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Dating constraints on the last British-Irish Ice Sheet: a map and database

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Abstract

We present a collation of 975 published dates relevant to the timing of build-up and retreat of ice over the British Isles during the most recent glacial stage. The spatial distribution of dates is essential to interpreting the evolution of the ice sheet over time and space. For this reason the dates are presented as a map showing the spatial distribution across the UK and Ireland. Full documentation for each date, attributed to its source publication and detailing geographic location, the material dated, its stratigraphic position or setting, the dating technique, the dating result, errors and calibration, and comments pertinent to its interpretation, are included in the accompanying table. It is anticipated that this dataset will be a useful resource for Quaternary research in the UK and Ireland and is therefore available to download as a shapefile and/or PDF file. The map is presented at a scale of 1: 2,700,000, designed to be printed at A2 size.

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1. Introduction

Geochronology is an essential tool for ice sheet reconstruction. It enables us to connect spatially fragmented evidence, relate glacial events to dated climatic changes and consider the phasing of glacial events. Substantial effort has gone into establishing a chronology of the last British-Irish Ice Sheet (BIIS) (e.g. Andersen, 1981; Ballantyne, 2010; Bowen et al., 2002; Chiverrell and Thomas, 2010). Yet for a long time the chronology has been insufficient for assessing phasing with other ice sheets such as the Laurentide and Scandinavian, or the timing of regional/global climate signals such as Heinrich Events. For example, until very recently, the extent at the Last Glacial Maximum (LGM) was constrained by only five dates (Bowen et al., 2002). Often, and probably for good reasons such as cost and time, much geochronological work has been conducted on a local scale. The local-regional focus of the majority of work fails to produce a robust picture of the general form of the ice sheet and the relative timing of different sectors. In the absence of a good spatial density of dates there is a temptation to extrapolate local interpretations to the whole ice sheet. However, due to the geographic situation of the BIIS on the edge of the North Atlantic and its sensitivity to multiple transitions in the location of the Polar Front, it is probable that different sectors of the multi-domed ice sheet operated differently (Scourse et al., 2009; Clark et al., in press). Recent work has reflected a desire to produce ice sheet scale syntheses (e.g. Clark et al., 2004a; Evans et al., 2005; Bradwell et al., 2008b) but this has been largely pattern-based rather than on timing. Recent attempts at compiling dating information are welcome contributions, though have thus far focussed on a single time period (e.g. the LGM; Chiverrell and Thomas, 2010), dating method (e.g. terrestrial cosmogenic nuclides; Ballantyne, 2010) or data type (e.g. the offshore record of ice-rafted debris; Scourse et al., 2009). A full and insightful reconstruction of the last BIIS requires a synthesis of all available geochronological information across the whole of the former bed of the ice sheet, and beyond (e.g. Gyllencreutz et al., 2007), to tie point and spatial-pattern evidence, from sediments and geomorphology, together with data on timing.

This paper presents a database and map of published absolute dates that constrain the timing of the ice sheet. Our aim was to produce an easily accessible reference database of all published chronological evidence along the lines of the BRITICE database and map of geomorphological evidence (Clark et al., 2004a; Evans et al., 2005). This was motivated by the need to combine evidence from spatially distant parts of the ice sheet margin in order to reconstruct the retreat of the last BIIS (Clark et al., in press). The total volume of information gathered from systematic inspection of the literature (975 dates) was found to be reassuringly large. A considerable volume of information has amassed in the last decade, partially due to the advent of new dating methods such as *in situ* terrestrial cosmogenic isotope dating and a renewed interest in the last BIIS (e.g. Vincent et al., 2010; Ballantyne, 2010). In addition to reporting here the 'raw' summary of existing information, dates have been interpreted in terms of their significance for ice sheet glacial history. All ages referred to in this paper are calendar ages unless documented with the suffix ^{14}C yr BP. The database follows a similar and more ambitious project to produce isochrones of build-up and deglaciation from a collation of dates and margin positions for all Eurasian ice sheets during the last glacial cycle conducted by the DATED-group at University of Bergen (Gyllencreutz et al., 2007) and the earlier compilation for the Laurentide Ice Sheet by Dyke et al. (2003).

2. Methods

2.1 Data collation

We conducted a thorough (but probably not exhaustive) search of the published literature for dates pertaining to the growth, development and decay of the last BIIS. Review articles and previous collations of chronological information were consulted in the first instance, including the online Oxford Radiocarbon Laboratory Datelist (Oxford Radiocarbon Accelerator Unit, 2008) and review articles (Sissons, 1967; Andersen, 1981; Sutherland, 1984; Jones and Keen, 1993; Bowen, 1999; Knight, 2001; Bowen et al., 2002; Evans et al., 2005). For Ireland the journal archives of *Archaeometry* (which publishes Oxford radiocarbon laboratory results) and *Radiocarbon* (Cambridge, Dublin, Belfast, Birmingham, SRR) were systematically searched. The search was extended beyond the Quaternary glaciological literature in order to capture a larger number of relevant dates. For example, the online date list of the Council for British Archaeology (CBA) 'Archaeological Site Index to Radiocarbon Dates for Great Britain and Ireland' was obtained in full from The Archaeology Data Service (Council for British Archaeology, 2000, (updated 2008)). The census date for inclusion of material was 31 October 2009. In press articles were included if available to us by this date. The dataset therefore is an update to that referred to in Greenwood and Clark (2009) for the Irish Ice Sheet which had a census date of February 2008. A full bibliography for the table is included at the end of this paper.

All sites from the continental shelf relating to the ice sheet and thought to be within the maximum extent limits portrayed in Sejrup et al. (2005) are included (Figure 1). Dates from beyond the maximum limits are excluded from the main database with the exception of dates on or close to the accepted maximum southern extension of ice across England and Wales. Offshore dates with implications for the timing of glacial events, such as the flux of ice-rafted detritus (IRD) (e.g. Scourse et al., 2009), are not included but instead are presented in Figure 1, together with a summary of the chronology of the adjacent Fennoscandian Ice Sheet.

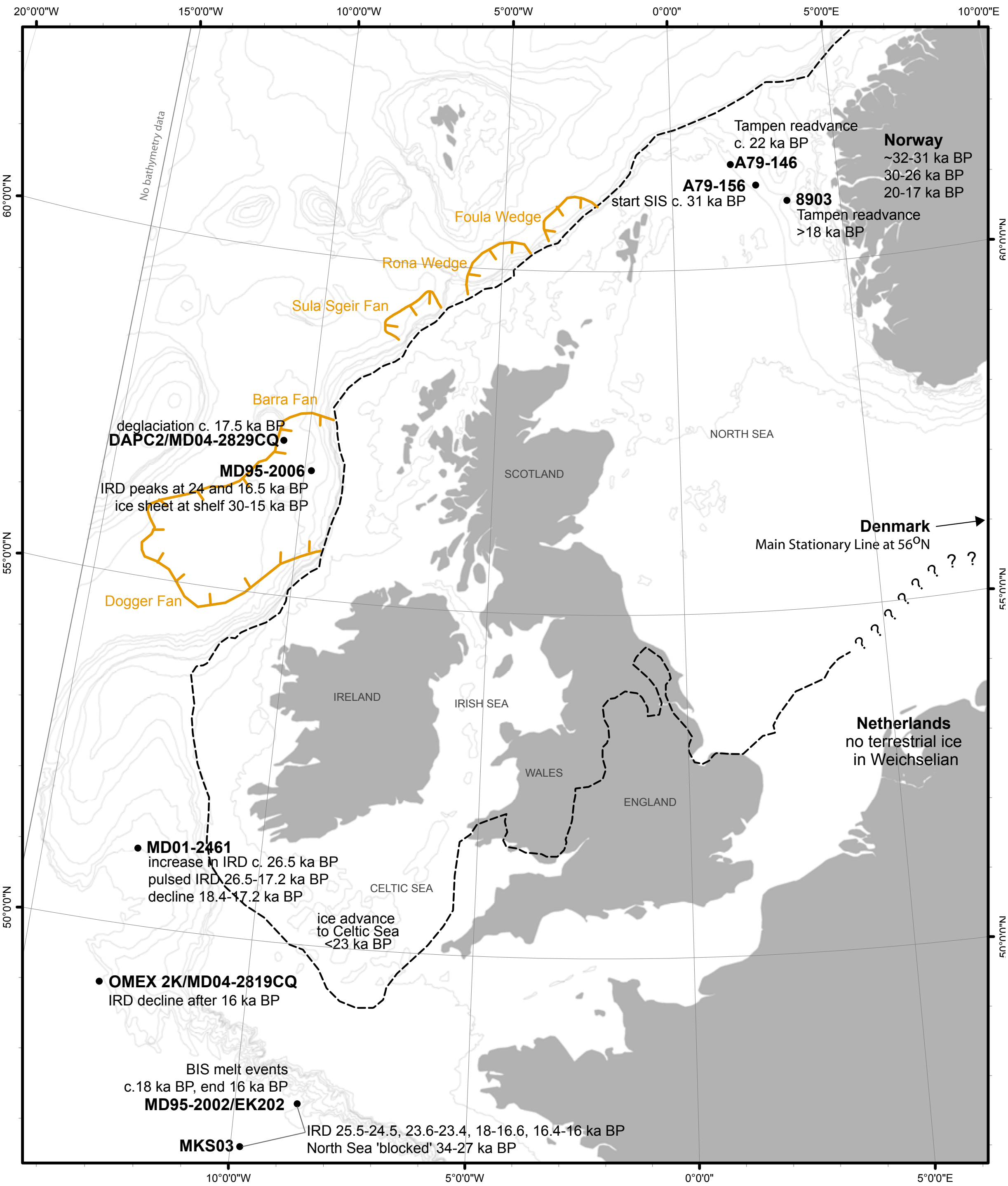

Figure 1. Summary of distal geochronological information (from beyond maximum limits of the last British-Irish Ice Sheet). Information derived from a number of sources (Kroon et al., 2000; Auffret et al., 2002; Wilson et al., 2002; Carr, 2004; Houmark-Nielsen, 2004; Laban and van der Meer, 2004; Mangerud, 2004). Dashed line marks presently accepted maximum extent of ice during the last glacial. This is simplified after Sejrup et al. (2005) and Bradwell et al. (2008b). Only dates that fall within this maximum extent, as defined here, are included in the database in this paper.

Information we report for each date broadly follows that included by Dyke et al. (2003) in their database of radiocarbon dates for the Laurentide Ice Sheet. Location is given as reported in the original source; either latitude/longitude or national grid reference as appropriate. For completeness, where only one piece of location information was reported in the original source this was used to calculate the absent coordinates. In some cases precise geographic and projected coordinates were unspecified. To obtain coordinate information the location figure from the particular paper was scanned and geocorrected to obtain latitude/longitude and national grid reference (see Clark et al., 2004a, for description of the geocorrection procedure). Due to the potential for introducing location errors by this technique, if the site in question was considered a 'classic' or one reported in other papers, these references were checked prior, and in preference, to scanning. It is estimated that the error due to misplacement of dated sites is on the order of 1 km and therefore unlikely to be problematic for reconstruction at the scale of the ice sheet. Locations are given as 12 figure UK Ordnance Survey or Irish grid references and decimal degrees to three decimal places.

