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The environment of early humans in Southern Caucasus - High-resolution reconstruction of climate and vegetation in Armenia at the Matuyama/Jaramillo reversal

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The Southern Caucasus is the area of earliest human occupation in Eurasia, proven by findings of Homo fossils in Georgia with an age of ca. 1.8 Ma. The pace and causes of the early human colonization, in one or several migratory waves from Africa in new environments of the Eurasian continent during the Early Pleistocene, are still a matter of debate. However, climate change is considered a major driving factor of hominin evolution and dispersal patterns. In fact directly or indirectly by its severe influence on vegetation, physiography of landscape, and animal distribution, climate modulates the availability of resources.

Lake sediments from Sisian Formation, Vorotan River Basin, southern Armenia, provide detailed information on environmental changes during late Early Pleistocene. Based on magnetostratigraphic and radiometric dating, the exposed part of the succession covers a stratigraphic age from ca. 1.3 to 0.9 Ma and includes the Jaramillo subchron. Due to the precise age control high-resolution pollen analysis was conducted at the Matuyama/Jaramillo reversal spanning from 1.12 to 1.035 Ma (MIS 33 - MIS 30) with a mean resolution of ca. 250 years per samples. Results document a clear vegetation response on orbitally forced climatic changes with open vegetation during the less pronounced cycles MIS 33/34, the expansion of broadleaved deciduous forests during the very warm and humid MIS 31, and the expansion of needleleaved forests during the long, cool and humid MIS 30. Furthermore, the age of the numerous macro floral assemblages could be constrained to warm and humid parts of the climatic phases, most of them connected to MIS 31 confirming the dominance of mosaic vegetation at that time. Plant species compositions show strong relations to Euxinian and Hycanian forests occurring today at the coasts of the Black Sea and Caspian Sea, respectively, which must have been expanded considerably during warmer and more humid periods of the Early Pleistocene. Climate quantifications show substantially warmer and 50-100% more humid conditions for most pronounced interglacials. Based on those results we extrapolate the distribution of forests and mosaic landscapes in Southern Caucasus for different climatic phases during Early Pleistocene as a prerequisite for the reconstruction of early human environments in this region.