Geophysical Research Abstracts
Vol. 18, EGU2016-8881, 2016
EGU General Assembly 2016

Episodic speleothem deposition in Ireland during the late Quaternary; implications for Greenland ice core chronology and British-Irish Ice Sheet dynamics

Frank McDermott (1) and Adelheid Fankhauser (2)

(1) UCD School of Earth Sciences, University College Dublin, Belfield, Dublin 4, Ireland, (2) EC-JRC, Institute for Reference Materials and Measurements (IRMM), Retieseweg 111, 2440 Geel, Belgium

In shallow caves, episodes of speleothem deposition during the late Quaternary, constrained by U-series dates, provide unequivocal evidence for periods of climate amelioration (presence of liquid water, elevated soil pCO_2). U-series data for speleothems from several cave systems in Ireland (Crag, Ballynamintra and Marble Arch) provide clear evidence for episodic speleothem deposition, ranging in age from Marine Isotope Stage (MIS) 7 to the Last Glacial Termination. Speleothem deposition and non-depositional phases within these caves are particularly sensitive to regional-scale climatic conditions, reflecting Ireland's mid-latitudinal, Atlantic margin location. Currently, the earliest dated speleothems from the region are sparsely preserved and thin MIS 7 and MIS 5 flowstones from Ballynamintra and Crag caves respectively. Relatively short-lived depositional phases also occurred at Crag cave during MIS4 and MIS3 and are coeval with the Greenland Interstadials (GI), supporting the recently modified GICC05 Greenland ice core chronology (Buizert et al., 2015), and new providing evidence for synchronous or nearly-synchronous climate amelioration in the N. hemisphere mid- and high-latitudes during the GI events. On the other hand, there is strong evidence that conditions at Crag cave site during stadials and the Heinrich stadials were not conducive to speleothem deposition. Episodes of non-deposition occur synchronously in several speleothems from Crag cave, providing independent constraints on the timing of Heinrich stadials HS-6 to HS-2. The new data also provide independent new insights into the behaviour of the British Irish Ice Sheet (BIIS) during MIS2. In this regard, the presence of a short depositional pulse at 23.35 $\pm$ 0.1 ka at Crag cave coincides precisely with the weak and short-lived GI2.2 event within MIS 2, suggesting a dynamic BIIS margin. Simple conductive thermal models for the propagation of surface air temperatures through the limestone karst indicates very rapid (typically sub-decadal) transfer of transient climate anomalies into the cave systems, underpinning the observed sensitivity of these systems to surface climatic conditions.

Buizert et al. (2015) The WAIS Divide deep ice core WD2014 chronology - Part 1: Methane synchronization (68-31 ka BP) and the gas age-ice age difference. Clim. Past, 11, 153-173.