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Paleolimnological and geochronological studies of salt lakes of Crimea, the Black Sea area

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1. Crimea is one of the few places in the northern Black Sea region with mineral lakes with sediments that can give information about paleoclimate and environmental changes over a long time period. All of these lakes are shallow (c. 1-1.5 m), saline of marine origin (former marine bays and lagoons), the emergence of which took place in 'historical' time (c. 5000 yrs ago).
2. The thickness of sediments is reaching up to 20-25 m. The recovery of long sediment sequences permits comparative study of the complex interactions among humans, climate and environment in the Crimea. Moreover, it provides an opportunity to establish a direct chronological link between major ethno-historical and economic processes on the one hand and climatic changes such as wet-dry circles that affected the whole area on the other.
3. Two lake sediment sequences have been recovered from the Crimean Peninsula ((Lake Saki (45º 06',8N; 33º 33',2E, water depth ca 0.8 m, recovered sediments 4.2 m) and Lake Dzharylgach(45º 34',7N; 32º 51',7E, water depth ca 0.8 m, recovered sediments 4.15 m)) during the field campaign 2005, as part of the Joint Danish-Russian-Ukraine project called "Northern Black Sea in the 1st millennium BC: human history and climate changes". In 2006, a detailed examination of the cores was carried out by the team members from the Institute of Limnology, RAS, St Petersburg, the National Taras Shevchenko University of Kyiv, and the Institute of Physics of the Earth, NASU, Kiev. The detailed examination of the cores, which includes varve counting, lithostratigraphy, geochemistry, pollen, diatom and ostracods analyses is presently being carried out. The AMS 14C dating is being processed by the Radiocarbon Laboratory, Institute of Physics and Astronomy.
4. In the both studied lakes, marine sediments overlain by mineralized lake sediments were recovered. The oldest dates from marine sediment from both studied sequences are 5500-5370 cal BP (L.Saki) and 7200-7050 cal BP (L.Dzharylgach).
5. The transition from the open sea environment conditions to the lagoon and the closed mineralized lakes is dated ca 5610-5340 calendar yr BP for the Saki Lake and 5590-5350 calendar yr BP for the Dzharylgach Lake. A complete isolation of the Saki Lake from the Black Sea occurred ca. 5200 calendar yr BP and isolation of the Dzharylgach Lake occurred around 4700 calendar yr BP, 500 years later then Lake Saki, during the transgression phase of the Black Sea.
6. The analysis of ostracods of the Dzharylgach Lake revealed a significant change in their associations along the sediment sequence that corresponded with water-level changes and a connection with the Black Sea. This allowed outlining the lake's main development stages which resulted from the changing paleogeographical situation, climate, and, as a consequence, ecological conditions of the basin.
7. The ensuing glacio-eustatic New Black Sea transgression resulted in a gradual rise of sea level, which reached its maximum of 2.0-2.5 m at 5800-5600 BP. At this stage, sea water penetrated into the river valleys and formed the estuaries which eventually developed into the present-day limans.
8. Pollen diagrams illustrating the region's basic variations in vegetation and climate have been produced for both sediment sequences.
9. New results of our multi-proxy paleolimnological studies which is being carried out in the Crimean Peninsula will be presented during the Conference.