We report all dates and errors (to 1 standard deviation) as given in the original reference. Dates are from a variety of dating methods, but primarily radiocarbon analysis. In the case of radiocarbon dates the original radiocarbon age excluding any correction for marine reservoir effect is reported. All radiocarbon dates require calibration to calendar ages before they can be considered alongside absolute dates derived by other methods (Reimer et al., 2004; 2009; Guilderson et al., 2005). Detailed discussion of the differences between the available calibration curves is documented in (van der Plicht et al., 2004). The BIIS retreat pattern chronology presented in Clark et al. (in press) is based on the database presented here with the Fairbanks 0107 curve and online calculation tool (http://radiocarbon.ldeo.columbia.edu/) used to calibrate all radiocarbon dates (Fairbanks et al., 2005). Use of the Fairbanks calibration curve was largely a pragmatic choice. An alternative would have been to calibrate using the internationally agreed calibration curves INTCAL04 (Reimer et al., 2004) and MARINE04 (Hughen et al., 2004), as appropriate for each date, to the limit of these curves at c. 26 ka BP and continued with the Fairbanks curve for the remainder, noting the offset at the point of change. However, it was decided that the advantages of such an approach were outweighed by the benefits of using the same calibration curve for all dates, thus creating an internally consistent database from which to reconstruct the retreat pattern and timing of the last BIIS. Whilst this manuscript was in review, the INTCAL09 and MARINE09 curves extending back to 50 ka BP were released (Reimer et al., 2009). We therefore updated the database and calibrated ages listed in the Table are derived using the CALIB Radiocarbon Calibration Program (Version 6.0.2; http://calib.qub.ac.uk/calib/) using INTCAL09 and MARINE09 calibration curves as appropriate for each date. The calibrated dates therefore deviate slightly from calibrated ages listed in the database exert in Clark et al. (in press) and in Greenwood and Clark (2009). Twenty-eight dates were unable to be calibrated as they were either out of range of the calibration curve or no error margins were specified. Both calibrated ages and original radiocarbon ages are presented in the accompanying Table.

Dates from *in situ* terrestrial cosmogenic nuclide dating are reported assuming zero erosion where different estimates are given in the original source, or as per original source where only one case is given. However, it is acknowledged that this is likely to be an unreasonable assumption in the context of a history of glacial erosion and deposition. Where there are multiple dates at a single location, it is common in cosmogenic exposure dating, though not always preferred, to take the oldest date as the most reliable (Phillips et al., 2008). This considers the possibility of inheritance and/or postglacial shielding and interprets the oldest date as a minimum limiting age (Heyman et al., 2011). However, some studies use a weighted average of the ages especially where ages occur in a cluster (e.g. Everest et al., 2006; Clark et al., 2009a;b). The most appropriate treatment of multiple dates from a single site is still under debate so combined/averaged ages should be treated with caution especially in consideration of differences arising due to various production rate models and significant error margins (e.g. ± 1000 years) (Heyman et al., 2011; Ballantyne, 2010). Each individual sample date is presented in the Table. No 'recalibration' of cosmogenic nuclide dates using different production rate estimate models has been conducted (e.g. Balco et al., 2009; Ballantyne, 2010). We report cosmogenic exposure ages derived using the production rate estimates and scaling as chosen in the original publication and do not report isotope determinations or associated sample information necessary to recalculate ages (Dunai and Stuart, 2009; Balco et al., 2008). We suggest reference to original sources for full details of laboratory calculations and measurements, and strongly recommend recalculating dates using the same production rates and scaling for precise comparisons with new information.

Where available, the following additional information is reproduced from the source material. Laboratory codes and/or sample numbers or source reference codes are given when listed in original source. Material dated, method of dating, and stratigraphic or setting information, including elevation, is reported as described in the original source. Interpretation of ice sheet context (see below) is based on this information and therefore is dependent on the original quality of description/interpretation. Additional pertinent comments made by the original authors and/or subsequent researchers are also recorded, for example, if a date was believed to be unreliable due to contamination. Many of the dates derived from the CBA date list contain little or no information on the stratigraphic position of the sampled material. Most of these dates are from archaeological artefacts and bone found in caves, and therefore constrain the approximate date that the cave was occupied. So, although they do not have complete stratigraphical information, where the sites lie within or close to the limit of the glaciated area, they can still provide minimum dates for when an area became deglaciated enough to allow human or animal occupation, and maximum dates for the onset of glacial conditions that prevented settlement.

During compilation of the database, no discrimination was made on the quality or reliability of dates. All dates encountered are reported here; any comments made by authors on the likely reliability of their dates are noted.

2.2 Interpretation

To the compilation of all reported chronological data, we add one element of interpretation. The purpose of data compilation was to provide a resource with which we can constrain ice sheet position in time (see Clark et al., in press). To achieve this, it is necessary to take an interpretative step in terms of each date's context or setting. We assign each reported date an interpreted 'ice sheet context' based on its stratigraphic position or local setting (*c.f.* Bryson et al., 1969). Note that no new data or analysis is introduced in assigning a context to dates; we merely use the setting information provided in the source publication, and as documented in the Table (stratigraphic position/setting and comments columns). The contextual classes into which we organise the dates are as follows:

1. *Advance*: we recognise two types of stratigraphy that provide information on timing of ice sheet build up. Dated material incorporated within till; ice cover must postdate the given age, but is likely close to it, e.g. organics within till deposit. Dated material from a unit stratigraphically below a till unit; ice cover must postdate the given age, e.g. peat underlying till.
2. *Retreat*: dated material records ice free conditions subsequent to ice cover. The site possesses stratigraphic information specifically indicating ice free conditions postdate ice cover, e.g. dated organic material lies stratigraphically above a till, dated material infilling a kettle hole, or exposure age from within/below limit of glacial erosion.
3. *Ice free*: dated material records ice free conditions but its connection to evidence of ice cover is lacking. The site possesses no stratigraphic information which indicates prior ice cover, e.g. animal bones in caves, or organic sediments not explicitly described as overlying a till or subglacial landforms such as drumlins.
4. *Margin*: retreat, with evidence of immediate proximity to an ice margin, e.g. boulder from a moraine crest.
5. *Exposure time (cumulative)*: length of exposure at site that does not possess evidence of glacial erosion, or no setting or 'stratigraphic' information has been provided, e.g. sample above glacial erosion limit or trimline. The age may reflect actual length of time since the site last became exposed, or multiple phases of exposure

and burial beneath non-erosive ice. Applies exclusively to ages derived from *in situ* cosmogenic isotope analysis.

We take the most conservative approach to contextualising the dates from the stratigraphic details provided in the original source material; if 'stratigraphic' position with respect to ice cover cannot be explicitly demonstrated, the date is assigned one of the more open classes (e.g. *ice free*). Dates which have been deemed unreliable are assigned as '*unclassified*'; common reasons for their exclusion include contamination of radiocarbon dates, incomplete resetting of luminescence dates, signal inheritance of cosmogenic surface exposure dates, or unreasonably large error margins. Where a single date can constrain more than one event (for example, organic material between two tills), it is given two classifications (e.g. *advance; retreat*). We note that there may be uncertainty in some classifications because of the lack of stratigraphic information or confidence in an *in situ* assemblage. For example, dates from bones within caves are classified as *ice free*, although they may have amassed in a variety of ways (active use of the cave vs. ice/meltwater transport) which may render the ice free date spatially erroneous. There may be conflicts between our interpretations and those of subsequent users of the database due to reinterpretations of the sedimentological and stratigraphic descriptions made in the original sources.

3. Database and map

From over 200 papers and the databases examined, 975 dates from a total of 378 locations were found and are enclosed in the database. We present the data in the accompanying Table and Map. The dataset is downloadable as a `.shp` and/or `.pdf`. The Map shows all dated sites with corresponding site numbers for cross-referencing with the database; additional `.pdf` layers illustrate ice sheet context information with labelled calibrated ages. We recommend printing with only one or two layers displayed for clarity.

Included in the database are 626 radiocarbon dates, 260 *in situ* terrestrial cosmogenic isotope dates, 80 luminescence, and 9 U- and Th-series dates. Largely as a result of the nature of the dating methods currently available to us (all based on exposure or lack thereof), the majority of absolute dates relate to ice free conditions, i.e. they are minimum dates for ice sheet retreat or maximum dates for ice sheet advance, and thus bracket the time period that the ice sheet existed in any particular area. Minimum dates for deglaciation of ice in (and maximum dates for advance of ice over) a particular area are most commonly derived from radiocarbon dating of organic sediments overlying (or underlying) till or moraines. Such dates define a relatively crude bracket for glaciation due to the lag time involved between ice melt and vegetation succession. *In situ* terrestrial cosmogenic isotope exposure dating has been used on occasion to date moraine surfaces and luminescence dating has been attempted for glaciofluvial outwash sediments and loess. These dates provide a more direct means of dating specific ice sheet margin positions but tend to have high associated errors, often of the order of 1000s of years.

Out of the 975 dates, 816 are interpreted for their ice sheet context. Of these, 115 are *advance*, 24 are both *retreat* and *advance* dates, 150 are *retreat*, 84 are *margin*, and 337 are *ice free*. There are 106 *exposure time (cumulative)* dates. *Unclassified* dates include those that could not be calibrated or are considered unreliable by the original or subsequent authors (159). It is unsurprising that the majority of dates relate to ice free conditions and retreat, since an ice sheet will tend to erase or remould pre-existing material rather than preserve it. There are, however, a significant number of advance dates which is encouraging for efforts to constrain ice sheet build-up as well as deglaciation. The spatial distribution of dates is similarly encouraging and more 'complete' than one might have imagined. The number and distribution of sites, and the range of ages and ice sheet contexts, put us in a significantly better position for interpreting an ice sheet wide chronology for the BIIS than has hitherto been possible. The database has already been used, along with landform data on retreat patterns to reconstruct the demise of the BIIS (Clark et al., in press).

Nonetheless, there are significant gaps in southern Scotland (notably the Southern Uplands), the Cheviots, the Dales, Lake District, central Wales, and central Ireland. Many of these data gaps lie in mountain areas, perhaps historically reflecting an absence of organic material suitable for radiocarbon dating in such locations, though this disparity is beginning to be overcome through application of cosmogenic exposure techniques (e.g. Ballantyne et al., 2009a). In Ireland, there is predominance of coastal or near coastal sites relative to inland locations, which may help efforts to pinpoint a time-window for ice sheet retreat back onto present-day land, but hinder attempts to document ice sheet retreat more fully back to its final sites of demise. The most notable gaps, however, remain the marine sectors of the ice sheet with very little information on the timing and rapidity of ice retreat across the continental shelf and from the North Sea. Our synthesis of geochronological knowledge, particularly the gaps, identifies targets for future dating programmes. We recognise there may be omissions and potential errors in the database which require revision; we appeal to the community to notify the corresponding author(s) of any such information, and new information post-dating the census for the database. It is anticipated that this database will be maintained and a new version released alongside an updated BRITICE database that is currently undergoing compilation.

4. Summary

Overall the number and spread of dates in time and space is impressive. The last 10 years has seen a dramatic increase in the number of dates, partly facilitated by the development and application of new dating techniques such as terrestrial cosmogenic nuclides and improvements to radiocarbon dating. However, it is evident from the map that the geographical spread is uneven. There are both significant gaps and areas of over-sampling. The Southern Uplands and Scottish-English border region extending down into northeast England, and central Wales and central Ireland stand out as the largest 'holes' in the distribution. Upland areas in general are under-sampled. Offshore, the southern North Sea is devoid of dates as are the seas between the Outer Hebrides and Northern Ireland. All of these regions should be targets for future dating campaigns. Areas that are currently adequately dated, at least from an ice sheet scale view, are the Irish coastline, the maximum southern limit in England (although recently published and existing dates from eastern England are in conflict and so this region requires careful consideration and possible reassessment of existing dates (Clark et al., in press), the Scilly Isles, the southern limit of the Loch Lomond Stadial ice cap, and the western coastline of mainland Scotland (especially in the vicinity of the Wester Ross Moraine). This reflects the long established aim of identifying the maximum extent of ice and the hunt for re-advances.

