

Formation and early diagenesis of cold and freshwater terrestrial carbonates (lake Sevan, Armenia)

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Processes involved in terrestrial carbonate formation and early diagenesis in cold and freshwater conditions remain poorly understood.

Lake Sevan is one of the largest freshwater high-altitude lakes in Eurasia. Supplied with alkaline water and siliciclastics, it occupies a pull-apart basin that developed along the major active Pambak-Sevan-Sunik fault system. Its intense exploitation during the Soviet period lowered the water level by 20 meters and revealed several generations of paleoshorelines. At Shorja, paleoshorelines are beach-ridge conglomerates with carbonate cements and microbialite-type encrustations and adjoin a beach where they are currently being reworked. These paleoshorelines are therefore ideal to study freshwater and cold-water terrestrial carbonates and estimate the part of abiotic and biotic processes in their formation and early diagenesis.

Radiocarbon and U/Th dating are underway to determine the age of the paleoshorelines. Field observations were realised to establish an inventory of the different type of conglomerates and encrustations observed. Optical and cathodoluminescence microscopy analyses were performed to characterize microfacies and cement generations, respectively. All these deposits were also characterized by scanning electron microscopy coupled with analytical detectors.

The first date acquired is 1355 yr cal. BP. Unconformities indicate composite paleoshorelines in which cements are abundant and diversified, implying a long and complex history. Micritic coatings and several types of peloidal and microsparitic cements precede encrustations, which are either microsparitic or micritic depending on their location in the paragenetic sequence and seem to need a hard substrate to grow. Encrustation features are the same from one paleoshoreline to another, suggesting either similar primary conditions or early diagenetic homogenization. The paragenetic sequence ends with pores that indicate emersive and dissolution episodes.

These preliminary results lead to a first conceptual scheme that addresses the chronological organization of the processes involved in the formation and early diagenesis of these cold and freshwater terrestrial carbonates. These processes are abiotic or biotic and directly linked to high-frequency lake-level changes.

Keywords: terrestrial carbonates, microbialite-type encrustations, early diagenesis, abiotic vs. biotic processes

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