



The velocity of vegetation response to rapid climate changes in the past

Maria Dance (1,3), Sandy Harrison (2), and Iain Colin Prentice (3)

(1) NERC DTP, University of Oxford, Oxford, United Kingdom (maria.dance@env-res.ox.ac.uk), (2) Centre for Past Climate Change, University of Reading, Reading, United Kingdom (s.p.harrison@reading.ac.uk), (3) Department of Life Sciences, Imperial College London, London, United Kingdom (c.prentice@imperial.ac.uk)

Several recent studies focusing on the ‘velocity’ of climate change, i.e. the speed at which a given climate moves across the landscape, have concluded that the projected velocities of climate changes in the near future are far beyond most species’ migration capabilities. But these studies have not attempted to quantify ecological changes that took place in response to the very large and rapid warming events associated with Dansgaard-Oeschger events during the last glacial period. Reconstructions of past climates from high-resolution sedimentary pollen records can provide estimates of the velocity of vegetation response to rapid climate change. Based on a published pollen record from the Massif Central, France, we show that reconstructed coldest-month temperatures – a major limiting factor for the distribution of many species of plants and animals – varied over Dansgaard-Oeschger cycles by up to 9°C, implying an average (geometric mean) velocity of vegetation response of 1.8 km/year across the surrounding region. Such a high velocity is contrary to conventional wisdom concerning the (in)ability of plant species to respond rapidly to changes in climate.