The temporal spread of dates is presented in Figure 2. The greatest frequency of dates is around 15 ka BP. This reflects the increased likelihood for preservation of dates constraining the margin positions and retreat of the ice. After 45 ka BP there are fewer than 10 dates for each 1000 year time interval. The large number of dates older than 56 ka BP reflects maximum ages for advance and exposure times where there has been insufficient erosion to give a true age for the most recent exposure (e.g. under cold based ice, Stroeven et al., 2002; Hättestrand and Stroeven, 2002; Fabel et al., 2002). It is interesting that there is near complete overlap of advance and deglacial dates in time. This demonstrates that different sectors of the ice sheet were advancing while other margins were retreating. We interpret this as support for a model of a dynamic multi-source last BIIS, possibly never in steady-state with climate (Clark et al., in press). It should be restated that we made no attempt to assess the quality of dates and that the database content reflects the existing published literature. In the light of new radiocarbon methods leading to revisions of previously accepted dates, it would be beneficial if all the dates contained in this database were scrutinised for quality and reliability. It is beyond the scope of our collective expertise (and a significant task in its own right) and we call on the dating community to address this, so as to avoid drawing incorrect interpretations.

We hope that the map and database will be a useful piece of reference information for the Quaternary community and stimulate new research and continued interest in the last BIIS, as was experienced following publication of the Glacial Map of Britain

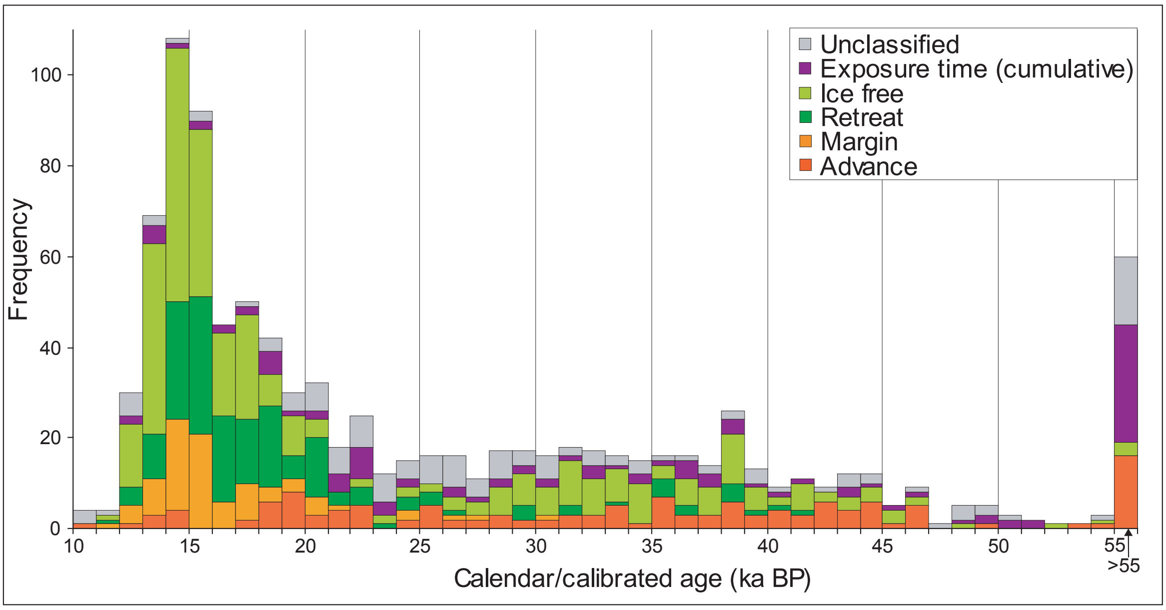

Figure 2. To complement the spatial distribution of dates presented in the map, this frequency histogram shows the temporal distribution of dates through the last glacial cycle. The final class includes all dates >55 ka BP (exposure dates with insufficient erosion and maximum bounding dates for ice advance). Dates are calibrated ages. The frequency of dates in each 1000 year class is coloured by the contextual class. Radiocarbon dates that could not be calibrated are excluded. Retreat and advance dates overlap. For example, there are dates constraining advance as late as 17 ka BP (followed by a later group of advance dates between 10-14 ka BP) and retreat dates as early as 42 ka BP. We suggest that this reflects the geographical spread of dates and asynchronous behaviour of different sectors of the ice sheet (Clark et al., in press). It is interesting that for most of the time (50 to 10 ka BP) there are recorded dates indicative of ice advances (at least in some sectors) and that this is even so during the global period of ice recession. It is only between 15 and 17 ka BP that no such advance dates exist.

(Clark et al., 2004a; Evans et al., 2005). We will periodically update the database and call upon the community to notify the authors of new information. Updated versions will be released through the BRITICE webpages (http://www.sheffield.ac.uk/geography/staff/clark_chris/britice.html); please check here for the latest version.

Software

Date information was recorded in Excel worksheets. Where location information was not given, maps were scanned and geocorrected in Erdas Imagine and ENVI. Shapefiles and the map were produced using ArcGIS 9.3. Final map was produced using Adobe Acrobat and Illustrator.

Data

The author has supplied data (as an ESRI Shapefile) used in the production of the accompanying map. This PDF has a ZIP archive embedded within it (see the attachment tab) containing the data; you will need to save the file and edit the file extension to .ZIP. Whilst the contents of the ZIP file are the sole responsiblity of the author, the journal has screened them for appropriateness.

The shapefile is of date locations and is accompanied by a PDF of the tabular data. The table is published as supplementary downloadable material as it is too large to fit within the constraints of an A4 page. The table is designed to be readable when printed on A3 landscape paper. Site 108 is absent from the shapefile due to insufficient location information in the original source.

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References

AHLBERG, K., ALMGREN, E., WRIGHT, H. E., ITO, E. and HOBBIE, S. (1996) Oxygen-isotope record of Late-Glacial climatic change in western Ireland, Boreas, 25, 257–270, doi: 10.1111/j.1502-3885.1996.tb00641.x.

ALDHOUSE-GREEN, S. (2000) Paviland Cave and the "Red Lady": a definitive report, Western Academic and Specialist Press, Bristol, 314 pp.

ALDHOUSE-GREEN, S. and PETTITT, P. (1998) Paviland cave : contextualising the 'Red Lady', Antiquity, 72, 756–772.

ANDERSEN, B. G. (1981) Late Weichselian Ice Sheets in Eurasia and Greenland, In DENTON, G. H. and HUGHES, T. J., (eds.) The Last Great Ice Sheets, John Wiley and Sons, pp. 1–65.

ASHWORTH, A. C. (1972) A late glacial insect fauna from Red Moss, Lancashire, England, Entomologica Scandinavia, 3, 211–224, doi: 10.1163/187631272X00300.

ATKINSON, T. C., LAWSON, T. J., SMART, P. L., HARMON, R. S. and HESS, J. W. (1986) New data on speleothem deposition and palaeoclimate in Britain over the last forty thousand years, Journal of Quaternary Science, 1, 67–72, doi: 10.1002/jqs.3390010108.

AUFFRET, G., ZARAGOSI, S., DENNIELOU, B., CORTIJO, E., ROOIJ, D. V., GROUSSET, F., PUJOL, C., EYNAUD, F. and SIEGERT, M. (2002) Terrigenous fluxes at the Celtic margin during the last glacial cycle, Marine Geology, 188, 79–108, doi: 10.1016/S0025-3227(02)00276-1.

BALCO, G., BRINER, J., FINKEL, R. C., RAYBURN, J. A., RIDGE, J. C. and SCHAEFER, J. M. (2009) Regional beryllium-10 production rate calibration for late-glacial northeastern North America, Quaternary Geochronology, 4, 93–107, doi: 10.1016/j.quageo.2008.09.001.

BALCO, G., STONE, J. O., LIFTON, N. A. and DUNAI, T. J. (2008) A complete and easily accessible means of calculating surface exposure ages or erosion rates from ^{10}Be and ^{26}Al measurements, Quaternary Geochronology, 3, 174–195.

BALLANTYNE, C. K. (2010) Extent and deglacial chronology of the last British-Irish Ice Sheet: implications of exposure dating using cosmogenic isotopes, Journal of Quaternary Science, 25, 515–534, doi: 10.1002/jqs.1310.

BALLANTYNE, C. K. and HALL, A. M. (2008) The altitude of the last ice sheet in Caithness and east Sutherland, northern Scotland, Scottish Journal of Geology, 44, 169–181, doi: 10.1144/sjg44020169.

BALLANTYNE, C. K., HALL, A. M., PHILLIPS, W., BINNIE, S. and KUBIK, P. W. (2007a) Age and significance of former low-altitude corrie glaciers on Hoy, Orkney Islands, Scottish Journal of Geology, 43, 107–114.

BALLANTYNE, C. K., MCCARROLL, D., NESJE, A., DAHL, S. O. and STONE, J. O. (1998a) The last ice sheet in north-west Scotland: reconstruction and implications, Quaternary Science Reviews, 17, 1149–1184, doi: 10.1016/S0277-3791(98)00003-1.

BALLANTYNE, C. K., MCCARROLL, D. and STONE, J. O. (2006) Vertical dimensions and age of the Wicklow Mountains ice dome, Eastern Ireland, and implications for the extent of the last Irish ice sheet, Quaternary Science Reviews, 25, 2048–2058, doi: 10.1016/j.quascirev.2006.01.026.

BALLANTYNE, C. K., MCCARROLL, D. and STONE, J. O. (2007b) The Donegal ice dome, northwest Ireland: dimensions and chronology, Journal of Quaternary Science, 22, 773–783, doi: 10.1002/jqs.1116.

BALLANTYNE, C. K., SCHNABEL, C. and XU, S. (2009a) Readvance of the last British-Irish Ice Sheet during Greenland Interstade 1 (GI-1): the Wester Ross Readvance, NW Scotland, Quaternary Science Reviews, 28, 783–789, doi: 10.1016/j.quascirev.2009.01.011.

BALLANTYNE, C. K. and STONE, J. O. (2009) Rock-slope failure at Baosbheinn, Wester Ross, NW Scotland: age and interpretation, Scottish Journal of Geology, 45, 177–181, doi: 10.1144/0036-9276/01-388.

BALLANTYNE, C. K., STONE, J. O. and FIFIELD, L. K. (1998b) Cosmogenic Cl-36 dating of postglacial landsliding at The Storr, Isle of Skye, Scotland, The Holocene, 8, 347–351, doi: 10.1191/095968398666797200.

BALLANTYNE, C. K., STONE, J. O. and FIFIELD, L. K. (2009b) Glaciation and deglaciation of the SW Lake District, England: implications of cosmogenic ^{36}Cl exposure dating, Proceedings of the Geologists Association, 120, 139–144, doi: 10.1016/j.pgeola.2009.08.003.

BALLANTYNE, C. K., STONE, J. O. and MCCARROLL, D. (2008) Dimensions and chronology of the last ice sheet in Western Ireland, Quaternary Science Reviews, 27, 185–200, doi: 10.1016/j.quascirev.2007.10.019.

