

Empirically constrained ice sheet modelling of the last British-Irish Ice Sheet using the new BRITICE-CHRONO age assessments.

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Improved understanding of the dynamics, extent and palaeogeography of retreating ice sheets can be accomplished by combining ice sheet modelling with the wealth of evidence they leave behind. Large volumes of constraining data exist and numerical models which can simulate entire glaciations are readily available. However, attempts to directly compare and connect empirically-based reconstructions with model-based simulations have been surprisingly rare, perhaps due to the complexity of combining the two fields and the abundance of approaches that could be taken. Here, we focus on a new method of directing ice sheet model simulations to match empirically reconstructed ice extents through time.

Empirical evidence recording the behaviour of the last British-Irish Ice Sheet has been enhanced by the BRITICE-CHRONO consortium of researchers. This has been a six-year project to constrain the timing of retreat by a systematic dating programme focused on the marine-to-terrestrial transition. From two research cruises (18,000 km of geophysical data and 377 vibro- and piston cores), along with numerous investigations of stratigraphic sections on land we collected samples for dating from 914 sites from which 639 new geochronometric ages have been derived (336 radiocarbon, 156 luminescence and 157 cosmogenic). Organised into eight key transects from the shelf break to tens of kilometers onshore the pattern and pace of retreat has been compiled into an ice sheet wide reconstruction of ice extent at one thousand year times steps. We then used numerical models either forced or nudged to comply with these ice extents to yield simulations of ice sheet change thereby incorporating ice sheet physics, grounding lines, ice shelves, ice streams, and glacio isostatic adjustment and sea level. This empirically-constrained model simulation of the last British-Irish Ice Sheet will be presented.