

Changes of the Selenga River runoff in the Lake Baikal basin and their relationship to El Niño phenomena

I.I. Mokhov^{1,2} and M.R. Parfenova¹

¹A.M. Obukhov Institute of Atmospheric Physics RAS

²Lomonosov Moscow State University
mokhov@ifaran.ru, parfenova@ifaran.ru

The Lake Baikal basin is among North Asian regions with the strongest warming in summer during the last decades. Long-term positive trends of surface air temperature in the region are accompanied by negative trends for precipitation during the last decades (<http://meteorf.ru/>). Such regional climate trends should cause negative trends of the water balance in the Lake Baikal basin. Against the background of long-term trends, significant interannual climate variations are revealed. In particular, the summer of 2015 was characterized by extremely high temperature and extreme precipitation deficit in the Lake Baikal basin. It can be related with the influence of the strongest El Niño that year [1-8]. We assess here the relationship of the runoff of the Selenga River (as a key water supplier to Lake Baikal) to the El Niño phenomena with the use of cross-wavelet analysis of observations for the period 1934-2015. Different El Niño indices were used to account for different types of El Niño.

Figure 1 shows local coherences of the Selenga River runoff in July with the El Niño indices Niño4 (a) and Niño3 (b) in January for the period 1934-2015. According to Fig. 1 there is significant coherence of the Selenga River runoff in summer with both El Niño indices in preceding winter since 1990s on intra-decadal time scale. There is a significant difference in interdecadal (long-term) coherence for different El Niño indices. Figure 1a shows significant relationship between long-period variations of the Selenga River runoff with Niño4 index since the second half of 1970s. At the same time, Figure 1b does not show any significant coherence between long-period variations of the Selenga River runoff with Niño3 index.

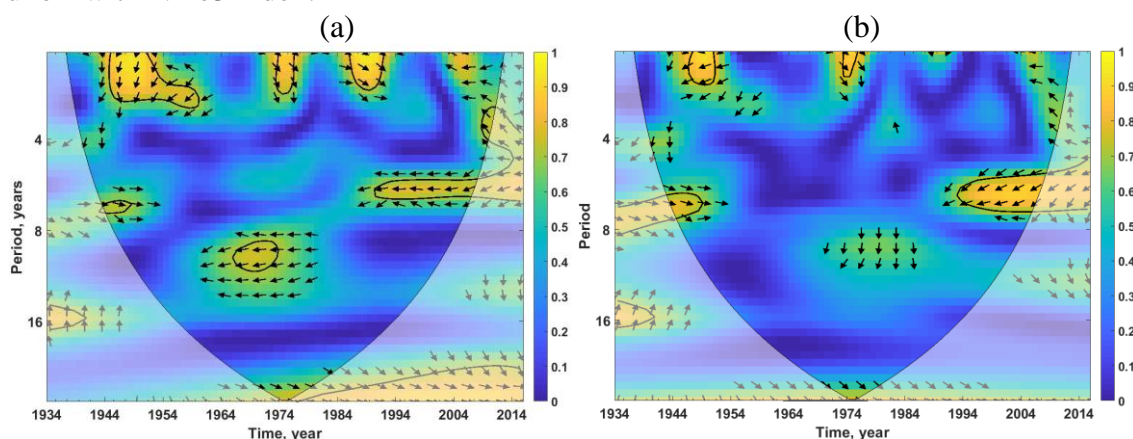


Fig. 1. Local coherences of the Selenga River runoff in July with the El Niño indices Niño4 (a) and Niño3 (b) in January for the period 1934-2015. The arrows signify the correlation phase direction.

Figure 2 shows local coherences of the Selenga River annual-mean runoff with El Niño indices Niño4 (a) and Niño3 (b) in January for the period 1934-2015. According to Fig. 2 in comparison with Fig.1 there is less significant coherence between both El Niño indices in winter and Selenga River annual-mean runoff since 1990s on intra-decadal time scale.

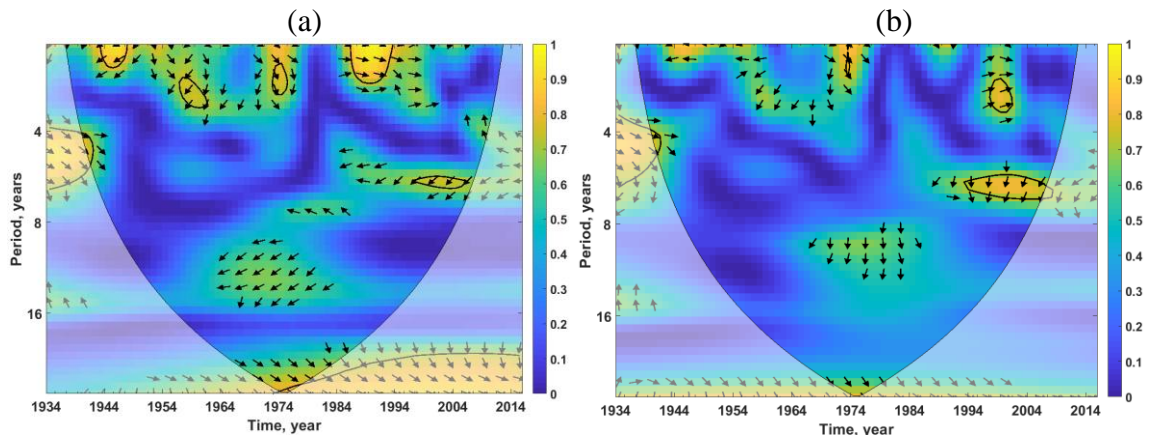


Fig. 2. Local coherences of the Selenga River annual-mean runoff with the El Niño indices Nino4 (a) and Nino3 (b) in January for the period 1934-2015.

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