

INVESTIGATION OF THE QUATERNARY HISTORY OF THE COLORADO RIVER USING COSMOGENIC RADIONUCLIDES

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Cosmic-ray-produced radionuclides in surface samples are being used to investigate the emplacement of colluvial and fluvial deposits in the eastern Grand Canyon, between Lee's Ferry and Unkar Creek. The colluvial surfaces in this reach of the Colorado River are mantled by debris-flow deposits emplaced by tributary washes or on pediments, whereas the fluvial surfaces are comprised of river gravels. Downcutting of the Colorado River punctuated by periods of stasis or aggradation resulted in the formation of multiple terraces in which the lowest levels are the youngest. The terrace levels were identified on the basis on morphostratigraphy. These surfaces are mantled by locally derived rocks, many of which contain chert. Cosmogenic ¹⁰Be and ²⁶Al are produced by cosmic ray interactions in chert so these samples should help to establish a chronology for aggradation events in this portion of the Grand Canyon. Soil samples were also obtained from most surfaces sampled for cosmogenic radionuclide measurements, providing a means for calibrating and constraining models of carbonate formation.

In the samples analyzed to date we have demonstrated that chert is a suitable mineral for surface exposure dating. The surfaces have exposure ages ranging from <2000 yr to >100 ka and the lowest level surfaces yield the youngest ages. Based on the ages of the youngest colluvial surfaces, which are dated by archaeological methods, and on the overall consistency of the surface exposure ages, we believe that most samples do not contain inherited cosmogenic ¹⁰Be and ²⁶Al. The older surfaces show evidence of degradation and yield exposure ages less than would be indicated by their stratigraphic level.

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TRACING THE ENVIRONMENTAL EFFECT OF NUCLEAR-WASTE DISPOSAL TO THE OB RIVER SYSTEM IN CENTRAL SIBERIA, RUSSIA USING ACCELERATOR MASS SPECTROMETRY

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In May and June 1995, a Russian-American research team sampled the flowing Ob River system, including the suspended and bed sediments, for determination of radionuclide concentrations. The research team consisted of seven Russian scientists from the State Hydrologic Institute, St. Petersburg, and four hydrologists from the U.S. Geological Survey (USGS). Water samples were collected using high-volume peristaltic pumps, then were prefiltered through 63-micrometer (μm) nylon media and filtered sequentially through 0.45- μm and 10,000-dalton tangential-flow ultrafiltration systems. Samples were collected from five stations along the Ob River system representing channel length of >3,500 km from the headwaters in central Siberia to the Ob Gulf on the Kara Sea. Two