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Neanderthal and Anatomically Modern Human interaction with Abrupt Late Pleistocene Environments – the data is finally good enough to talk about climate change!

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The timing and nature of the appearance of Anatomically Modern Humans (AMH) in Europe, their interaction with, and eventual morphological replacement of Neanderthals (despite some shared genetic heritage) has been a matter of intense debate within archaeology for a generation. This period, often termed the Middle to Upper Palaeolithic transition occurs in the latter part of Marine Isotope Stage Three and in recent decades archaeological interest has been complemented by the input of palaeoclimate scientists, over the role of abrupt climate change in this process. This was due to the recognition from ice core and marine proxy archives, in particular, of periods if intense cooling, correlated to the marine record of Heinrich ice rafted debris layers from the Atlantic. As a result of these collaborations between the archaeological and palaeoenvironmental communities various drivers have been proposed for the Middle to Upper Palaeolithic Transition that include: (1) resource competition between two species occupying similar niches; (2) the impact of repeated cycles of Heinrich event cooling, leading to the decline and eventual disappearance of the Neanderthal populations, leaving a new region open for AMH exploitation; and (3) catastrophic impacts of large volcanic eruptions on Neanderthal populations.

Attempts to address the above hypotheses have been dogged by the chronological precision available for a number of key archives. The accuracy of many of the radiocarbon ages that underpin the chronology for both Neanderthal and AMH archaeological sites has been questioned1. This has been exacerbated by uncertainties over the influence of variability in the radiocarbon marine reservoir effect on marine palaeoclimate records and a marine dominated radiocarbon calibration curve. Additionally, the counting uncertainties of the master Greenland palaeoclimate archives are also large by this time, meaning palaeoclimate interpretation can be equivocal. However, several research groups have been independently addressing key archaeological and palaeoclimate sites in order to resolve these chronological uncertainties, using a combination of tephrochronological marker layers2, to synchronise records, and improved radiocarbon dating frameweworks3, including the first terrestrially derived radiocarbon calibration curve4. This paper brings these results together, for the first time, and discusses the concrete evidence now available for any climatic input into the Middle to Upper Palaeolithic transition. By also incorporating reliably dated faunal material, the paper also goes on to discuss the evidence for environmental influences versus intra species competition between the two hominins as a driver behind the transition within Europe.

1. Blockley et al., 2008, Journal of Human Evolution. 55, 764-771.

2. Lowe, J.J., Barton, N., Blockley, S.P.E. et al. 2012. Proceedings of the National Academy of Sciences of the United States of America. 109, 13532-13537.

3. Higham, T.F.G., Douka, K., Wood, R. et al. 2014. The timing and spatio-temporal patterning of Neanderthal disappearance. Nature, 512, 306–309.