



Influence of heat balance elements and clouds on temperature variability over the Asian territory of Russia using reanalysis data

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The most important role in the weather and climate formation belongs to radiative balance elements at the top of atmosphere and at the surface. Also clouds contribute to both heating and cooling of climatic system. The main purpose is to investigate the spatial and temporal variability of heat balance elements and cloudiness in the period of global warming 1979-2008 and to detect the relationship between air surface temperature and radiative and heat fluxes. This investigation was carried out for the Asian territory of Russia (ATR), large climatic region in the north-east Asia (45 - 80°N, 60-180°E).

The average fields of radiative and heat balance and the fields of their linear trends were calculated and constructed for the period of 1979 - 2008 for several regions (ATR, West Siberia, East Siberia and Far East) using JRA-25 reanalysis data, which were compared with satellite data (CERES and ERBE).

Slight decrease of radiative balance ($\sim 2\text{W/m}^2$) is observed at the top of atmosphere and we can suppose that the tendency of regional climatic system cooling is possible; it can decelerate the growth of air temperature at the surface.

To determine temperature variability over ATR, we used a regression model, which relates surface temperature anomalies with short-wave radiation anomalies, longwave radiation anomalies, calculated for clear sky, anomalies of latent, sensibility heat, heat flux into the ground, and with cloudiness anomalies. These anomalies describe from 47% to 71% of temperature variability in different months. We also determined the role of each cloud level in air temperature variability. The contribution of each predictor in the regression analysis was calculated.