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Landforms, sediments and dates to constrain rates and style of marine-influenced ice sheet decay; the BRITICE-CHRONO project.

Chris Clark and the BRITICE-CHRONO Team
University of Sheffield, Geography, Sheffield, (c.clark@sheffield.ac.uk)

Uncertainty exists regarding the future mass of the Antarctic and Greenland ice sheets and how they will respond to forcings from sea level, and atmospheric and ocean temperatures. If we want to know more about the mechanisms and rate of change of shrinking ice sheets, then why not examine an ice sheet that has fully disappeared and track its retreat through time? If achieved in enough detail such information on ice retreat could be a data-rich playground for improving the next breed of numerical ice sheet models to be used in ice and sea level forecasting. We regard that the last British-Irish Ice Sheet is a good target for this work, on account of its small size, density of information and with its numerous researchers already investigating it.

Geomorphological mapping across the British Isles and the surrounding continental shelf has revealed the nature and distribution of glacial landforms. Here we demonstrate how such data have been used to build a pattern of ice margin retreat. The BRITICE-CHRONO consortium of Quaternary scientists and glaciologists, are now working on a project running from 2012 – 2017 to produce an ice sheet wide database of geochronometric dates to constrain and then understand ice margin retreat. This is being achieved by focusing on 8 transects running from the continental shelf edge to a short distance (10s km) onshore and acquiring marine and terrestrial samples for geochronometric dating. The project includes funding for 587 radiocarbon, 140 OSL and 158 TCN samples for surface exposure dating; with sampling accomplished by two research cruises and 16 fieldwork campaigns. Results will reveal the timing and rate of change of ice margin recession for each transect, and combined with existing landform and dating databases, will be used to build an ice sheet-wide empirical reconstruction of retreat. Simulations using two numerical ice sheet models, fitted against the margin data, will help us understand the nature and significance of sea-level rise and ocean/atmosphere forcing on influencing the rate of retreat and ice sheet demise and the effect that bed topography has in controlling this.