



Recent Climate Changes in East Europe and Ukraine

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Recent regional climate change is analyzed via study into seasonal trends in the near-surface air temperatures (SAT) and precipitation and their extremes, as well as by means analysis of the atmospheric circulation. Classification of MSLP and 500hPa geopotential fields is made via classes of probability, along with composite analysis. The main purpose of this study is to reveal new features in the large-scale circulation and to show how the latter has changed regional climate.

An episode of warming in the lower troposphere in the late XX century was followed by another warm decade, although new seasonal features were identified. Winter SAT in Ukraine showed greater variability with sharp change between periods of heat and cold weather, with lower seasonal minima than in previous two decades. Siberian high has been more pronounced affecting East and central Europe, with a risk of significant cold spells; snowfalls are also distinguished by an increased extremeness as a result of the development of Mediterranean-Black Sea depression.

Both maximum and minimum Summer SAT showed further growth in the recent decade along with shift period of warmest SAT to late July or August. Start of summer is unstable with growth in extreme precipitation, due to convective instability within frequent cut-off lows. General growth in weather settings' stability is identified in Late July and August, with growth potential for the heat waves and droughts, with intensification of the West Russian (Ural) high with great time residence. Transition seasons show features of the preceding season: spring is unstable with sharp transition to summer regime; autumn is characterized by more settled like-summer weather.

Low tropospheric warming over Ukraine and most of East Europe continues, although some seasonal characteristics are changed; it is mainly because of changes in regional atmospheric circulation in comparison to previous decades. Weather contrast is intensified between West and East Europe, because of specific development of main synoptic systems (intensification in the meridional alignment). Predictability potential of North Atlantic Oscillation has been decreased for the region of interest due to greater influence of eastern synoptic processes both in summer and winter, with greater importance of Indian monsoon/ENSO to regional climate. Tendency towards more frequent Summer heat waves is one of the most important phenomena, being underestimating in climate models.