



Assessing environmental factors to the replacement of Neanderthals by modern humans in terms of eco-cultural niche modelling

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Eco-cultural niche modelling (ECNM) is an application of ecological niche modelling (ENM) to estimate the human niche in response to environmental settings. The niche probability is calculated for each spatial pixel, based on (1) the location of known archaeological sites as occurrence data and (2) environmental factors such as palaeoclimate (temperature and precipitation), palaeovegetation (biome) and palaeotopography (elevation, slope and aspect). Some ENM software packages, including MaxEnt (maximum entropy model), output the percentage of contribution for each environmental factor, and therefore it is possible to identify and evaluate environmental constraints to the geographic expansion of human populations. Based on this thought, the authors applied ECNM to Palaeolithic stone tool industries in Europe and Siberia at 50–46 kya, the time period during which the first anatomically modern humans (AMHs) are presumed to have appeared in those regions, under the assumption that stone tool groups may reflect different human groups in terms of subsistence strategy. The preliminary results suggested that the population using Emiran and related industries (Bohunician and Bachokirian) were likely to construct their niches in the geographic zones where the long-term variability of the coldest month temperature was larger than in those occupied by the populations using the Late Mousterian, Szeletian and Châtelperronian stone tool industries.