processes: latitude and longitude, altitude, slope and aspect of terrain form, its concavity and convexity and also obturation and exposure. On the base of significant correlation between mentioned variables the spatial layouts of air temperature in following air circulation sequences are done.
The results confirm that using the sequences of circulation types in the analysis of spatial air temperature differentiation cause better understanding of spatial relation between air temperature and dynamics of atmosphere. It also shows that this approach is good enough for identification of areas where individual topoclimatic processes become stronger or weaker in specific circulation condition. In sequences of cyclonic air circulation types the highest significance has not the durability of the baric system type but the changes of direction and speed of air masses advection. In sequences of anticyclonic circulation types the most important is durability of the pressure system.