

Variations of precipitation-temperature relationship in spring-summer for Eurasian regions

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According to observations since the end of 19th century there is a general decrease of precipitation in spring-summer months in mid-latitude European (ER) and Asian (AR) Russian regions under regional warming [1-5]. Figure 1 shows precipitation anomalies in May-July in dependence on corresponding anomalies of surface air temperature for ER and AR by data from [1,2] for the period 1891-2015. Here we estimate variations in the precipitation-temperature relationship in spring-summer months with the use of cross-wavelet analysis.

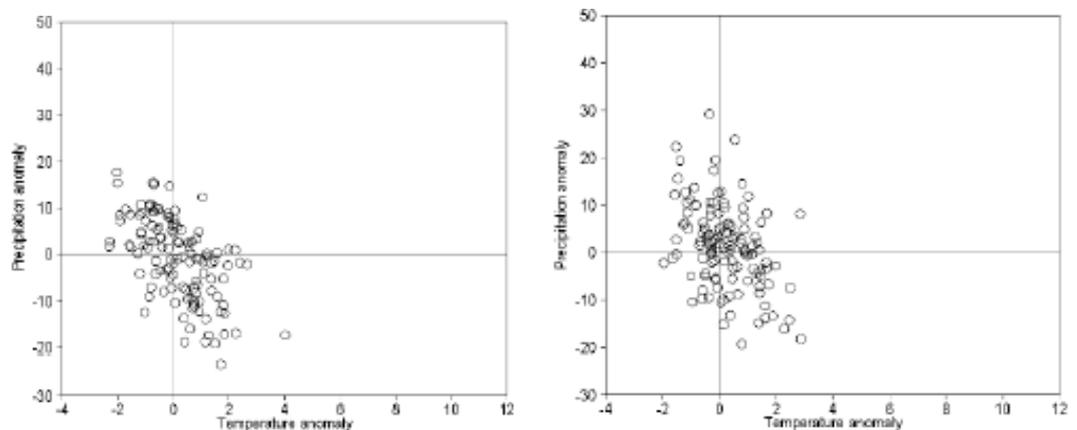


Fig. 1. Precipitation anomalies in May-July in dependence on corresponding anomalies of surface air temperature for ER (left) and AR (right) from observations for the period 1891-2015.

Figure 2 shows significant differences of local coherence of precipitation and surface air temperature in May-July for ER and AR from observations for the period 1891-2015. There is significant negative correlation between long-term variations of precipitation and temperature for ER. Such a correlation for AR is less significant, especially during last decades. On the other hand the negative correlation between precipitation and temperature for AR in May-July is remarkably more significant for interdecadal variations. Negative correlation between precipitation and temperature for interannual variations is displayed for some relatively short periods.

According to [5] climate model simulations with historical scenario display well-marked negative correlation between temperature and precipitation for ER and AR. Significant differences in the East Asian mid-latitude regions to the east from Baikal Lake (in the Amur River basin, in particular) can be related with the influence of the Asian monsoon. Under the warming scenarios in the 21st century, the range of precipitation fluctuations increases and the relationship between precipitation and temperature in midlatitude Eurasian regions becomes less significant as a whole [5].

In particular, according to model estimates the significant negative correlation between long-term variations of precipitation and temperature for ER can become insignificant to the middle of the 21 century or even earlier. In particular, according to model estimates, a significant negative correlation between precipitation and temperature in May-July in the European region may become insignificant by the middle of the 21st century or earlier.

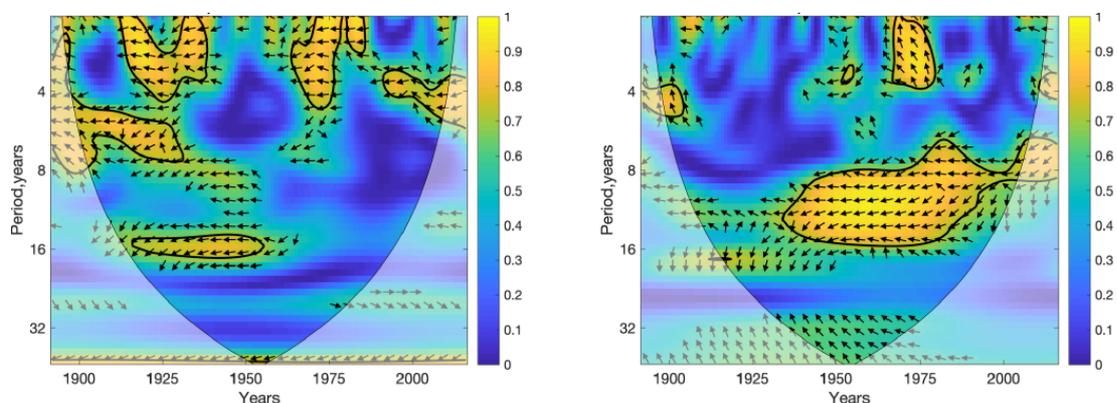


Fig. 2. Local coherence of precipitation and surface air temperature in May-July for ER (left) and AR (right) from observations for the period 1891-2015.

This work has been supported by the RSF (project No. 19-17-00240) using the results obtained in the framework of the RAS Presidium program "Climate change: causes, risks, consequences, problems of adaptation and regulation" and RFBR (projects No. 17-05-01097 and No. 17-29-05098).

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