

Natural Factors of Interannual Variability of Winter Precipitation over the Altai Krai

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Abstract : Winter precipitation variability over the Altai Krai was investigated by retrieving temporal patterns. The spectral singular analysis was used to describe the variance distribution and to reduce the precipitation data into a few components (modes). The associated time series were related to large-scale atmospheric and oceanic circulation indices by using lag cross-correlation and wavelet-coherence analysis. GPCP monthly precipitation data for rectangular field limited by 50-55N, 77-88E and monthly climatological circulation index data for the cold season were used to perform SSA decomposition and retrieve statistics for analyzed parameters on the time period 1951-2017. Interannual variability of winter precipitation over the Altai Krai are mostly caused by three natural factors: intensity variations of momentum exchange between mid and polar latitudes over the North Atlantic (explained variance 11.4%); wind speed variations in equatorial stratosphere (quasi-biennial oscillation, explained variance 15.3%); and surface temperature variations for equatorial Pacific sea (ENSO, explained variance 2.8%). It is concluded that under the current climate conditions (Arctic amplification and increasing frequency of meridional processes in mid-latitudes) the second and the third factors are giving more significant contribution into explained variance of interannual variability for cold season atmospheric precipitation over the Altai Krai than the first factor.

Keywords : interannual variability, winter precipitation, Altai Krai, wavelet-coherence

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