Geophysical Research Abstracts
Vol. 12, EGU2010-9007, 2010
EGU General Assembly 2010

Late Quaternary Megafaunal Extinctions in Northern Eurasia: Latest Results

Anthony Stuart
Biological and Biomedical Sciences, Durham University, Durham UK (tony.s@megafauna.org.uk)

Anthony J. Stuart1 & Adrian M. Lister2
1 Biological and Biomedical Sciences, Durham University, South Road, Durham DH1 3LE, UK. Email: tony.s@megafauna.org.uk
2 Department of Palaeontology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK. Email: a.lister@nhm.ac.uk.

The global extinction of many spectacular species of megafauna (large terrestrial mammals, together with a few large reptiles and birds) within the last c. 50,000 years (Late Quaternary) has been attributed on the one hand to 'overkill' by human hunters and on the other to environmental change. However, in spite of more than half a century of active interest and research the issue remains unresolved, largely because there are insufficient dated records of megafaunal species for most parts of the world.
Northern Eurasia is an especially fruitful region in which to research megafaunal extinctions as it has a wealth of megafaunal material and crucially most extinctions occurred well within the range of radiocarbon dating. Our approach, in a series of projects over the last decade funded by the UK Natural Environment Research Council (NERC), involves amassing radiocarbon dates made directly on megafaunal material from across the entire region: a) by submitting a substantial number of samples (so far c. 500 dates) for AMS dating at Oxford (ORAU); b) obtaining AMS dates from colleagues working on aDNA projects; and c) carefully screening ('auditing') dates from the literature. The dates (calibrated using OxCal) are plotted as time-sliced maps and as chronological/geographical charts.
In our previous work we targeted a range of extinct species from Northern Eurasia: woolly mammoth, woolly rhinoceros, giant deer, cave bear (in collaboration with Martina Pacher), cave lion, and spotted hyaena (which survives today only in Sub-Saharan Africa). By this means we have established a reliable chronology for these extinctions which we are able to compare with the climatic, vegetational and archaeological records in collaboration with colleagues at Durham University, Royal Holloway, University of London and Southampton University. It is clear from the results that environmental change had a major impact, but the geographical and chronological patterns are complex and there is striking variation in extinction dynamics between species. For example cave bear and spotted hyaena show early extinction in Europe c.28 cal ka, whereas cave lion and woolly rhino disappeared in the Late Glacial c.14 cal ka, and mammoth and giant deer persisted in limited areas well into the Holocene.
Our current NERC funded project (3 years from March 2009) extends the scope of our research to include several species that survive to the present day: e.g. musk ox, reindeer, horse, red deer, and moose, and is also extended geographically to Alaska, and the Yukon. Modelling of vegetational changes during the last 40,000 years (by our colleagues at Durham: Judy Allen, Yvonne Collingham, Brian Huntley, using LPJ-Guess data from Paul Valdes) is providing much better geographical coverage than the available pollen data, and also structure and productivity of the vegetation – both of considerable importance to the mammal fauna. Comparing the chronological and geographical dynamics of extant and extinct species promises to shed light on why some species were lost whereas others survived. Moreover, by using a niche-modelling approach we hope to show whether or not species became extinct due to habitat loss, or whether other factors such as human hunting might have been involved in their final disappearance.