BARKER, H., BURLEIGH, R. and MEEKS, N. (1969) British Museum Natural Radiocarbon Measurements VI, Radiocarbon, 11, 177–194.

BARTLEY, D. D. and MORGAN, A. V. (1990) The palynological record of the King's Pool, Stafford, England, New Phytologist, 116, 177–194, doi: 10.1111/j.1469-8137.1990.tb00522.x.

BATEMAN, M. D. (1995) Thermoluminescence dating of the British coversand deposits, Quaternary Science Reviews, 14, 791–798, doi: 10.1016/0277-3791(95)00053-4.

BATEMAN, M. D., BUCKLAND, P. C., CHASE, B., FREDERICK, C. D. and GAUNT, G. D. (2008) The Late Devensian proglacial Lake Humber: new evidence from littoral deposits ast Ferrybridge, Yorkshire, England, Boreas, 37, 195–210, doi: 10.1111/j.1502-3885.2007.00013.x.

BATEMAN, M. D., BUCKLAND, P. C., FREDERICK, C. D. and WHITEHOUSE, N. J. (2001) The Quaternary of East Yorkshire and North Lincolnshire, Field Guide, Quaternary Research Association, London.

BAXTER, M. S., ERGIN, M. and WALTON, A. (1969) Glasgow University radiocarbon measurements I, Radiocarbon, 11, 43–52.

BECKETT, S. C. (1981) Pollen diagrams from Holderness North Humberside, Journal of Biogeography, 8, 177–198, doi: 10.2307/2844676.

BIRNIE, J. F., GORDON, J. E., BENNETT, K. D. and HALL, A. M. (1993) The Quaternary of Shetland. Field Guide, Quaternary Research Association, Cambridge.

BISHOP, W. W. and COOPE, G. R. (1977) Stratigraphical and faunal evidence for Lateglacial and early Flandrian environments in South-west Scotland, In GRAY, J. M. and LOWE, J. J., (eds.) Studies in the Scottish Lateglacial Environment, Pergamon Press, Oxford, pp. 61–88.

BISHOP, W. W. and DICKSON, J. H. (1970) Radiocarbon Dates Related to Scottish Late-Glacial Sea in Firth of Clyde, Nature, 227, 480–482, doi: 10.1038/227480a0.

BLACKBURN, K. B. (1952) The dating of a deposit containing an elk skeleton found at neasham near Darlington, county Durham, New Phytologist, 51, 364–377, doi: 10.1111/j.1469-8137.1952.tb06145.x.

BOWEN, D. Q. (1974) The Quaternary of Wales, In OWEN, T. R., (ed.) The upper Palaeozoic and post Palaeozoic rocks of Wales, University of Wales Press, Cardiff, pp. 373–426.

BOWEN, D. Q. (1984) Introduction, In BOWEN, D. Q. and HENRY, A., (eds.) Field Guide - Wales: Gower, Preseli, Fforest Fawr, Quaternary Research Association, Cambridge, pp. 1–17.

BOWEN, D. Q. (1994) Late Cenozoic Wales and South-west England, Proceedings of the Ussher Society, 8, 209–213.

BOWEN, D. Q. (1999) A Revised correlation of Quaternary deposits in the British Isles, The Geological Society, London, 174 pp.

BOWEN, D. Q. (2005) South Wales, In LEWIS, C. A. and RICHARDS, A. E., (eds.) The Glaciations of Wales and adjaecent areas, Logaston Press, Logaston, pp. 145–164.

BOWEN, D. Q., PHILLIPS, F. M., MCCABE, A. M., KNUTZ, P. C. and SYKES, G. A. (2002) New data for the Last Glacial Maximum in Great Britain and Ireland, Quaternary Science Reviews, 21, 89–101, doi: 10.1016/S0277-3791(01)00102-0.

BRADWELL, T., FABEL, D., STOKER, M., MATHERS, H., MCHARGUE, L. and HOWE, J. (2008a) Ice caps existed throughout the Lateglacial interstadial in northern Scotland, Journal of Quaternary Science, 23, 401–407, doi: 10.1002/jqs.1181.

BRADWELL, T., STOKER, M. S., GOLLEDGE, N. R., WILSON, C. K., MERRITT, J. W., LONG, D., EVEREST, J. D., HESTVIK, O. B., STEVENSON, A. G., HUBBARD, A. L., FINLAYSON, A. G. and MATHERS, H. E. (2008b) The northern sector of the last British Ice Sheet: Maximum extent and demise, Earth-Science Reviews, 88, 207–226, doi: 10.1016/j.earscirev.2008.01.008.

BROWN, E. J., ROSE, J., COOPE, R. G. and LOWE, J. J. (2006) An MIS 3 age organic deposit from Balglass Burn, central Scotland: palaeoenvironmental significance and implications for the timing of the onset of the LGM ice sheet in the vicinity of the British Isles, Journal of Quaternary Science, 22, 295–308, doi: 10.1002/jqs.1028.

BROWNE, M. A. E. and GRAHAM, D. K. (1981) Glaciomarine deposits of the Loch Lomond Stadial glacier in the Vale of Leven between Dumbarton and Balloch, west-central Scotland, Quaternary Newsletter, 34, 1–7.

BROWNE, M. A. E., HARKNESS, D. D., PEACOCK, J. D. and WARD, R. G. (1977) The date of deglaciation of the Paisley-Renfrew area, Scottish Journal of Geology, 13, 301–303, doi: 10.1144/sjg13040301.

BROWNE, M. A. E., MCMILLAN, A. A. and GRAHAM, D. K. (1983a) A Late-Devensian Marine and Non-Marine Sequence near Dumbarton, Strathclyde, Scottish Journal of Geology, 19, 229–234, doi: 10.1144/sjg19020229.

BROWNE, M. A. E., MCMILLAN, A. A. and HALL, I. H. S. (1983b) Blocks of Marine Clay in Till near Helensburgh, Strathclyde, Scottish Journal of Geology, 19, 321–325, doi: 10.1144/sjg19030321.

BRYSON, R. A., WENDLAND, W. M., IVES, J. D. and ANDREWS, J. T. (1969) Radiocarbon isochromes on the disintegration of the Laurentide Ice Sheet, Arctic and Alpine Research, 1, 1–14, doi: 10.2307/1550356.

BUCKLAND, P. C. (1976) The use of insect remains in the interpretation of archaeological environments, In DAVIDSON, D. A. and SHACKLEY, M. L., (eds.) Geoarcheology: earth science and the past, Duckworth, London, pp. 369–396.

BUCKLAND, P. C. (1982) The cover sands of north Lincolnshire and the Vale of York, In ADLAM, B. H., FENN, C. R. and MORRIS, L., (eds.) Papers in earth Studies: Lovatt Lectures - Worcester, Geo Books, Norwich, pp. 143–178.

BURLEIGH, R., AMBERS, J. and MATTHEWS, K. (1982) British-Museum Natural-Radiocarbon Measurements XV, Radiocarbon, 24, 262–290.

CARR, S. (2004) The North Sea basin, In EHLERS, J. and GIBBARD, P. L., (eds.) Quaternary Glaciations - extent and chronology. Part I: Europe, Elseiver, pp. 261–270, doi: 10.1016/S1571-0866(04)80077-0.

CASELDINE, C. J. and EDWARDS, K. J. (1982) Interstadial and last interglacial deposits covered by till in Scotland: comments and new evidence, Boreas, 11, 119–122, doi: 10.1111/j.1502-3885.1982.tb00528.x.

CATT, J. A. (1987) The Quaternary of east Yorkshire and adjacent areas, In ELLIS, S., (ed.) East Yorkshire, Field guide, Quaternary Research Association, Cambridge, pp. 1–14.

CHIVERRELL, R. C. and THOMAS, G. S. P. (2010) Extent and timing of the Last Glacial Maximum (LGM) in Britain and Ireland: a review, Quaternary Science Reviews, 25, 535–549, doi: 10.1002/jqs.1404.

CLARK, C. D., EVANS, D. J., KHATWA, A., BRADWELL, T., JORDAN, C. J., MARSH, S. H., MITCHELL, W. A. and BATEMAN, M. D. (2004a) Map and GIS database of glacial landforms and features related to the last British Ice Sheet, Boreas, 33, 359–375, doi: 10.1080/03009480410001983.

CLARK, C. D., HUGHES, A. L. C., GREENWOOD, S. L., JORDAN, C. J. and SEJRUP, H. P. (in press) Pattern and timing of retreat of the last British-Irish Ice Sheet, Quaternary Science Reviews, doi: 10.1016/j.quascirev.2010.07.019.

CLARK, J., MCCABE, A. M., SCHNABEL, C., CLARK, P. U., FREEMAN, S., MADEN, C. and XU, S. (2009a) ^{10}Be chronology of the last deglaciation of County Donegal, northwestern Ireland, Boreas, 38, 111–118, doi: 10.1111/j.1502-3885.2008.00040.x.

CLARK, J., MCCABE, A. M., SCHNABEL, C., CLARK, P. U., MCCARRON, S., FREEMAN, S., MADEN, C. and XU, S. (2009b) Cosmogenic ^{10}Be chronology of the last deglaciation of western Ireland, and implications for sensitivity of the Irish Ice Sheet to climate change, Geological Society of America, Bulletin, 121, 3–16.

CLARK, P. U., MCCABE, A. M., MIX, A. C. and WEAVER, A. J. (2004b) Paleoclimate: Rapid Rise of Sea Level 19,000 Years Ago and Its Global Implications, Science, 304, 1141–1143, doi: 10.1126/science.1094449.

COLHOUN, E. A., DICKSON, J. H., MCCABE, A. M. and SHOTTON, F. W. (1972) A Middle Midlandian freshwater series at Derryvree, Maguiresbridge, County Fermanagh, Northern Ireland, Proceedings of the Royal Society of London, B, 180, 273–292.

COLHOUN, E. A. and SYNGE, F. M. (1980) The cirque moraines at Lough Nahanagan, County Wicklow, Ireland, Proceedings of the Royal Irish Academy, 80B, 25–45.

COOPE, G. R. (1977) Fossil Coleopteran Assemblages as Sensitive Indicators of Climatic Changes during Devensian (Last) Cold Stage, Philosophical Transactions of the Royal Society of London Series B-Biological Sciences, 280, 313–340, doi: 10.1098/rstb.1977.0112.

COOPE, G. R. and BROPHY, J. A. (1972) Late glacial environmental changes indicated by a coleopteran succession from North Wales, Boreas, 1, 97, doi: 10.1111/j.1502-3885.1972.tb00146.x.

COOPE, G. R. and JOACHIM, M. J. (1980) Lateglacial environmental changes interpreted from fossil Coleoptera from St Bees, Cumbria, England, Studies in the Lateglacial of North-West Europe, Pergamon, Oxford, pp. 55–68.

COOPE, G. R. and LISTER, A. M. (1987) Late-Glacial Mammoth Skeletons from Condover, Shropshire, England, Nature, 330, 472–474, doi: 10.1038/330472a0.

COOPE, G. R. and PENNINGTON, W. (1977) The Windermere Interstadial of the late Devensian, Philosophical Transactions of the Royal Society of London Series B, 280, 337–339.

COUNCIL FOR BRITISH ARCHAEOLOGY (2000) Archaeological Site Index to Radiocarbon Dates from Great Britain and Ireland. [Online]. Available from: http://ads.ahds.ac.uk/catalogue/specColl/c14_cba/index.cfm, [Last accessed: 12 January, 2007].

