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COSMOGENIC ^{10}BE AND ^{26}AL STUDIES OF THE RISING STAR SITE, CRADLE OF HUMANKIND, SOUTH AFRICA: MYSTERY OF THE TRUE DENUDATION RATES

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Assessing the history and rate of landscape change of the Cradle of Humankind (CoH), UNESCO World Heritage Site, South Africa, is important for better understanding of paleo-ecosystems and hominin evolution in southern Africa, as well as fossil deposition and preservation in caves [1]. In the CoH, terrestrial cosmogenic nuclides have previously been used for this [1,2,3], as well as for burial dating of the fossil-bearing cave deposits [4,5,6]. We present new *in situ* cosmogenic ^{10}Be and ^{26}Al concentrations ([^{10}Be] and [^{26}Al], respectively) in quartz and chert from soils, chert float and chert horizons in outcropping dolomite, on the peneplain surface above the Rising Star cave system.

Soil samples yield the highest [^{10}Be] followed by clast samples, with bedrock chert samples yielding the lowest (Table 1). The average apparent erosion rates for the soil and clast samples are similar within 1σ: 3.58 ± 1.91 m/Ma and 4.29 ± 0.69 m/Ma, respectively. The average apparent erosion rate for the bedrock chert is up to three times faster than for soils and clasts (11.28 ± 1.09 m/Ma). All soil samples have ^{26}Al/^{10}Be ratios significantly lower than the 6.75 surface steady state ratio.

Based on ^{10}Be denudation rates previously found (3.6 m/Ma, [2]; 3.44 m/Ma, [1]), the landscape across the CoH is considered old and eroding slowly. High erosion rates similar to our results (5.13 - 15.02 m/Ma) for chert bedrock are ascribed to fast river incision or a recent partial collapse event [1,2]. In contrast, we think our high outcrop erosion rates reflect true denudation and the low apparent values from soil samples indicate long retention of quartz on surface, while dolomite is largely removed in solution. The quartz then experiences periods of burial and reworking in caves and river terraces, resulting in low ^{26}Al/^{10}Be ratios.

Table 1: Range of [10Be] and [26Al] (10^6 atoms/g)		
Samples	[10Be]	[26Al]
Soils	2.28 – 3.91	13.13 – 19.58
Clasts	1.02 – 2.43	7.79 – 14.04
Bedrock chert	0.457 – 0.904	3.79 – 6.66

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