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Developing a chronological and environmental framework of Early Pleistocene hominin expansions in the Caucasus region: Current research in northern Armenia

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Understanding the chronology and environmental context of the earliest hominin expansions into Eurasia is of considerable interest in palaeoanthropology, however, our current knowledge is based on a handful of sites. Dated to 1.85–1.78 Ma, Dmanisi (southern Georgia) is not only the locus of the earliest *Homo* fossils in Eurasia but has also yielded stone tools and rich assemblages of vertebrate fossils (1,2). Whilst Dmanisi fundamentally changed our views on the timing of hominin expansions out of Africa and the technological capabilities of these populations, it has long represented a single site in the region, and little is known about the broader environmental context.

The Debed Valley (located in the Lori Depression, northern Armenia) represents a key area in which to improve our understanding of this early hominin expansion. The area lies at the southeast margins of the Javakheti Plateau, a large volcanic province spanning both southern Georgia and northern Armenia. Current chronological study of the Javakheti-derived lavas places the interval of volcanic activity between 2.1 and 1.6 Ma (3,4). The lavas are exposed along the Debed valley and trap sediment sequences below, within, and atop the flows.

Here, we present the first results of our ongoing paleoenvironmental and geoarchaeological investigations in the Debed valley. We first present a model of landscape evolution during the Early Pleistocene based on detailed geologic and geomorphic mapping in the valley. We then describe preliminary results from two of the key sequences in the valley: 1) the open-air archaeological site of Haghtanak-3, from which a Mode 1 lithic assemblage has been recovered, and 2) the fluvio-lacustrine sequence of Dzoragyugh-1 paleolake. We discuss the stratigraphic,

sedimentological, and chronological ($^{40}Ar/^{39}Ar$ and palaeomagnetism) results from each site and provide linkages between these sites, the geomorphic evolution of the Debed valley, and Dmanisi sequence. Through this, we highlight the environmental and archaeological significance of sedimentary archives in northern Armenia for understanding the nature and environmental context of early hominin expansions into Eurasia.

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