CRAIG, A. J. (1978) Pollen percentage and influx analyses in south-east Ireland: a contribution to the ecological history of the late-glacial period, Journal of Ecology, 66, 297–324, doi: 10.2307/2259194.

CURRANT, A. P., STRINGER, C. B. and COLLCUTT, S. N. (1984) Bacon Hole Cave, In BOWEN, D. Q. and HENRY, A., (eds.) Wales: Gower, Preseli, Fforest Fawr Field Guide, Quaternary Research Association, Cambridge, pp. 38–45.

CWYNAR, L. C. and WATTS, W. A. (1989) Accelerator-Mass Spectrometer Ages for Late-Glacial Events at Ballybetagh, Ireland, Quaternary Research, 31, 377–380, doi: 10.1016/0033-5894(89)90044-6.

DAWSON, A. G., BENN, D. I. and DAWSON, S. (1997) Late Quaternary glaciomarine sedimentation in the Rhinns of Islay, Scottish Inner Hebrides, The Quaternary of Islay and Jura. Field Guide, Quaternary Research Association, Cambridge, pp. 66–77.

DIEFENDORF, A. F., PATTERSON, W. P., MULLINS, H. T., TIBERT, N. and MARTINI, A. (2006) Evidence for high-frequency late Glacial to mid-Holocene (16,800 to 5500 cal yr B.P.) climate variability from oxygen isotope values of Lough Inchiquin, Ireland, Quaternary Research, 65, 78–86, doi: 10.1016/j.yqres.2005.08.001.

DONNER, J. J. (1979) The Early or Middle Devensian peat at Burn of Benholm, Kincardineshire, Scottish Journal of Geology, 15, 247–250, doi: 10.1144/sjg15030247.

DRESSER, P. Q. (1980) Dublin Radiocarbon Dates III, Radiocarbon, 22, 1028–1030.

DRESSER, P. Q. and MCAULAY, I. R. (1974) Dublin Radiocarbon Dates II, Radiocarbon, 16, 6–9.

DUNAI, T. J. and STUART, F. M. (2009) Reporting of cosmogenic nuclide data for exposure age and erosion rate determinations, Quaternary Geochronology, 4, 437–440, doi: 10.1016/j.quageo.2009.04.003.

DYKE, A. S., MOORE, A. and ROBERTSON, L. (2003) Deglaciation of North America, Geological Survey of Canada Open File, 1574.

EVANS, D. J. A., CLARK, C. D. and MITCHELL, W. A. (2005) The last British Ice Sheet: A review of the evidence utilised in the compilation of the Glacial Map of Britain, Earth-Science Reviews, 70, 253–312, doi: 10.1016/j.earscirev.2005.01.001.

EVEREST, J., BRADWELL, T., FOGWILL, C. J. and KUBIK, P. W. (2006) Cosmogenic ^{10}Be age constraints for the Wester Ross readvance moraine: insights into British Ice-Sheet behaviour, Geografiska Annaler Series A, 88, 9–17, doi: 10.1111/j.0435-3676.2006.00279.x.

EVEREST, J. and KUBIK, P. (2006) The deglaciation of eastern Scotland: cosmogenic 10Be evidence for a Lateglacial stillstand, Journal of Quaternary Science, 21, 95–104, doi: 10.1002/jqs.961.

EVEREST, J. D. and GOLLEDGE, N. R. G. (2004) Dating deglaciation in Strathspey and the Cairngorm Mountains, In LUKAS, S., MERRITT, J. W. and MITCHELL, W. A., (eds.) The Quaternary of the central Grampian Highlands: Field Guide, Quaternary Research Association, Cambridge, pp. 50–57.

FABEL, D., STROEVEN, A. P., HARBOR, J., KLEMAN, J., ELMORE, D. and FINK, D. (2002) Landscape preservation under Fennoscandian ice sheets determined from in situ produced ^{10}Be and ^{26}Al, Earth and Planetary Science Letters, 201, 397–406.

FAIRBANKS, R. G., MORTLOCK, R. A., CHIU, T. C., CAO, L., KAPLAN, A., GUILDERSON, T. P., FAIRBANKS, T. W., BLOOM, A. L., GROOTES, P. M. and NADEAU, M. J. (2005) Radiocarbon calibration curve spanning 0 to 50,000 years BP based on paired ^{230}Th/^{234}U/^{238}U and ^{14}C dates on pristine corals, Quaternary Science Reviews, 24, 1781–1796, doi: 10.1016/j.quascirev.2005.04.007.

FITZPATRICK, E. A. (1965) An interglacial soil at Teindland, Morayshire, Nature, 207, 621–622.

FOSTER, H. D. (1968) The Glaciation of the Harlech Dome, Unpublished PhD Thesis, University of London.

FOSTER, H. D. (1970) Establishing the age and geomorphological significance of sorted stone-stripes in the Rhinog Mountains, North Wales, Geografiska Annaler Series A, 52, 96–102, doi: 10.2307/520602.

GALLAGHER, C. and THORP, M. (1997) The age of the Pleistocene raised beach near Fethard, County Wexford, using infra red stimulated luminescence (IRSL), Irish Geography, 30, 68–89, doi: 10.1080/00750779709478635.

GAUNT, G. D. (1974) A radiocarbon date relating to Lake Humber, Proceedings of the Yorkshire Geological Society, 40, 195–197.

GAUNT, G. D. (1976) The Devensian maximum ice limit in the Vale of York, Proceedings of the Yorkshire Geological Society, 40, 631–637, doi: 10.1144/pygs.40.4.631.

GAUNT, G. D., COOPE, G. R. and FRANKS, J. W. (1970) Quaternary deposits at Oxbow opencast coal site in the Aire Valley, Yorkshire, Proceedings of the Yorkshire Geological Society, 38, 175–200, doi: 10.1144/pygs.38.2.175.

GAUNT, G. D., JARVIS, R. A. and MATTHEWS, B. (1971) The late Weichselian sequence in the Vale of York, Proceedings of the Yorkshire Geological Society, 38, 281–284, doi: 10.1144/pygs.38.2.281.

GEMMELL, A. M. D., MURRAY, A. S. and CONNELL, E. R. (2008) Devensian glacial events in Buchan (NE Scotland): A progress report on new OSL dates and their implications, Quaternary Geochronology, 2, 237–242, doi: 10.1016/j.quageo.2006.05.016.

GILLESPIE, R., GOWLETT, J. A. J., HALL, E. T., HEDGES, R. E. M. and PERRY, C. (1985) Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 2, Archaeometry, 27, 237–246, doi: 10.1111/j.1475-4754.1985.tb00367.x.

GIRLING, M. A. (1974) Evidence from Lincolnshire of the age and intensity of the mid Devensian temperate episode, Nature, 250, 270, doi: 10.1038/250270a0.

GODWIN, H. and WILLIS, E. H. (1959) Cambridge University Natural Radiocarbon Measurements I, Americal Journal of Science, Radiocarbon Supplement, 1, 63–75.

GODWIN, H. and WILLIS, E. H. (1964) Cambridge University Natural Radiocarbon Measurements VI, Radiocarbon, 6, 116–137.

GOLLEDGE, N., FABEL, D., EVEREST, J. D., FREEMAN, S. and BINNIE, S. (2007) First cosmogenic 10Be age constraint on the timing of Younger Dryas glaciation and ice cap thickness, western Scottish Highlands, Journal of Quaternary Science, 22, 785–791, doi: 10.1002/jqs.1113.

GOWLETT, J. A. J., HALL, E. T., HEDGES, R. E. M. and PERRY, C. (1986) Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 3, Archaeometry, 28, 116–125, doi: 10.1111/j.1475-4754.1986.tb00379.x.

GRAY, J. M. (1975) Lateglacial, in situ barnacles from Glen Cruitten quarry, Oban, Quaternary Newsletter, 15, 1–2.

GRAY, J. M. and BROOKS, C. L. (1972) The Loch Lomond Readvance moraines of Mull and Menteith, Scottish Journal of Geology, 8, 95–103, doi: 10.1144/sjg08020095.

GRAY, J. M. and LOWE, J. J. (1977) Studies in the Scottish Lateglacial Environment, Pergamon Press, Oxford.

GREEN, H. S. (1984) Pontnewydd Cave: a Lower Palaeolithic hominid site in Wales - the first report, National Museum of Wales, Cardiff.

GREENWOOD, S. L. and CLARK, C. D. (2009) Reconstructing the last Irish Ice Sheet 2: a geomorphologically-driven model of ice sheet growth, retreat and dynamics, Quaternary Science Reviews, 28, 3101–3123, doi: 10.1016/j.quascirev.2009.09.014.

GREGORY, J. W. and CURRIE, E. D. (1928) The Vertebrate Fossils from the Glacial and Associated Post-Glacial Beds of Scotland in the Hunterian Museum, University of Glasgow, Monograph of the Geology Department Hunterian Museum, Glasgow.

GUILDERSON, T. P., REIMER, P. J. and BROWN, T. A. (2005) Geoscience The Boon and Bane of Radiocarbon Dating, Science, 307, 362–364, doi: 10.1126/science.1104164.

GYLLENCREUTZ, R., MANGERUD, J., SVENDSEN, J.-I. and LOHNE, Ø. (2007) DATED - A GIS-based reconstruction and dating database of the Eurasian deglaciation. Applied Quaternary Research in the central part of glaciated terrain, Geological Survey of Finland, Special Paper, 46, 113–120.

HALL, A. M. (1984) Buchan. Field Guide, Quaternary Research Association, Cambridge, 120 pp.

HALL, A. M. and JARVIS, J. (1989) A preliminary report on the late Devnsian glaciomarine deposits around St Fergus, Grampian region, Quaternary Newsletter, 5–7.

HALLAM, J. S., EDWARDS, B. J. N., BARNES, B. and STUART, A. J. (1973) Remains of a Late Glacial Elk Associated with Barbed Points from High-Furlong, near Blackpool, Lancashire, Proceedings of the Prehistoric Society, 39, 100–128.

HARKNESS, D. D. (1981) Scottish Universities Research and Reactor Center Radiocarbon Measurements-IV, Radiocarbon, 23, 252–304.

HARKNESS, D. D. and WILSON, H. W. (1974) Scottish Universities Research and Reactor Center Radiocarbon Measurements - II, Radiocarbon, 16, 238–251.

HARKNESS, D. D. and WILSON, H. W. (1979) Scottish Universities Research and Reactor Centre Radiocarbon Measurements III, Radiocarbon, 21, 203–256.

HÄTTESTRAND, C. and STROEVEN, A. P. (2002) A relict landscape in the centre of Fennoscandian glaciation: geomorphological evidence of minimal Quaternary glacial erosion, Geomorphology, 44, 127–143, doi: 10.1016/S0169-555X(01)00149-0.

HEDGES, R. E. M., HOUSLEY, R. A., BRONK, C. R. and KLINKEN, G. J. (1992) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-14, Archaeometry, 34, 141–159, doi: 10.1111/j.1475-4754.1992.tb00484.x.

HEDGES, R. E. M., HOUSLEY, R. A., LAW, I. A. and BRONK, C. R. (1989) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-9, Archaeometry, 31, 207–234, doi: 10.1111/j.1475-4754.1989.tb01015.x.

HEDGES, R. E. M., HOUSLEY, R. A., LAW, I. A. and BRONK, C. R. (1990) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-10, Archaeometry, 32, 101–108, doi: 10.1111/j.1475-4754.1990.tb01086.x.

