

Precipitation-temperature relationship in spring-summer for Eurasian regions:

Model projections

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Observations since the end of 19th century (Meshcherskaya and Blazhevich, 1997) show a general decrease of precipitation in spring-summer months in mid-latitude European and Asian Russian regions under regional warming (Mokhov et al., 2002; Mokhov, 2005). Here we estimate possible changes in the precipitation-temperature relationship in spring-summer months from model simulations for the 21st century for different regions, in particular for three mid-latitude regions in the Northern Eurasia (Fig. 1).

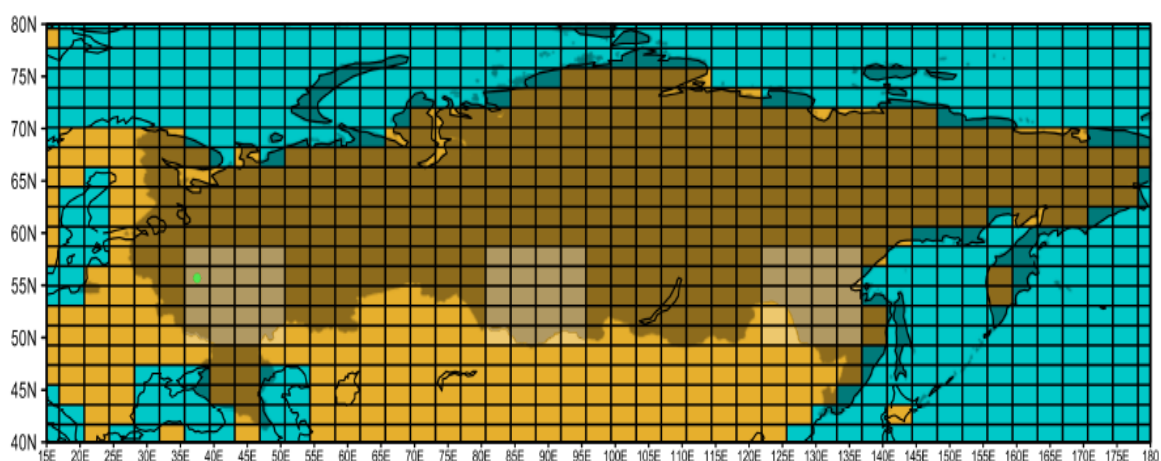


Fig. 1. Selected three regions in midlatitudes of Northern Eurasia.

Figure 2 shows precipitation anomalies in May-July in dependence on corresponding anomalies of surface air temperature for three Eurasian regions (European Territory of Russia (ETR), Asian Territory of Russia (ATR) and Far East of Russia (DVR)) from simulations with the IPSL-CM5B global climate model (Dufresne et al., 2013) under different scenarios. Precipitation and temperature anomalies are analyzed for ETR, ATR, and DVR for 3 scenarios: historical (1850-2005), RCP4.5 and RCP8.5 (2006- 2100) (Fig. 1). Anomalies were calculated for 3 midlatitude regions of Northern Eurasia (Fig. 1).

For historical scenario there is a well-marked negative correlation between temperature and precipitation for ETR and ATR. A significant difference is exhibited for DVR in the field of 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 becomes less significant.

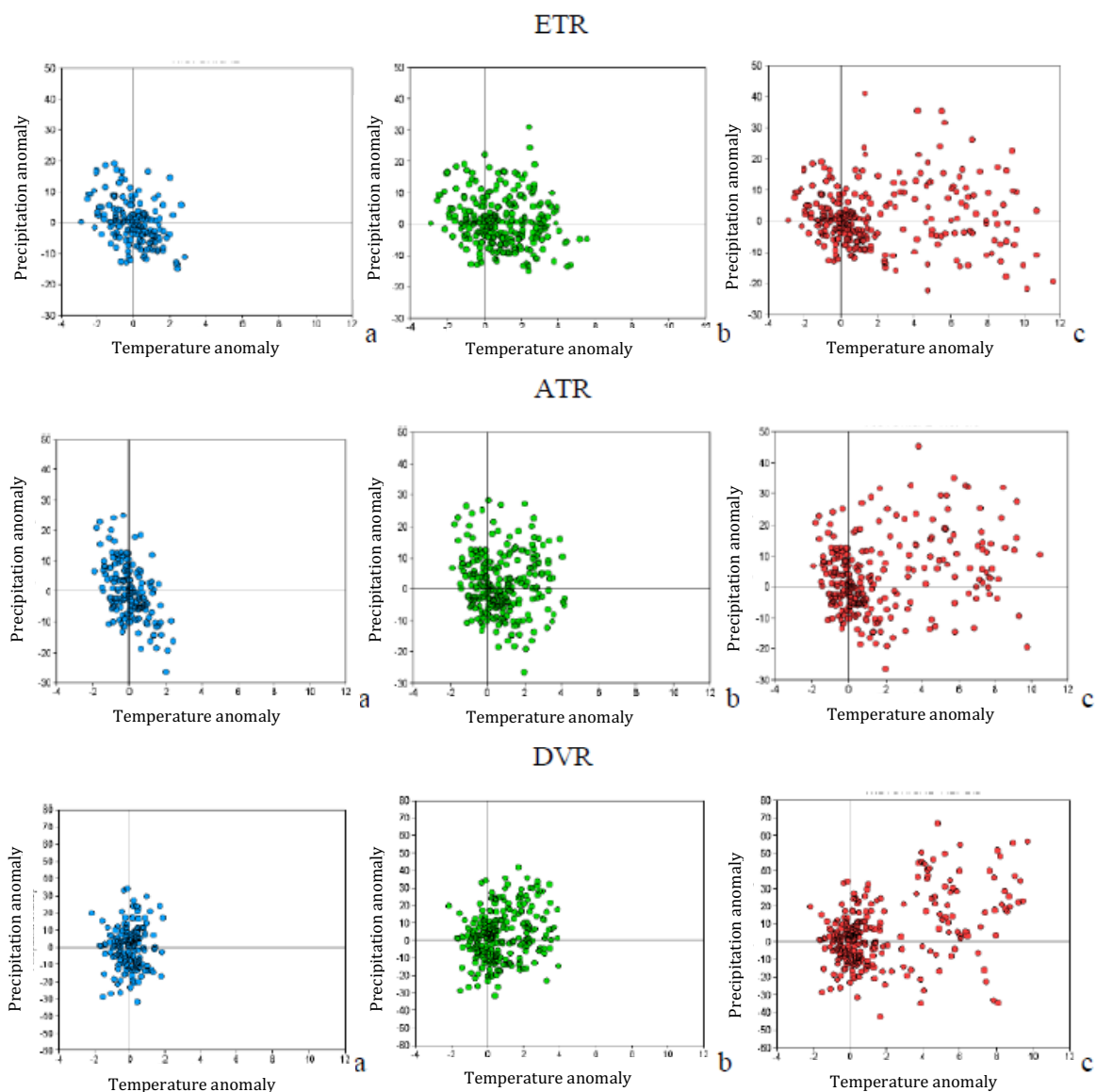


Fig. 2. Precipitation anomalies in May-July in dependence on corresponding anomalies of surface air temperature for three Eurasian regions (ETR, ATR, and DVR) from model simulations for the period 1850-2005 (“historical” scenario (a)) and for the period 1850-2100 (“historical” and RCP4.5 (b), “historical” and RCP8.5 (c)).

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References

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