

The intensity of synoptic-scale processes in the Northern Hemisphere and interaction between the North Pacific and North Atlantic storm tracks.

Zyulyaeva Y.A. (1), Gulev S. K. (1)

(1) P.P.Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia

We analyzed the intensities of atmospheric processes in the Northern Hemisphere troposphere-stratosphere coupling, namely 6-hourly geopotential heights from the NCEP/NCAR reanalysis at standard levels from 1000 hPa to 10 hPa during the wintertime (December-February) in 1948-2002 for the better understanding of a role of synoptic scale and storm track variability in the Arctic Oscillation. In order to investigate processes at different time scales, band-pass filtering for different ranges from 0-2 days (ultra-high frequency variability) to more than 12 days (low-frequency variability) was applied (Gulev et al., 2002). For the band-passed time series, we computed standard deviations which were used for quantification of the intensity of the processes for given ranges. Climatological horizontal and vertical distributions of the intensity of atmospheric processes of different scales are quite different both in the Atlantic and Pacific. Spatial distribution of the standard deviations for the ranges from 0-2 days to 4-6 days marks effectively the midlatitudinal storm tracks over the North Pacific and the North Atlantic sectors. Analysis shows that sub-synoptic high-frequency variability is likely associated with the oceanic signals, being closely linked to the NAO mode in the Atlantic and PNA mode in the Pacific. At the same time, longer scale synoptic variability (6-9 days) exhibits close connection with the upper layer atmospheric processes diagnosed through the Polar Night Jet (PNJ) intensity. The EOF analysis of vertical sectors along storm tracks shows that the identified synoptic ranges are associated with the vertically propagating patterns and atmospheric disturbances over the Pacific. Possible mechanisms of the interaction between the North Pacific and North Atlantic storm tracks are discussed.

Gulev S.K., Jung T., Ruprecht E., 2002. Climatology and interannual variability in the intensity of synoptic-scale processes in the North Atlantic from the NCEP-NCAR Reanalysis data. *Journal of climate*.