HEDGES, R. E. M., HOUSLEY, R. A., LAW, I. A. and PERRY, C. (1988a) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-7, Archaeometry, 30, 155–164, doi: 10.1111/j.1475-4754.1988.tb00443.x.

HEDGES, R. E. M., HOUSLEY, R. A., LAW, I. A., PERRY, C. and GOWLETT, J. A. J. (1987) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-6, Archaeometry, 29, 289–306, doi: 10.1111/j.1475-4754.1987.tb00421.x.

HEDGES, R. E. M., HOUSLEY, R. A., LAW, I. A., PERRY, C. and HENDY, E. (1988b) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-8, Archaeometry, 30, 291–305, doi: 10.1111/j.1475-4754.1988.tb00454.x.

HEDGES, R. E. M., HOUSLEY, R. A., RAMSEY, C. B. and KLINKEN, G. J. V. (1993) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-17, Archaeometry, 35, 305–326, doi: 10.1111/j.1475-4754.1993.tb01046.x.

HEDGES, R. E. M., HOUSLEY, R. A., RAMSEY, C. B. and KLINKEN, G. J. V. (1994) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist- 18, Archaeometry, 36, 337–374, doi: 10.1111/j.1475-4754.1994.tb00975.x.

HEDGES, R. E. M., PETTITT, P. B., RAMSEY, C. B. and KLINKEN, G. J. V. (1996) Radiocarbon-Dates from the Oxford Ams System - Archaeometry Datelist-22, Archaeometry, 38, 391–415, doi: 10.1111/j.1475-4754.1996.tb00785.x.

HEDGES, R. E. M., PETTITT, P. B., RAMSEY, C. B. and KLINKEN, G. J. V. (1997) Radiocarbon Dates from the Oxford AMS System: Archaeometry Datelist 23, Archaeometry, 39, 247–262, doi: 10.1111/j.1475-4754.1997.tb00803.x.

HEIJNIS, H., RUDDOCK, J. and COXON, P. (1993) A uranium-thorium dated Late Eemian or Early Midlandian organic deposit from near Kilfenora between Spa and Fenit, Co. Kerry, Ireland, Journal of Quaternary Science, 8, 31–43, doi: 10.1002/jqs.3390080104.

HEYMAN, J., STROEVEN, A. P., HARBOR, J. and CAFFEE, M. W. (2011) Too young or too old: evaluating cosmogenic exposure dating based on analysis of compiled boulder exposure ages, Earth and Planetary Science Letters, 302 (1-2), 71–80, doi: 10.1016/j.epsl.2010.11.040.

HOLLOWAY, L. K., PEACOCK, J. D., SMITH, D. E. and WOOD, A. M. (2002) A Windermere Interstadial marine sequence: environmental and relative sea level interpretations for the western Forth valley, Scotland, Scottish Journal of Geology, 38, 41–54, doi: 10.1144/sjg38010041.

HOPPE, G. (1972) Ice sheets around the Norwegian Sea during the Wurm glaciation, AMBIO Special Report, 2, 25–29.

HOPPE, G. (1974) The glacial history of the Shetland Islands, Transactions of the Institute of British Geographers, 7, 197–210.

HOUMARK-NIELSEN, M. (2004) The Pleistocene of Denmark: a review of stratigraphy and glaciation history, In EHLERS, J. and GIBBARD, P., (eds.) Quaternary Glaciations - Extent and Chronology, Part 1: Europe, Elsevier, Amsterdam, pp. 35–46.

HUGHEN, K. A., BAILLIE, M. G. L., BARD, E., BECK, J. W., BERTRAND, C. J. H., BLACKWELL, P. G., BUCK, C. E., BURR, G. S., CUTLER, K. B. and DAMON, P. E. (2004) Marine04 Marine Radiocarbon Age Calibration, 0-26 cal kyr BP, Radiocarbon, 46, 1059–1086.

HULME, P. D. and DURNO, S. E. (1980) Contribution to the Phytogeography of Shetland, New Phytologist, 84, 165–169, doi: 10.1111/j.1469-8137.1980.tb00758.x.

INCE, J. (1981) Pollen Analysis and Radiocarbon Dating of Late-Glacial and Early Flandrian Deposits in Snowdonia, North Wales, Unpublished PhD. thesis, City of London Polytechnic.

JACOBI, R. M. and HIGHAM, T. F. G. (2008) The "Red Lady" ages gracefully: new ultra-filtration AMS determinations from Paviland, Journal of Human Evolution, 55, 898–907, doi: 10.1016/j.jhevol.2008.08.007.

JACOBI, R. M., JACOBI, E. B. and BURLEIGH, R. (1986) Kent's Cavern, Devon: dating of the 'Black Band' and human resettlement of the British Isles following the last glacial maximum, Quaternary Newsletter, 48, 10–12.

JACOBI, R. M., ROSE, J., MACLEOD, A. and HIGHAM, T. F. G. (2009) Revised radiocarbon ages on woolly rhinoceros (Coelodonta antiquitatis) from western central Scotland: significance for timing the extinction of woolly rhinoceros in Britain and the onset of the LGM in central Scotland, Quaternary Science Reviews, 28, 2551–2556, doi: 10.1016/j.quascirev.2009.08.010.

JARDINE, W. G., DICKSON, J. H., HAUGHTON, P. D. W., HARKNESS, D. D., BOWEN, D. Q. and SYKES, G. A. (1988) A Late middle Devesnsian interstadial site at Sourlie, near Irvine, Strathclyde, Scottish Journal of Geology, 24, 288–295, doi: 10.1144/sjg24030288.

JOHN, B. S. (1967) Further evidence for a Middle Würm interstadial and a Main Würm glaciation in Southwest Wales, Geological Magazine, 104, 630–633, doi: 10.1017/S0016756800050287.

JONES, R. L. (1976) Late Quaternary vegetational history of the North York Moors IV Seamer Carrs, Journal of Biogeography, 3, 397–406, doi: 10.2307/3037983.

JONES, R. L. (1977) Late Devensian deposits from Kildale, north-eat Yorkshire, Proceedings of the Yorkshire Geological Society, 41, 398–406.

JONES, R. L. and GAUNT, G. D. (1976) A dated Late Devensian organic deposit at Cawood, near Selby, Naturalist, 121–123.

JONES, R. L. and KEEN, D. H. (1993) Pleistocene environments of the British Isles, 346, Chapman and Hall, London.

KIRK, W. and GODWIN, H. (1962) A late-glacial site at Loch Droma, Ross and Cromarty, Transactions of the Royal Society of Edinburgh, 65, 225–249.

KNIGHT, J. (2001) Glaciomarine deposition around the Irish Sea basin: some problems and solutions, Journal of Quaternary Science, 16, 405–418, doi: 10.1002/jqs.630.

KROON, D., SHIMMIELD, G., AUSTIN, W. E., DERRICK, S., KNUTZ, P. and SHIMMIELD, T. (2000) Century-to millennial-scale sedimentological-geochemical records of the glacial-Holocene sediment variations from the Barra Fan (NE Atlantic), Journal- Geological Society London, 157, 643–654.

LABAN, C. and VAN DER MEER, J. J. M. (2004) Pleistocene glaciation in The Netherlands, In EHLERS, J. and GIBBARD, P., (eds.) Quaternary Glaciations - Extent and Chronology, Part 1: Europe, Elsevier, Amsterdam, pp. 251–260, doi: 10.1016/S1571-0866(04)80076-9.

LAWSON, T. J. (1984) Reindeer in the Scottish Quatenary, Quaternary Newsletter, 42, 1–7.

LISTER, A. M. (2009) Late-glacial mammoth skeletons (Mammuthus primigenius) from Condover (Shropshire, UK): anatomy, pathology, taphonomy and chronological significance, Geological Journal, 44, 447–479, doi: 10.1002/gj.1162.

LOWE, J. J. (1978) Radiocarbon-dated lateglacial and early Flandrian pollen profiles from the Teith Valley, Perthshire, Scotland, Pollen et Spores, 3, 367–397.

LOWE, J. J., WALKER, M. J. C., SCOTT, E. M., HARKNESS, D. D., BRYANT, C. L. and DAVIES, S. M. (2004) A coherent high-precision radiocarbon chronology for the Late-glacial sequence at Sluggan Bog, Co. Antrim, Northern Ireland, Journal of Quaternary Science, 19, 147–158, doi: 10.1002/jqs.814.

LUKAS, S., MERRITT, J. W. and MITCHELL, W. A. (2004) Central Grampian Highlands: Field Guide, Quaternary Research Association, Cambridge.

MANGERUD, J. (2004) Ice sheet limits in Norway and on the Norwegian continental shelf, In EHLERS, J. and GIBBARD, P., (eds.) Quaternary Glaciations - Extent and Chronology, Part 1: Europe, Elsevier, Amsterdam, pp. 271–294, doi: 10.1016/S1571-0866(04)80078-2.

MATTHEWS, B. (1970) Age and origin of aeolian sand in the Vale of York, Nature, 227, 1234.

MCCABE, A. M. (2008) Glacial Geology and Geomorphology: The Landscapes of Ireland, Dunedin Academic Press, Edinburgh, 247 pp.

MCCABE, A. M. and CLARK, P. U. (1998) Ice-sheet variability around the North Atlantic Ocean during the last deglaciation, Nature, 392, 373–377, doi: 10.1038/32866.

MCCABE, A. M. and CLARK, P. U. (2003) Deglacial chronology from County Donegal, Ireland: implications for deglaciation of the British-Irish Ice Sheet, Journal- Geological Society London, 160, 847–856.

MCCABE, A. M., CLARK, P. U. and CLARK, J. (2005) AMS ^{14}C dating of deglacial events in the Irish Sea Basin and other sectors of the British-Irish ice sheet, Quaternary Science Reviews, 24, 1673–1690, doi: 10.1016/j.quascirev.2004.06.019.

MCCABE, A. M., CLARK, P. U. and CLARK, J. (2007a) Radiocarbon constraints on the history of the western Irish ice sheet prior to the Last Glacial Maximum, Geology, 35, 147–150, doi: 10.1130/G23167A.1.

MCCABE, A. M., CLARK, P. U., CLARK, J. and DUNLOP, P. (2007b) Radiocarbon constraints on readvances of the British-Irish Ice Sheet in the northern Irish Sea Basin during the last deglaciation, Quaternary Science Reviews, 26, 1204–1211, doi: 10.1016/j.quascirev.2007.01.010.

MCCABE, A. M., CLARK, P. U., SMITH, D. E. and DUNLOP, P. (2007c) A revised model for the last deglaciation of eastern Scotland, Journal of the Geological Society, 164, 313–316, doi: 10.1144/0016-76492006-120.

MCCABE, A. M. and DUNLOP, P. (2006) The Last Glacial Termination in Northern Ireland, Geological Survey of Northern Ireland, Belfast, 96 pp.

MCCABE, A. M. and HAYNES, J. R. (1996) A late Pleistocene intertidal boulder pavement from an isostatically emergent coast, Dundalk Bay, eastern Ireland, Earth Surface Processes and Landforms, 21, 555–572.

MCCABE, A. M., HAYNES, J. R. and MACMILLAN, N. F. (1986) Late-Pleistocene tidewater glaciers and glaciomarine sequences from north County Mayo, Republic of Ireland, Journal of Quaternary Science, 1, 7–84.

