

## Regional intraseasonal anomalies in transitional seasons in Northern Eurasia

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The number of hazardous meteorological phenomena in Russia is increasing by about 6-7% per year since the end of the 20th century, according to observations (<http://www.meteorf.ru/>). Last year (2017), this number was four times higher than it was in 2000, when very extreme spring with high temperature in March and cold air outbreaks in May in Russian regions were observed. Analysis of intraseasonal variability of surface air temperature (SAT) from long-term observations reveals multimodal features in probability density functions (PDF), in particular for transitional (spring, autumn) seasons (Agayan and Mokhov, 1989; Mokhov and Semenov, 1997; Mokhov et al., 1998; Mokhov, 2017). The PDF polymodality can be a result of various climatic processes. In (Mokhov and Semenov, 1997; Mokhov, 2017) the analysis of bimodal features of PDF for intra-seasonal SAT variations was performed, using a stochastic energy balance model and daily data from long-term (since the end of the 19<sup>th</sup> century) observations at various Eurasian meteorological stations. In particular, the formation of the PDF bimodality for regional SAT anomalies can be related to the nonlinear temperature dependence of surface albedo near the snow boundaries and meridional heat transfer.

We present here some estimates of the PDF polymodality for SAT anomalies and their changes in last decades from observations in Russian regions. Figures 1,2 show the frequency of different SAT anomalies near Lake Baikal (in Irkutsk) in spring and autumn for two decades (1956-1965 and 2006-2015). The Lake Baikal basin is characterized by strong thermal and hydrological anomalies during last years.

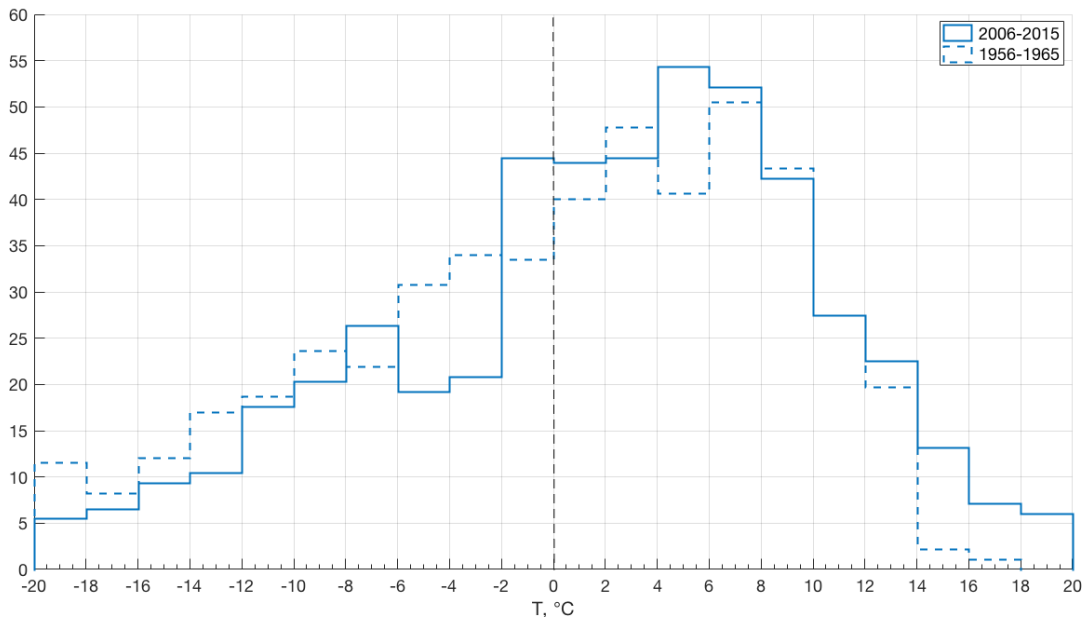


Fig. 1. Frequency (number of days) of different SAT anomalies in autumn in Irkutsk for two decades (1956-1965 and 2006-2015).

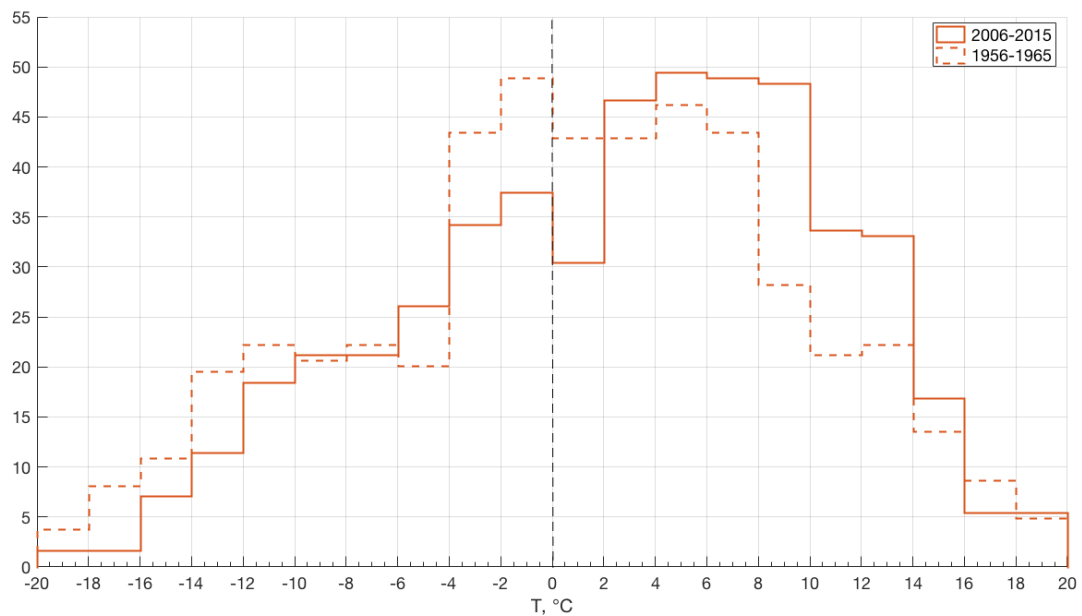


Fig. 2. Frequency (number of days) of different SAT anomalies in spring in Irkutsk for two decades (1956-1965 and 2006-2015).

Figures 1,2 display the polymodal (bimodal) features of the PDF for SAT anomalies in Irkutsk. It should be noted that general warming during last decades is accompanied by a more pronounced manifestation of bimodality near  $0^{\circ}\text{C}$ , in particular in spring. Similar estimates were obtained for other North Eurasian regions, in particular for Moscow and Arctic and subarctic regions. For different regions, the changes in the distribution functions for SAT anomalies vary significantly. This is also due to the different times for transition of the temperature near surface through  $0^{\circ}\text{C}$ .

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