Database of the Eurasian Deglaciation, DATED: what did we learn, and what next?

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Data compilation and synthesis are an integral part of geological research. Development and testing of new theoretical interpretations largely depend upon evaluation of accumulated observations. Yet over time the task of compiling information becomes increasingly daunting as the volume (and complexity) of data increases. Databases provide an increasingly valuable means by which to collate and share data amongst diverse communities, facilitated by advances in GIS tools and increasing use of online data repositories. This is especially true in the case of palaeo-ice sheet reconstruction which combines a range of approaches and expertise. Glacial geologists require state-of-the-art syntheses of past ice extent to set individual records in context. Glacial modellers require ice-sheet scale empirical constraints that are specified in time and include uncertainty estimates. In 2005, motivated by these dual demands, we started a project (Database of the Eurasian Deglaciation, DATED) to compile and archive all published dates relating to the build-up and retreat of the last Eurasian ice sheets including the British-Irish, Scandinavian and Svalbard-Barents-Kara Seas ice sheets (BIIS, SIS and SBKIS respectively). Over 5000 dates were assessed for reliability and used together with mapped ice-sheet margin positions to reconstruct time-slice maps of the ice sheets' extent every 1000 years between 25-10 ka, and selected older periods. Ten years after the idea for a database was conceived, the first version of results (DATED-1) has now been released (Hughes et al. 2015).

We observe that: i) both the BIIS and SBKIS achieve maximum extent, and commence retreat earlier than the larger SIS; ii) the eastern terrestrial margin of the SIS reached its maximum extent up to 7000 years later than the westernmost marine margin; iii) maximum ice volume ($\sim$24 m sea-level equivalent) was reached c. 21 ka; iv) large uncertainties exist; predominantly across marine sectors (e.g. the timing of coalescence and separation of the SIS and BKIS) but also in well-studied areas due to conflicting yet equally robust data.

In this talk, we examine the ice sheet evolution against documented climatic and oceanographic changes of the last glacial period to explore possible driving mechanisms behind the observed changes, and discuss the implications of the documented uncertainty. In just three years since the DATED-1 census (1 January 2013), the volume of new information (from both dates and pattern information) has grown significantly, and we discuss the implications of these additional data and plans for the next version of the database, DATED-2. We also discuss the advantages and challenges of data synthesis from historical data and make recommendations for geological database building, archiving and maintenance. Key considerations to maximise the potential of databases to strengthen future geological research include: data reporting in and appropriate citation of original data sources, the needs of database users and selection of database metadata, access to resulting datasets, clear description of uncertainties and separation of data from interpretations, data standardisation, and access to long-term funding for database maintenance.

References:

Hughes, A. L. C., Gyllencreutz, R., Lohne, Ø. S., Mangerud, J., Svendsen, J. I.: 2015. The last Eurasian ice sheets — a chronological database and time-slice reconstruction, DATED-1. *Boreas*. 10.1111/bor.12142