MCCABE, A. M., MITCHELL, G. F. and SHOTTON, F. W. (1978) An inter-till freshwater deposit at Hollymount, Maguiresbridge, Co. Fermanagh, Proceedings of the Royal Irish Academy, 78B, 77–89.

MCCARROLL, D., SCOURSE, J. D. and JOHNS, C. (2006) Shipman Head Down (SV874164), The Isles of Scilly. Field Guide, Quaternary Research Association, London, pp. 147–148.

MILLING, M. E. (1975) Geological appraisal of foundation conditions, northern North Sea, In Proceedings of Oceanology International, pp. 310–319.

MITCHELL, G. F. (1976) The Irish Landscape, Collins, London, 240 pp.

MOLLESON, T. and BURLEIGH, R. (1978) A new date for Goat's Hole Cave, Antiquity, 52, 143–145.

MORGAN, A. V. (1973a) Late Pleistocene environmental changes indicated by fossil insect faunas of the English Midlands, Boreas, 2, 173–212, doi: 10.1111/j.1502-3885.1973.tb00254.x.

MORGAN, A. V. (1973b) The pleistocene geology of the area north and west of Wolverhampton, Staffordshire, England, 265, 15–295.

MURTON, D. K., PAWLEY, S. M. and MURTON, J. B. (2009) Sedimentology and luminescence ages of Glacial Lake Humber deposits in the central Vale of York, Proceedings of the Geologists' Association, 120, 209–222, doi: 10.1016/j.pgeola.2009.09.001.

MYKURA, W. and PHEMISTER, J. (1976) The geology of western Shetland, HMSO, London, 314 pp.

OAKLEY, K. P. (1968) The date of the Red Lady of Paviland, Antiquity, 42, 306–307.

Ó COFAIGH, C. and EVANS, D. J. A. (2007) Radiocarbon constraints on the age of the maximum advance of the British-Irish Ice Sheet in the Celtic Sea, Quaternary Science Reviews, 26, 1197–1203, doi: 10.1016/j.quascirev.2007.03.008.

Ó COFAIGH, C., TELFER, M. W., BAILEY, R. M. and EVANS, D. J. A. (in press) Late Pleistocene chronostratigraphy and ice sheet limits, southern Ireland, Quaternary Science Reviews, doi: 10.1016/j.quascirev.2010.01.011.

OTLET, R. L. and WALKER, A. J. (1979) Harwell Radiocarbon Measurements III, Radiocarbon, 21, 358–383.

OXFORD RADIOCARBON ACCELERATOR UNIT (2008) ORAU online datelist [Online]. Available from: https://c14.arch.ox.ac.uk/login/login.php?Location=/database/db.php, [Last accessed: 12 January, 2007].

PAGE, N. R. (1972) On the age of the Hoxnian Interglacial, Geological Journal, 8, 129–142.

PEACOCK, J. D. (1971) Marine Shell Radiocarbon Dates and Chronology of Deglaciation in Western-Scotland, Nature-Physical Science, 230, 43–45.

PEACOCK, J. D. (1995) Late Devensian to early Holocene palaeoenvironmental changes in the Viking Bank area, northern North Sea, Quaternary Science Reviews, 14, 1029–1042, doi: 10.1016/0277-3791(95)00041-0.

PEACOCK, J. D. (1999) The Pre-Windermere Interstadial (Late Devensian) raised marine strata of eastern Scotland and their macrofauna: a review, Quaternary Science Reviews, 18, 1655–1680, doi: 10.1016/S0277-3791(98)00117-6.

PEACOCK, J. D. (2002) Macrofauna and palaeoenvironment of marine strata of Windermere Interstadial age of the east coast of Scotland, Scottish Journal of Geology, 38, 31–40, doi: 10.1144/sjg38010031.

PEACOCK, J. D. (2008) Late Devensian palaeoenvironmental changes in the sea area adjacent to Islay, SW Scotland: implications for the deglacial history of the island, Scottish Journal of Geology, 44, 183–190, doi: 10.1144/sjg44020183.

PEACOCK, J. D., ARMSTRONG, M., BROWNE, M. A. E., GOLLEDGE, N. R. and STOKER, M. S. (2007) Discussion on a revised model for the last deglaciation of eastern Scotland By McCabe, A.M., Clark, P.U., Smith, D.E. and Dunlop, P. Journal of the Geological Society, 164, 2007, 313-316, Journal of the Geological Society, 164, 1261–1263, doi: 10.1144/0016-76492007-053.

PEACOCK, J. D., AUSTIN, W. E. N., SELBY, I., GRAHAM, D. K., HARLAND, R. and WILKINSON, I. P. (1992) Late Devensian and Flandrian paleoenvironmental changes on the Scottish continental shelf west of the Outer Hebrides, Journal of Quaternary Science, 7, 145–161, doi: 10.1002/jqs.3390070206.

PEACOCK, J. D. and BROWNE, M. A. E. (1998) Radiocarbon dates from the Errol Beds (pre-Windermere Interstadial raised marine deposits) in eastern Scotland, Quaternary Newsletter, 86, 1–7.

PEACOCK, J. D., GRAHAM, D. K., ROBINSON, J. E. and WILKINSON, I. P. (1978) Evolution and chronology of Lateglacial marine environments at Lochgilphead, Scotland, In GRAY, J. M. and LOWE, J. J., (eds.) Studies in the Scottish Lateglacial Environment, Pergamon Press, Oxford, pp. 89–100.

PEACOCK, J. D., GRAHAM, D. K. and WILKINSON, I. P. (1977) Late-glacial and Post-glacial marine environments at Ardyne, Scotland, and their significance in the interpretation of the history of the Clyde sea area, Report of the Institute of Geological Sciences, 78/11.

PEACOCK, J. D. and LONG, D. (1994) Late Devensian glaciation and deglaciation of Shetland, Quaternary Newsletter, 16–21.

PEARSON, G. W. (1979) Belfast Radiocarbon Dates IX, Radiocarbon, 21, 274–290.

PENNINGTON, W. (1975) A chronostratigraphic comparison of Late Weichselian and Late Devensian subdivisions, illustrated by two radiocarbon dated profiles from western Britain, Boreas, 4, 157–171, doi: 10.1111/j.1502-3885.1975.tb00687.x.

PENNINGTON, W. (1977) Late Devensian Flora and Vegetation of Britain, Philosophical Transactions of the Royal Society of London Series B-Biological Sciences, 280, 247–271, doi: 10.1098/rstb.1977.0109.

PENNY, L. F., COOPE, G. R. and CATT, J. A. (1969) Age and insect fauna of the Dimlington silts, East Yorkshire, Nature, 224, 65–66, doi: 10.1038/224065b0.

PERKINS, N. K. and RHODES, E. J. (1994) Optical Dating of Fluvial Sediments from Tattershall, UK, Quaternary Science Reviews, 13, 517–520, doi: 10.1016/0277-3791(94)90069-8.

PHILLIPS, F. M., BOWEN, D. Q. and ELMORE, D. (1994) Surface exposure dating of glacial features in Great Britain using cosmogenic chlorine-36: preliminary results, Mineralogical Magazine, 58A, 722–723, doi: 10.1180/minmag.1994.58A.2.113.

PHILLIPS, W. M., HALL, A. M., BALLANTYNE, C. K., BINNIE, S., KUBIK, P. W. and FREEMAN, S. (2008) Extent of the last ice sheet in northern Scotland tested with cosmogenic ^{10}Be exposure ages, Journal of Quaternary Science, 23, 101–107, doi: 10.1002/jqs.1161.

PHILLIPS, W. M., HALL, A. M., MOTTRAM, R., FIFIELD, L. K. and SUGDEN, D. E. (2006) Cosmogenic ^{10}Be and ^{26}Al exposure ages of tors and erratics, Cairngorm mountains, Scotland: timescales for the development of a classic landscape of selective linear glacial erosion, Geomorphology, 73, 222–245, doi: 10.1016/j.geomorph.2005.06.009.

RAE, D. A. (1976) Aspects of glaciation in Orkney, Unpublished PhD thesis, University of Liverpool.

REIMER, P. J., BAILLIE, M. G. L., BARD, E., BAYLISS, A., BECK, J. W., BERTRAND, C. J. H., BLACKWELL, P. G., BUCK, C. E., BURR, G. S. and CUTLER, K. B. (2004) IntCal04 Terrestrial Radiocarbon Age Calibration, 0-26 cal kyr BP, Radiocarbon, 46, 1029–1058.

REIMER, P. J., BAILLIE, M. G. L., BARD, E., BAYLISS, A., BECK, J. W., BLACKWELL, P. G., RAMSEY, C. B., BUCK, C. E., BURR, G. S., EDWARDS, R. L., FRIEDRICH, M., GROOTES, P. M., GUILDERSON, T. P., HAJDAS, I., HEATON, T. J., HOGG, A. G., HUGHEN, K. A., KAISER, K. F., KROMER, B., MCCORMAC, F. G., MANNING, S. W., REIMER, R. W., RICHARDS, D. A., SOUTHON, J. R., TALAMO, S., TURNEY, C. S. M., VAN DER PLICHT, J. and WEYHENMEYER, C. E. (2009) INTCAL 09 and MARINE09 Radiocarbon age calibration curves, 0-50,000 years Cal BP, Radiocarbon, 51, 1111–1150.

RISE, L. and ROKOENGEN, K. (1984) Surficial sediments in the Norwegian sector of the North Sea between 60° 30′ and 62° N, Marine Geology, 58, 287–317, doi: 10.1016/0025-3227(84)90206-8.

ROBERTS, D. H., CHIVERRELL, R. C., INNES, J. B., HORTON, B. P., BROOKS, A. J., THOMAS, G. S. P., TURNER, S. and GONZALEZ, S. (2006) Holocene sea levels, Last Glacial Maximum glaciomarine environments and geophysical models in the northern Irish Sea Basin, UK, Marine Geology, 231, 113–128, doi: 10.1016/j.margeo.2006.05.005.

ROKOENGEN, K., LØFALDLI, M., RISE, L., LØKEN, T. and CARLSEN, R. (1982) Description and dating of a submerged beach in the northern North Sea, Marine Geology, 50, M21–M28, doi: 10.1016/0025-3227(82)90056-1.

ROLFE, W. D. I. (1966) Woolly rhinoceros from the Scottish Pleistocene, Scottish Journal of Geology, 2, 253–258, doi: 10.1144/sjg02030253.

ROSE, J. (1980) Rhu, In JARDINE, W. G., (ed.) Glasgow Region Field Guide, Quaternary Research Accociation, Cambridge, pp. 31–37.

ROSS, H. (1996) The Last Glaciation of Shetland, Unpublished PhD thesis, University of St Andrews.

ROWLANDS, B. M. (1971) Radiocarbon Evidence of Age of an Irish-Sea-Glaciation in Vale of Clwyd, Nature-Physical Science, 230, 9–11.

SCOURSE, J. D. (1991) Late Pleistocene stratigraphy and palaeobotany of the Isles of Scilly, Philosophical Transactions of the Royal Society of London, B, 334, 405–448, doi: 10.1098/rstb.1991.0125.

SCOURSE, J. D. (2006) The Isles of Scilly: Field Guide, Quaternary Research Association, London, 180 pp.

SCOURSE, J. D. and AUSTIN, W. E. N. (1994) A Devensian Late-Glacial and Holocene sea-level and water depth record from the Central Celtic Sea, Quaternary Newsletter, 74, 22–29.

