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Petrogenesis and depositional history of felsic pyroclastic rocks from the Melka Wakena archaeological site-complex in South central Ethiopia

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2 **archaeological site-complex in South central Ethiopia**

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14 **Abstract:** The Melka Wakena archaeological site-complex is located at the eastern rift margin of
15 the central sector of the Main Ethiopian Rift (MER), in south central Ethiopia. This wide, gently
16 sloping rift shoulder, locally called the “Gadeb plain” is underlain by a succession of primary
17 pyroclastic deposits and intercalated fluvial sediments as well as reworked volcanoclastic rocks,
18 the top part of which is exposed by the Wabe River in the Melka Wakena area. Recent
19 archaeological survey and excavations at this site revealed important paleoanthropological
20 records. An integrated stratigraphic, petrological, and major and trace element geochemical study
21 has been conducted to constrain the petrogenesis of the primary pyroclastic deposits and the
22 depositional history of the sequence. The results revealed that the Melka Wakena pyroclastic
23 deposits are a suite of mildly alkaline, rhyolitic pantellerites (ash falls, pumiceous ash falls and
24 ignimbrites) and slightly dacitic ash flows. These rocks were deposited by episodic volcanic
25 eruptions during early to middle Pleistocene from large calderas along the Wonji Fault Belt
26 (WFB) in the central sector of the MER and from large silicic volcanic centers at the eastern rift
27 shoulder. The rhyolitic ash falls, pumiceous ash falls and ignimbrites have been generated by
28 fractional crystallization of a differentiating basaltic magma while the petrogenesis of the slightly
29 dacitic ash flows involved some crustal contamination and assimilation during fractionation.
30 Contemporaneous fluvial activities in the geomorphologically active Gadeb plain deposited
31 overbank sedimentary sequences (archaeology bearing conglomerates and sands) along

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