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Modelling the Climate of the Last Interglacial Using a Fully Coupled General Circulation Model

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Palaeorecords and previous modelling studies indicate that arctic summers were significantly warmer during the Last Interglacial (LIG) (∼130 to 116ka) and eustatic sea level estimated to be between approximately 2 to 8 m higher than today, implying less glacial ice on Earth during this period (e.g. Stirling *et al.*, 1998; Muhs *et al.*, 2002; Kopp *et al.*, 2009). Previous Atmosphere Ocean General Circulation Model (AOGCM) simulations have shown summer arctic warming of up to 5˚C (Montoya *et al*. 2000; Kaspar *et al.*, 2005) with the largest warming over Eurasia and in the Greenland region. Since and prior to the last IPCC report, however, there has been no standardised intercomparison of LIG model simulations from 130 to 125 ka.

Simulations which form part of the Past4Future program (www.past4future.eu/) have been performed in order to characterise the response of the climate system to changes in greenhouse gas concentrations and orbital forcings between 130 and 125ka conforming to the PMIP3 standard. This will enable a standardised intercomparison for the LIG to be realised. Three snapshots at 130, 128 and 125ka were run using the UK Met Office climate model, HadCM3 with the MOSES 2.1 land surface scheme, for 500 model years. Comparisons with proxy records for summer arctic temperatures are made showing general agreement. Changes in seasonal temperature and hydrology have also been assessed. The greatest change in near-surface air temperature compared with preindustrial occurs during the summer months, particularly over Greenland and Eurasia, while winter temperatures in the Northern Hemisphere are marginally colder than preindustrial. Annual temperatures are not significantly different compared with preindustrial consistent with the orbital forcing.

These key climate snapshots will further be used to evaluate low resolution GCM simulations (e.g. the FAMOUS climate model) which have the ability to perform a transient simulation between 130 and 125ka without the computational expense required by a more complex and higher resolution GCM such as HadCM3.

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