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Weathering and breakdown of mica schist on sand ramps, Cunene Valley, N W Namibia: Implications for understanding the tempo of geomorphic change.

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The Cunene area, in the NW of Namibia, is largely unexplored from a scientific perspective. Currently experiencing hyper-aridity, the area is dominated by a wide range of dune forms, rocky hills and outcrops and ancient, now inactive, valleys. The perennial Cunene River forms the northern border of the area. Mica schists formed during the Damara Orogen (800-650 million years ago) are commonly exposed within the area and are being subjected to apparently rapid rates of salt weathering and other breakdown processes, enhanced by frequent fog events. Along the sides of the Cunene valley, large cliffs of mica schist are fronted by sand ramps. The mica schist cliffs are punctuated by extensive alveoli formation, indicating weathering activity. Sporadic rock falls release debris of varying grain sizes which then, we suggest, become further broken down as a result of *in situ* weathering and breakdown on the sand ramp surfaces. Such rock fall debris, if persistent, may prove a useful tool in understanding the tempo of sand ramp accumulation and rock falls in the area, which may in turn contribute to palaeoenvironmental understanding. We report here on combined field survey of the rock fall debris and laboratory experiments to simulate the breakdown of clasts on the sand ramp surfaces in order to examine the persistence of the clasts.

Surveys of the distribution and granulometry of debris on the sand ramp surfaces reveal a highly patchy pattern, related to jointing and other geological structures which appear to control release of material from the cliff face. Various strands of field evidence point to the control of clast dimensions by both the geology of the schist outcrop and subsequent breakdown on the sand ramp. Experimental simulations of the sand

ramp weathering regime, using real clasts collected from the ramps, indicate surprisingly high resilience of the mica schist clasts in the face of heating and cooling, and salt weathering under conditions of frequent fogs. Aeolian abrasion may contribute to clast breakdown under field conditions, but nevertheless we conclude that breakdown rates of mica schist clasts on sand ramps in the Cunene area are slow and thus the debris recording rockfall events will persist.