

Global glaciation during glacial cycles: assessing the fine-scale division of glacial stages

Philip L. Gibbard 1, Philip D. Hughes 2,

1 Cambridge Quaternary, Department of Geography, University of Cambridge, Downing Place, Cambridge CB2 3EN, United Kingdom

2 Geography, School of Environment and Development, The University of Manchester, Oxford Road, Manchester M13 9PL, United Kingdom

Glaciers are known to have reached their maximum extents at a variety of times during the last glacial cycle. Some reached their maximum in Marine Isotope Stage (MIS) 2 (Weichselian/Wisconsinan Stage, etc.) close to the global last glacial maximum (LGM) when global sea levels were at their lowest. Some sectors of the largest mid-latitude ice sheets in the northern hemisphere (Laurentide, British-Irish, SE Fennoscandian) appear to have reached their maximum extent around this time and these ice sheets probably dominated the global sea-level signal at the LGM. Other ice sheets and large ice caps reached their maximum extent before this.

Many reached their maximum in MIS 3, 4 or earlier (New Zealand, Patagonia, East Antarctica, Himalaya-Tibet, Cordilleran, Alaska, SW Fennoscandia). In northern Eurasia, the Barents-Kara ice sheet reached its maximum extent early in the last glacial cycle (late MIS 5).

Mountain glaciers in many parts of the world advanced close to the global LGM. However, many also reached their maximum extents earlier in the last glacial cycle. The pattern of ice build-up, advances and retreats can be linked to glacier size, proximity to the major oceans

(continentality) and also to changes in global solar radiation receipt at different latitudes.

Improvements in geochronology offer the opportunity to assess these variations and to compare them with earlier, Middle Pleistocene glaciations, which were the largest recorded in the Quaternary.