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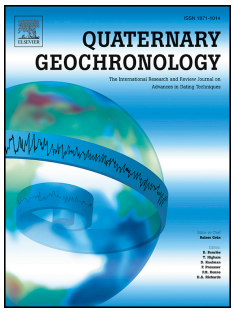

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Coupling cosmogenic nuclides and luminescence dating into a unified accumulation model of aeolian landforms age and dynamics: The case study of the Kalahari Erg

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1. Introduction

The chronology and dynamics of dune fields have been extensively investigated, particularly as proxies in paleoenvironmental studies (reviewed by Heine, 2005; Livingstone et al., 2007; Singhvi and Porat, 2008; Thomas and Burrough, 2012). Dunes are found in a variety of climatic regimes ranging from hyper arid to sub-humid (Telfer and Hesse, 2013). This range of climatic settings is expressed in varied dune morphologies, from un-vegetated and meandering seif dunes (e.g. Tsoar, 1983, 1984), to densely vegetated and degraded dunes with little or no aeolian activity occurring at present (e.g. McFarlane et al., 2005). Specifically, in many semi-arid to arid environments, dune fields and sand sheets are the dominant geomorphological features, thus providing key archives for paleoenvironmental research (e.g. Lancaster, 2013). Due to their varied depositional histories, dune accumulation and erosional phases are usually used to infer paleo-wind patterns, precipitation and vegetation coverage, as well as sediment supply and availability (e.g. Grove, 1969; Heine, 1992; Livingstone et al., 1995; Bullard et al., 1997; Stokes et al., 1997; Thomas et al., 2000; Thomas et al., 2003; Telfer and Thomas, 2007; Chase, 2009; Hürkamp et al., 2011). Furthermore, sand dunes and their surroundings more than often provide archaeological and anthropological archives, many of which extend into the early and middle Pleistocene (Gvirtzman et al., 1999; McDougall et al., 2005; Parker, 2010; Chazan et al., 2012a, b; Lee-Thorp et al., 2012; Dennell, 2013). Therefore, a robust chronological framework is required if a significant connection is to be made between archaeological findings, appearance of sand-dominated landforms and environmental conditions. However, such a