BOISE FUND END OF AWARD REPORT

Name	Michaela Ecker
Year of award	2014/15
Project title	Two million years of environmental change at Wonderwerk Cave, South Africa, explored through stable light isotope analysis
Amount awarded	£2915
Amount spent	£2915
Briefly restate the research question	The award was granted for stable isotope analysis on enamel of herbivores from Wonderwerk Cave, South Africa. In this region, long-term palaeoenvironmental records are sparse, but this analysis will allow detection of proportional changes in the past vegetation in an unprecedented sequence. Furthermore, oxygen isotope analysis will help to refine the climate signal and its relationship with the local vegetation.

In the following space please summarise your results. All text must be confined to this page. Any figures or diagrams can be attached on separate sheets.

Stable carbon and oxygen isotope analysis was run successfully on teeth of the entire Pleistocene and Holocene sequence in Wonderwerk Cave (Excavation area 1 and 2), spanning sediments from 1.96-0.78Ma, 0.78-0.35Ma, 97-220ka and 14-1ka. The associated archaeological remains are from the Early Stone Age (ESA) (Oldowan and Acheulean), as well as the early Middle Stone Age (MSA) and the Later Stone Age (LSA).

The carbon isotope results show a diet comprising a mix of C_3 and C_4 plants for grazer species (Alcelaphini, Equids, *Pedetes capensis*) in the early Pleistocene, with gradually more C_4 intake after 1Ma. During the Holocene and today, those species have a pure C_4 grass diet. In contrast, browsers have a variable C_3 diet throughout the sequence, with a trend to more specialization in the Holocene compared to the Pleistocene strata. The high amount of mixed-feeders in the Early Pleistocene strata is not present in any African savannah ecosystem today, where herbivores are categorized mainly as grazers or browsers. Presence of C_3 grasses in the local ecosystem in the past are the most likely explanation. The evidence for possible presence of C_3 grasses in the early Pleistocene strata is further strengthened by the oxygen isotope data. The results show influences of winter or year-round rainfall, followed by a general trend of increasing aridity, cumulating in the mid-Holocene. The Middle Pleistocene transition stands out as a phase with an especially variable climate signal, suggesting rapid changes from moist and cool to warm and dry conditions.

The outcomes of this study form a fundamental part of my DPhil thesis (supervised by J. Lee-Thorp), where the results are also assessed in the context of impact of palaeoenvironmental changes on human evolution in southern Africa. Publication of the results in international peer-reviewed journals is in preparation. I would like to thank the Boise fund very much for its generous support.