

Relationship between temperature changes near surface in the Arctic and in different regions of the Northern Hemisphere from reanalyses data

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Assessment of relationship between surface air temperature (SAT) changes in the Arctic as a whole and in different regions of the Northern Hemisphere (NH) has been performed based on data from reanalyses NCEP/NCAR (1948-2001) (Kistler et al., 2001) and ERA40 (1958-2001) (Simmons and Gibson, 2000).

It was noted that the general Arctic warming is accompanied in winter by the SAT decrease over western and northern parts of Atlantic and Pacific Oceans and also over eastern parts of Eurasia and North America (Fig.1). Opposite sign SAT changes are displayed at the same time over eastern and southern parts of oceans and also over western parts of continents.

The displayed dipole regimes over oceans differ from the COWL (Cold Ocean – Warm Land) regimes noted in (Wallace et al., 1995). It is because anomalies in extratropics are not necessary related with an appropriate anomalies in high latitudes. Also the contribution of polar anomalies to the total extratropical anomalies is decreasing due to relatively small area of the Arctic latitudes.

The noted spatial features of a dipole type correspond to the weakening of anticyclonic gyres in the Atlantic and Pacific with a weakening of warm oceanic currents (Gulf Stream and Kuroshio) in western parts of oceans during the Arctic warming.

We thank G.V. Alekseev and R. Barry for useful discussions. This study was supported by the RFBR and RAS program.

References

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Fig.1. Latitude-longitude distribution for coefficients of SAT correlation in the Arctic as a whole (60-90°N) and in different NH regions by reanalyses data for winter seasons: (a) ERA40 (1958-2001), (b) NCEP/NCAR (1948-2001).

