New chronology for the southern Kalahari Group sediments - implications for sediment-cycle dynamics and basin development

Ari Matmon (1), Alan Hidy (2), Shlomy Vainer (1), Onn Crouvi (3), David Fink (4), Yigal Erel (1), Aster Team (5), Liora Horwitz (6), and Michael Chazan (7)

(1) Hebrew University of Jerusalem, Institute of Earth Sciences, Geology, Jerusalem, Israel (arimatmon@mail.huji.ac.il), (2) Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA, (3) Israel Geological Survey, 30 Malkhe Israel Street, Jerusalem 95501, Israel, (4) Australian Nuclear Science and Technology Organization, PMB1, Menai, NSW 2234, Australia, (5) M. Arnold, G. Aumaître, D. Bourlès, K. Keddadouche, CEREGE, UMR 6635 CNRS-Aix-Marseille University, BP 80, 13 545 Aix en Provence Cedex 4, France, (6) National Natural History Collections, Faculty of Life Science, Berman Building, The Hebrew University, Jerusalem 91904, Israel, (7) Department of Anthropology, University of Toronto, 19 Russell Street, Toronto, Ontario M5S 2S2, Canada

Kalahari Group sediments accumulated in the Kalahari basin, which started forming during the breakup of Gondwana in the early Cretaceous. These sediments cover an extensive part of southern Africa and form a low-relief landscape. Current models assume that the Kalahari Group accumulated throughout the entire Cenozoic. However, chronology has been restricted to early-middle Cenozoic biostratigraphic correlations and to OSL dating of only the past ~300 ka. We present a new chronological framework that reveals a dynamic nature of sedimentation in the southern Kalahari. Cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments from the Mamatwan Mine, southern Kalahari, indicate that the majority of deposition at this location occurred rapidly at 1–1.2 Ma. This Pleistocene sequence overlies the Archaean basement, forming a significant hiatus that permits the possibility of many Phanerozoic cycles of deposition and erosion no longer preserved in the sedimentary record. Our data also establish the existence of a shallow early-middle Pleistocene water body that persisted for >450 ka prior to this rapid period of deposition and suggesting an Okavango-like environment. Evidence from neighboring archaeological excavations in southern Africa suggests an association of high-density hominin occupation with this water body.