SCOURSE, J. D., EVANS, D. J. A., HIEMSTRA, J. F., MCCARROLL, D. and RHODES, E. J. (2004) Late Devensian glaciation of the Isles of Scilly, Quaternary Newsletter, 102, 49–54.

SCOURSE, J. D., HAAPANIEMI, A. I., COLMENERO-HIDALGO, E., PECK, V. L., HALL, I. R., AUSTIN, W. E. N., KNUTZ, P. C. and ZAHN, R. (2009) Growth, dynamics and deglaciation of the last British-Irish Ice Sheet: the deep-sea ice-rafted detritus record, Quaternary Science Reviews, 28, 3066–3084, doi: 10.1016/j.quascirev.2009.08.009.

SCOURSE, J. D. and MCCARROLL, D. (2006) Peninnis Head (SV912093), In SCOURSE, J. D., (ed.) The Isles of Scilly: Field Guide, Quaternary Research Association, London, pp. 87–90.

SEJRUP, H. P., HAFLIDASON, H., AARSETH, I., KING, E., FORSBERG, C. F., LONG, D. and ROKOENGEN, K. (1994) Late Weichselian glaciation history of the northern North Sea, Boreas, 23, 1–13, doi: 10.1111/j.1502-3885.1994.tb00581.x.

SEJRUP, H. P., HJELSTUEN, B. O., DAHLGREN, K. I. T., HAFLIDASON, H., KUIJPERS, A., NYGÅRD, A., PRAEG, D., STOKER, M. S. and VORREN, T. O. (2005) Pleistocene glacial history of the NW European continental margin, Marine and Petroleum Geology, 22, 111–1129, doi: 10.1016/j.marpetgeo.2004.09.007.

SEJRUP, H. P., NYGÅRD, A., HALL, A. M. and HAFLIDASON, H. (2009) Middle and Late Weichselian (Devensian) glaciation history of south-western Norway, North Sea and eastern UK, Quaternary Science Reviews, 28, 370–380, doi: 10.1016/j.quascirev.2008.10.019.

SHOTTON, F. W., BLUNDELL, D. J. and JOHNSON, A. S. (1974a) Birmingham University Radiocarbon Dates VIII, Radiocarbon, 16, 285–303.

SHOTTON, F. W., BLUNDELL, D. J. and WILLIAMS, R. E. G. (1969) Birmingham University Radiocarbon Dates III, Radiocarbon, 11, 263–270.

SHOTTON, F. W. and STRACHAN, I. (1959) The investigation of a peat moor at Rodbaston, Penkridge, Staffordshire, Quarterly Journal of the Geological Society, 115, 1–15, doi: 10.1144/GSL.JGS.1959.115.01.01.

SHOTTON, F. W. and WILLIAMS, R. E. (1971) Birmingham-University Radiocarbon Dates V, Radiocarbon, 13, 141–156.

SHOTTON, F. W. and WILLIAMS, R. E. (1973) Birmingham University Radiocarbon-Dates VI, Radiocarbon, 15, 1–12.

SHOTTON, F. W., WILLIAMS, R. E. and JOHNSON, A. S. (1974b) Birmingham-University Radiocarbon-Dates VIII, Radiocarbon, 16, 285–303.

SIMMS, M. J. (2005) Glacial and karst landscapes of the Gort lowlands and Burren, In COXON, P., (ed.) The Quaternary of Central Western Ireland: Field Guide, Quaternary Research Association, London, pp. 39–63.

SIMPSON, J. B. (1933) The late-glacial readvance moraines of the Highland border west of the River Tay, Transactions of the Royal Society of Edinburgh, 57, 633–646.

SISSONS, J. B. (1967) Glacial stages and radiocarbon dates in Scotland, Scottish Journal of Geology, 3, 375–381, doi: 10.1144/sjg03030375.

SISSONS, J. B. and WALKER, M. J. C. (1974) Late Glacial Site in Central Grampian Highlands, Nature, 249, 822–824, doi: 10.1038/249822a0.

SMITH, A. G. and GODDARD, I. C. (1991) A 12 500 year record of vegetational history at Sluggan Bog, Co. Antrim, N. Ireland (incorporating a pollen zone scheme for the non-specialist), New Phytologist, 118, 167–187, doi: 10.1111/j.1469-8137.1991.tb00576.x.

SMITH, A. G., PEARSON, G. W. and PILCHER, J. R. (1971) Belfast Radiocarbon Dates IV, Radiocarbon, 13, 450–467.

SMITH, B. W., RHODES, E. J., STOKES, S., SPOONER, N. A. and AITKEN, M. J. (1990) Optical Dating of Sediments - Initial Quartz Results from Oxford, Archaeometry, 32, 19–31, doi: 10.1111/j.1475-4754.1990.tb01078.x.

STONE, J. O. and BALLANTYNE, C. K. (2006) Dimensions and deglacial chronology of the Outer Hebrides Ice Cap, northwest Scotland: implications of cosmic ray exposure dating, Journal of Quaternary Science, 21, 75–84, doi: 10.1002/jqs.933.

STROEVEN, A. P., FABEL, D., HÄTTESTRAND, C. and HARBOR, J. (2002) A relict landscape in the centre of the Fennoscandian glaciation: cosmogenic radionuclide evidence of tors preserved through multiple glacial cycles, Geomorphology, 44, 145–154, doi: 10.1016/S0169-555X(01)00150-7.

STUART, A. J. (1982) Pleistocene Vertebrates in the British Isles, Longman, London, 228 pp.

STUIVER, M. and REIMER, R. W. (1993) Extended 14C database and revised CALIB radiocarbon calibration program, Quaternary Science Reviews, 3, 157–254.

SUGGATE, R. P. and WEST, R. G. (1959) On the extent of the last glaciation in eastern England, Proceedings of the Royal Society of London, Series B, Biological Sciences, 939, 263–283.

SUTHERLAND, D. G. (1981) The raised shorelines and deglaciation of the Loch Long/Fyne area, Western Scotland, Unpublished PhD thesis, University of Edinburgh.

SUTHERLAND, D. G. (1984) The Quaternary deposits and landforms of Scotland and the neighbouring shelves: a review, Quaternary Science Reviews, 3, 157–254, doi: 10.1016/0277-3791(84)90017-9.

SUTHERLAND, D. G. (1986) A review of Scottish marine shell radiocarbon dates, their standardization and interpretation, Scottish Journal of Geology, 22, 145–164, doi: 10.1144/sjg22020145.

SUTHERLAND, D. G., BALLANTYNE, C. K. and WALKER, M. J. C. (1984) Late Quaternary glaciation and environmental change on St-Kilda, Scotland and their paleoclimatic significance, Boreas, 13, 261–272, doi: 10.1111/j.1502-3885.1984.tb01121.x.

SUTHERLAND, D. G. and WALKER, M. J. C. (1984) A late Devensian ice-free area and possible interglacial site on the Isle of Lewis, Scotland, Nature, 309, 701–703, doi: 10.1038/309701a0.

SWITSUR, V. R. and WEST, R. G. (1972) University of Cambridge Natural Radiocarbon Measurements X, Radiocarbon, 14, 239–246.

TELFER, M. W., WILSON, P., LORD, T. C. and VINCENT, P. J. (2009) New constraints on the age of the last ice sheet glaciation in NW England using optically stimulated luminescence dating, Journal of Quaternary Science, 24, 906–915, doi: 10.1002/jqs.1256.

THOMAS, G. S. P., CHIVERRELL, R. and HUDDART, D. (2004) Ice-marginal depositional responses to readvance episodes in the Late Devensian deglaciation of the Isle of Man, Quaternary Science Reviews, 23, 85–106, doi: 10.1016/j.quascirev.2003.10.012.

THRASHER, I. M., MAUZ, B., CHIVERRELL, R. C., LANG, A. and THOMAS, G. S. P. (2009) Testing an approach to OSL dating of Late Devensian glaciofluvial sediments of the British Isles, Journal of Quaternary Science, 24, 785–801, doi: 10.1002/jqs.1253.

TOOLEY, M. J. (1977) The Isle of Man, Lancashire Coast and Lake District, Geoabstracts for International Union for Quaternary Research, Norwich.

TOOLEY, M. J. and KEAR, B. (1977) Shirdley Hill Sand Formation, In TOOLEY, M. J., (ed.) The Isle of Man, Lancashire Coast and Lake District, Geoabstracts, Norwich, pp. 9–12.

VAN DER PLICHT, J., BECK, J. W., BARD, E., BAILLIE, M. G. L., BLACKWELL, P. G., BUCK, C. E., FRIEDRICH, M., GUILDERSON, T. P., HUGHEN, K. A. and KROMER, B. (2004) NotCal04-Comparison/Calibration ^{14}C Records 26-50 cal kyr BP, Radiocarbon, 46, 1225–1238.

VASARI, Y. N. (1977) Radiocarbon dating of the Late glacial and early Flandrian vegetational succession in the Scottish Highlands and the Isle of Skye, In GRAY, J. M. and LOWE, J. J., (eds.) Studies in the Scottish Lateglacial Environment, Pergamon Press, Oxford, pp. 143–162.

VENTRIS, P. A. (1985) Pleistocene environmental history of the Nar Valley, Norfolk, Unpublished PhD thesis, University of Cambridge.

VINCENT, P. J., WILSON, P., LORD, T. C., SCHNABEL, C. and WILCKEN, K. M. (2010) Cosmogenic isotope (36Cl) surface exposure dating of the Norber erratics, Yorkshire Dales: Further constraints on the timing of the LGM deglaciation in Britain, Proceedings of the Geologists' Association, 121, 24–31, doi: 10.1016/j.pgeola.2009.12.009.

VON WEYMARN, J. and EDWARDS, K. J. (1973) Interstadial site on the Island of Lewis, Nature, 246, 473–474, doi: 10.1038/246473a0.

WALKER, M. J. C. (1980) Late-Glacial History of the Brecon Beacons, South-Wales, Nature, 287, 133–135, doi: 10.1111/j.1469-8137.1982.tb03250.x.

WALKER, M. J. C. (1982) The Late-Glacial and Early Flandrian Deposits at Traeth Mawr, Brecon Beacons, South-Wales, New Phytologist, 90, 177–194.

WHITTINGTON, G., CONNELL, R. E., COOPE, G. R., EDWARDS, K. J., HALL, A. M., HULME, P. D. and JARVIS, J. (1998) Devensian organic interstadial deposits and ice sheet extent in Buchan, Scotland, Journal of Quaternary Science, 13, 309–324.

WILSON, L. J., AUSTIN, W. E. N. and JANSEN, E. (2002) The last British Ice Sheet: growth, maximum extent and deglaciation, Polar Research, 21, 243–250, doi: 10.1111/j.1751-8369.2002.tb00077.x.

WINTLE, A. G. (1981) Thermoluminescence dating of late Devensian loesses in southern England, Nature, 289, 479–480.

WINTLE, A. G. and CATT, J. A. (1985) Thermoluminescence dating of Dimlington Stadial deposits in eastern England, Boreas, 14, 231–234, doi: 10.1111/j.1502-3885.1985.tb00725.x.

WOODMAN, P., MCCARTHY, M. and MONAGHAN, N. (1997) The Irish Quaternary Fauna Project, Quaternary Science Reviews, 16, 129–159, doi: 10.1016/S0277-3791(96)00037-6.

YAMASAKI, F., HAMADA, T. and HAMADA, C. (1969) Riken Natural Radiocarbon Measurements V, Radiocarbon, 11, 451–462.