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Developments in the use of rock hyrax middens as southern African palaeoenvironmental archives

Brian Chase (1,2), Michael Meadows (3), Louis Scott (4), Paula Reimer (5), Arnoud Boom (6), Andrew Carr (6), Lynne Quick (3), Verushka Valsecchi (1), and Loic Truc (1)

(1) Institut des Sciences de l'Evolution de Montpellier, Department of Palaeoenvironments and Palaeoclimate, Montpellier, France (brian.chase@univ-montp2.fr), (2) Department of Archaeology, History, Cultural Studies and Religion University of Bergen, Bergen, Norway , (3) Department of Environmental and Geographical Science, University of Cape Town, Rondebosch, South Africa, (4) Department of Plant Sciences, University of the Free State, Bloemfontein, South Africa, (5) School of Geography, Archaeology and Palaeoecology, Queen's University Belfast, Belfast, Northern Ireland, UK, (6) Department of Geography, University of Leicester, Leicester, UK

Although it is clear that significant climatic changes have occurred in the southern African sector of the southern hemisphere, we have only limited, and often imprecise, knowledge of how the major moisture-bearing atmospheric circulation systems have reacted to these changes, and how regional environments have been impacted. This is due in large part to the region's generally semi- to hyperarid climate, which is not conducive to the preservation of organic material. Recent work, however, has revealed that a valuable palaeoenvironmental archive does exist in this region. Rock hyraxes (Procavia capensis), rodent-like herbivores common throughout southern Africa, defecate in the same location for many generations. These locations, often sheltered in caves, preserve thick accumulations of amber-like dried urine, known as hyraceum, which contains a wide range of palaeoenvironmental proxies. Unlike the herbivore middens of North and South America and Australia, the hyrax middens of southern Africa accumulate in coherent layers, preserving a stratigraphic record of environmental change. Individual laminations can be as fine as 30 μm, and the potential exists for annual or even seasonal records of environmental change spanning tens of thousands of years. Presented here are the results of a number of research initiatives have been launched to assess the potential of hyrax middens as palaeoenvironmental archives, and to analyse their constituent proxy records to answer questions about southern African environmental change. These records are playing an increasingly important role in the development of conceptual models of regional and hemispheric environmental dynamics over the last 40 ka.