

# ATMOSPHERIC BLOCKINGS IN NORTHERN HEMISPHERE: VARIATIONS DURING LAST DECADES

I.I. Mokhov and A.A. Timazhev

A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, Russia  
mokhov@ifaran.ru

Strongest regional weather-climate anomalies (including hot weather in summer and cold weather in winter) are related with the formation of long-lived blocking anticyclones (blockings). We analyze here variations of blocking activity in the Northern Hemisphere with the use of data from (<http://solberg.snr.missouri.edu/gcc>) for the period 1969-2013 (Wiedenmann et al., 2002; Mokhov et al., 2012).

Figure 1 shows seasonal longitudinal distributions for the blockings frequency in the Northern Hemisphere for two periods: 1969-1990 (I) and 1992-2013 (II). Significant increase in blocking frequency is noted during last decades according to Fig. 1 for different seasons.

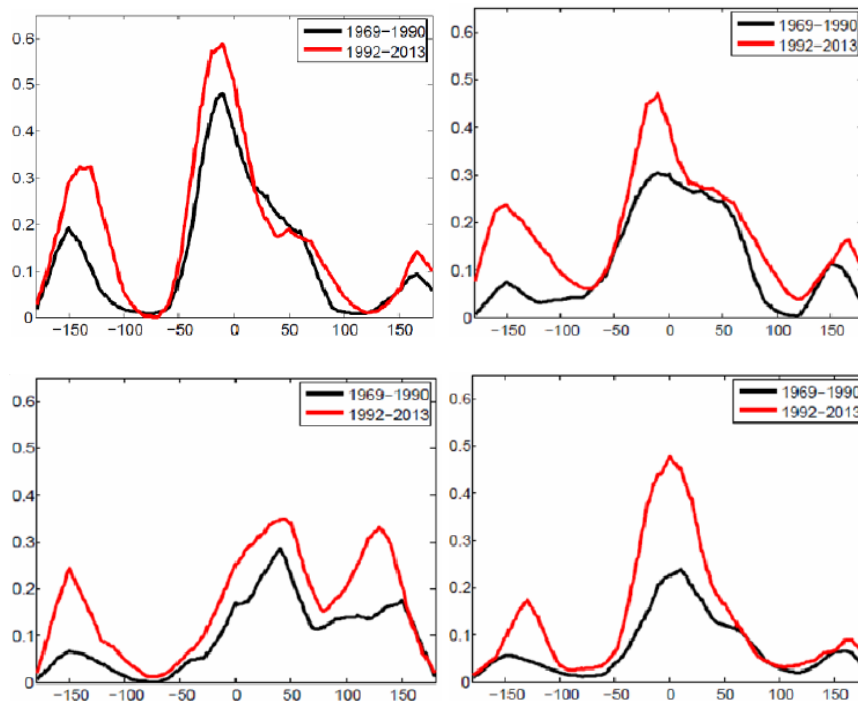


Figure 1. Longitudinal distributions for the blockings frequency in the Northern Hemisphere for two periods (1969-1990 and 1992-2013) in different seasons: winter (first row, first column), spring (first row, second column), summer (second row, first column), fall (second row, second column)/

We analyzed also the blockings frequency dependence on El-Nino/La-Nina phenomena (Mokhov, 2011). In particular, different transitions were analyzed similar to (Mokhov and Timazhev, 2013). Figure 2 shows longitudinal distributions of blockings frequency in summer for years in the neutral El-Nino/La-Nina phase (N) at the beginning (like 2014) and in the El-Nino phase (E) or neutral one at the end of the year. According to the forecasts these two

transitions (N→E and N→N) are the most probable for the year 2014, especially transition N→E.

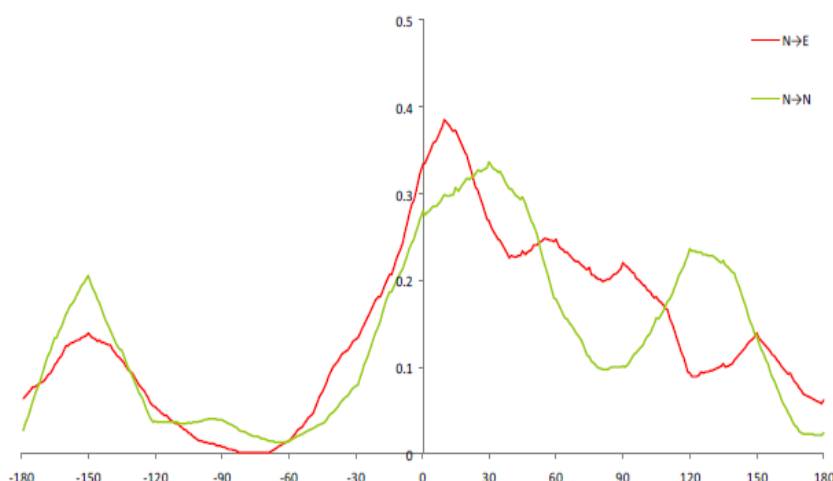


Figure 2. Longitudinal distributions of blockings frequency in summer for years in the neutral El-Nino/La-Nina phase (N) at the beginning and in the El-Nino phase (E) or neutral one at the end of the year.

According to Fig. 2 the largest blockings frequency is corresponding for Western Europe for the most probable in 2014 transition N→E. That means high probability of blocking situation in summer 2014 for Western Europe with a high risk of summer heat wave.

The transition N→N is characterized by significant increase in the blocking frequency over Pacific Ocean. Such a regime was realized in summer 2013 with the long-lived blocking over Pacific. It was a key cause for the formation of the extreme flood in the Amur River basin in summer-fall 2013.

The Russian heat wave in summer 2010 due to long-lived blocking was corresponding to the E→L transition from El-Nino to La-Nina phase. The E→L transition is characterized by the highest risk of hot weather with drought conditions for European part of Russia according to (Mokhov and Timazhev, 2013).

## References

Mokhov I.I., 2011: Specific features of the 2010 summer heat formation in the European territory of Russia in the context of general climate changes and climate anomalies. *Izvestiya, Atmos. Oceanic Phys.*, **47**(6), 653-660.

Mokhov I.I., M.G. Akperov, M.A. Prokofyeva, A.V. Timazhev, A.R. Lupo and H. Le Treut, 2013: Blockings in the Northern Hemisphere and Euro-Atlantic Region: Estimates of changes from reanalysis data and model simulations. *Doklady Earth Sci.*, **449**(2), 430-433.

Mokhov I.I. and A.V. Timazhev, 2013: Climatic anomalies in Eurasia from El-Nino/La-Nina effects. *Doklady Earth Sci.*, **453**(1), 1141-1144.

Wiedenmann J.M., A.R. Lupo, I.I. Mokhov and E.A. Tikhonova, 2002: The climatology of blocking anticyclones for the Northern and Southern Hemispheres: Block intensity as a diagnostic. *J. Climate*, **15**(23), 3459-3473.