

ORAL

## NEW RESULTS ON CHRONOLOGY OF LATE PLEISTOCENE PALEOGEOGRAPHICAL EVENTS OF NORTHERN CASPIAN SEA (OSL DATING)

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**Introduction.** The problem of periodization of the history of the natural environment evolution is one of the most important at the present time. For the Caspian region, the lack of factual material in the chronology of the paleogeographical events of the Late Pleistocene caused the current lack of a common view of the scale, duration and position of individual transgressive and regressive stages. So, the discussion continues about the age of the largest in the scale of the Late Pleistocene transgressive epoch of the Caspian Sea - Khvalynian. Age estimates of specialists vary in the range from 70 thousand [Rychagov, 2014] to 20 thousand years [Dolukhanov, 2010; Arslanov, 2016], while the Late Khvalynian stage is included in the framework of the Holocene [Svitoch, 2009]. Obtaining modern geochronological scheme for the evolution of the natural environment of the Caspian region is, in our view, the primary task for creating a reliable basis for paleogeographic correlations and reconstructions.

**Methodology.** Three sections of the Lower Volga region (Fig 1), the stratotypic region of the Late Pleistocene of the Caspian region, were chosen to determine the age of the Early Khvalynian transgression: Srednyaya Akhtuba, Raigorod and Leninsk. All three sections are

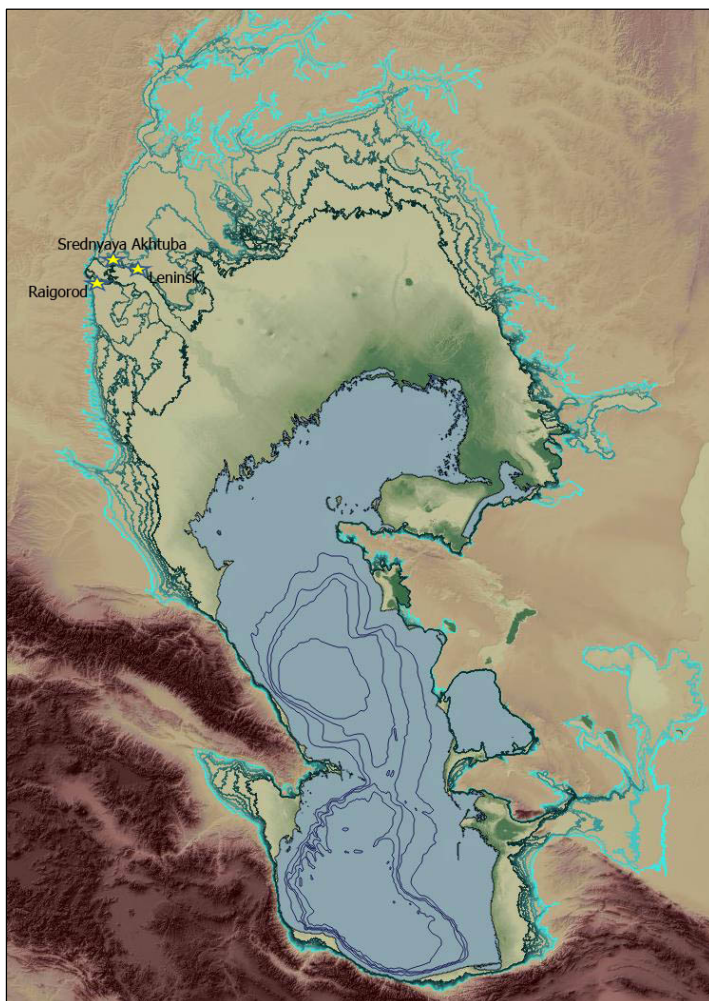


Fig 1. Stages of Kvalynian transgression and position of dated sections

characterized by the presence of a thick stratum of "chocolate clays" and the presence of the Khvalynian fauna in them (Yanina, 2016).

Our chronology is based on the determination of age by the method of optically stimulated luminescence [Murray, 2000] on samples of quartz and feldspar of sand-size (from 90 to 250 microns). The samples were prepared according to a standard procedure. The fine and medium sand fractions selected after sieving were treated with 10% HCl and H<sub>2</sub>O<sub>2</sub>, followed by 10% and 40% HF. Fluorescent dating was performed using Risø TL/OSL reader.

**Results.** OSL signal on the quartz is homogeneous, the dose regeneration coefficients are satisfactory ( $1.02 \pm 0.04$ ,  $n = 16$ ), and the samples of modern analogues, as well as the ratio of the signal over quartz and feldspar, are indicated by a sufficient zeroing of the signal. Our results show that Early Khvalynian "chocolate clays" of three sections is characterized by an age from 12 to 17 thousand years (9 dates). The age estimates obtained for the marine Khvalynina sediments are confirmed by dating of the overlying kashtanozem soils (from 0.16 to 8 thousand years) and underlying loess-soil series (20-25 thousand years) for all three sections studied.

**Conclusions.** The obtained results confirm the young age of the transgressive stage of the Early Khvalynian era, when the layers of chocolate clays of the northern part of the Lower Volga region were formed. In this case, the absolute sampling altitudes (9.33, 8.51 and 6.98 m) indicate that the position of the sea level was above these marks, and the rate of sedimentation was about 50 cm / year.

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## References

- Rychagov, G.I. 2014. Khvalynskii etap v istorii Kaspiyskogo moray [Khvalynian stage in history of Caspian sea] // Vestnik MGU, Ser. Geographiya, № 3, p. 3–9. (In Russian).
- Yanina, T.A., Svitoch, A.A., Kurbanov, R.N., Murray, A.S., Tkach, N.T., Sychev, N.V. 2017. Opyt datirovaniya pleystocenovyyh otlojeniy Nizhnego Povolzhya metodom optichesk-stimulirovannoy luminescencii [Experience of optically-stimulated luminescence dating of Pleistocene sediments of Lower Volga region] // Vestnik MGU, Ser. Geographiya, № 1, p. 3–9. (In Russian).
- Arslanov, K.A., Yanina, T.A., Chepalyga, A.L., Svitoch, A.A., Makshaev, R.R., Maksimov, F.E., Chernov, S.B., Tertychniy, N.I., and Starikova, A.A. 2016. On the age of the Khvalynian deposits of the Caspian sea coasts according to 14c and 230th/234u methods // Quaternary International, 409. P. 81–87.
- Dolukhanov P.M., Chepalyga A.L., Lavrentiev N.V. 2010. The Khvalynian transgressions and early human settlement in the Caspian basin // Quaternary International. —. — Vol. 225, no. 2. — P. 152–159.
- Murray, A.S., Wintle, A.G. 2000. Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol // Radiation Measurements, Vol. 32, Issue 1. P. 57-73.
- Svitoch A.A. 2009. Khvalynian transgression of the Caspian sea was not a result of water overflow from the Siberian proglacial lakes, nor a prototype of the Noachian flood // Quaternary International. Vol. 197, no. 1-2. P. 115–125.