

## Relationship between the Caspian Sea level and the Arctic sea ice extent

I.I. Mokhov<sup>1,2</sup> and M.R. Parfenova<sup>1</sup>

<sup>1</sup>A.M. Obukhov Institute of Atmospheric Physics RAS

<sup>2</sup>Lomonosov Moscow State University

mokhov@ifaran.ru

One of the largest regional climate variations during the last century is associated with hydrological cycle variations in the Caspian Sea basin with a large anomalies of the Caspian Sea level (CSL) (Arpe et al., 1999; Arpe et al., 2000). Enclosed seas and large lakes like Caspian Sea are sensitive indicators of the global climate and water balance changes (Mokhov, Khon, 2001). The most significant current climate changes are detected in the Arctic with the rapid reduction of the Arctic sea ice extent (Mokhov, 2015). Influence of the strongest changes in the Arctic should be manifested in the middle latitudes, in particular in regions sensitive to global changes. We analyze here the relationship of CSL with the Arctic ice extent. This connection has been studied for a long time, since the days of L. Berg and W. Wiese. We estimate changes in the relationship of CSL with the Arctic ice extent from observations during last decades with the use of cross-wavelet analysis.

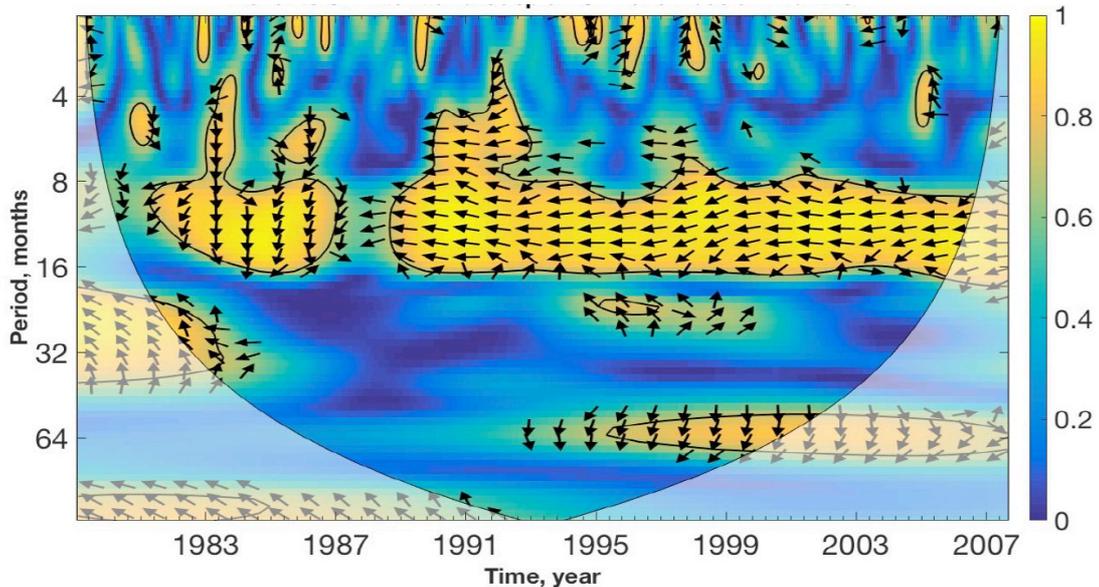


Fig. 1. Local coherence of CSL with BSIE by monthly-mean data for the period 1979-2008.

Figures 1,2 show local coherence of CSL (at Makhachkala) with the Barents Sea ice extent (BSIE) and Kara Sea ice extent (KSIE) by monthly-mean data from (<http://nsidc.org>) for the period 1979-2008. Along with significant coherence for variations in the annual cycle, significant coherence is exhibited for CSL with BSIE and KSIE variations with periods about 5 years and for interdecadal (long-term) variability. The coherence of CSL with variations of BSIE and KSIE with periods of about 5 years (characteristic for El Niño phenomena) was manifested only in last years.

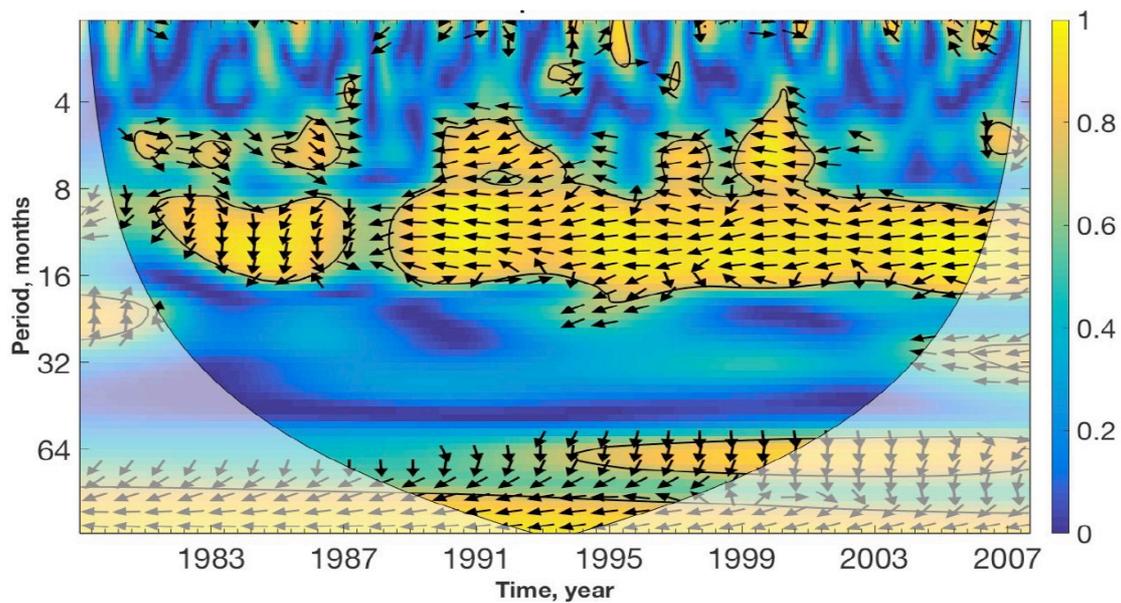


Fig. 2. Local coherence of CSL with KSIE by monthly-mean data for the period 1979-2008.

Interdecadal (long-term) CSL and sea ice extent coherence is more significant for KSIE than for BSIE (Fig. 2). According to Fig. 1, the coherence of CSL with BSIE in the interdecadal variability became statistically insignificant from the end of the 20th century.

This work was supported by the RFBR and RAS.

## References

- Arpe K., L. Bengtsson, Golitsyn G.S., Mokhov I.I., Semenov V.A., Sporyshev P.V. Analysis and modelling of the hydrological regime variations in the Caspian Sea basin. *Doklady Earth Sci.*, 1999, **366**, 552-556.
- Arpe K., L. Bengtsson, Golitsyn G.S., Mokhov I.I., Semenov V.A., Sporyshev P.V. Connection between Caspian Sea level variability and ENSO. *Geophys. Res. Lett.*, 2000, **27**, 2693-2696.
- Mokhov I.I. Contemporary climate changes in the Arctic. *Herald Russ. Acad. Sci.*, 2015, **85**(3), 265-271.
- Mokhov I.I., Khon V.Ch. Projections of future changes of hydrological cycle in the Caspian Sea basin. *Res. Activ. Atmos. Ocean. Modell.* Ed. by H. Ritchie. WMO/TD-No. 1064. 2001, 9.20-9.21.