British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

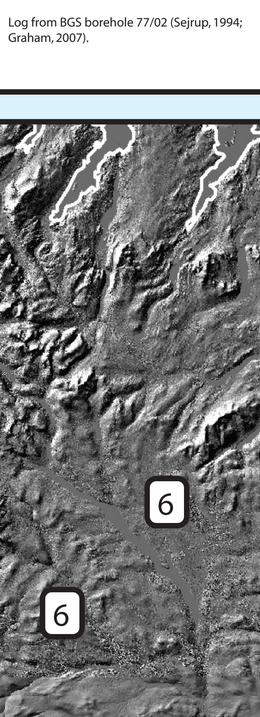
DYNAMICS AND DISINTEGRATION OF THE MORAY FIRTH PALAEO-ICE STREAM

Andrew Finlayson[1], Jon Merritt[1], Clive Auton[1], Ali Graham[2], Tom Bradwell,[1] Martyn Stoker[1], Nick Golledge[1] and Jez Everest[1].

1 *British Geological Survey, Murchison House, West Mains Road, Edinburgh*
2 *British Antarctic Survey, High Cross, Madingley Road, Cambridge*

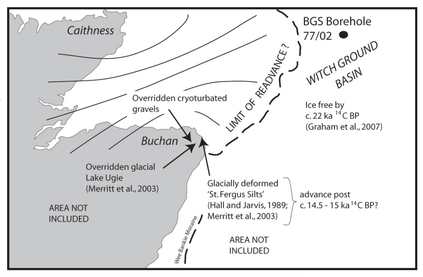
New datasets have provided an excellent opportunity to build on existing models of deglaciation in the Moray Firth area of NE Scotland. This poster presents a summary of recent findings, together with existing data, relating to dynamics and disintegration of the Moray Firth palaeo-ice stream.

1. An early, post-LGM re-advance



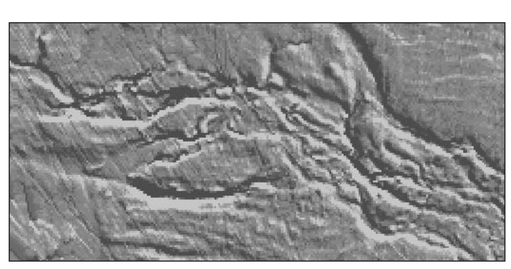
Log from BGS borehole 77/02 (Sejrup, 1994; Graham, 2007).

Onshore and offshore sediments and geomorphology suggest that a glacier re-advance and stillstand occurred following marine incursion into the North Sea area



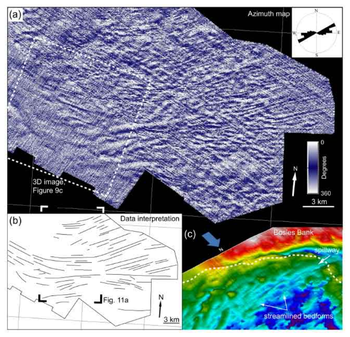
Till of the Moray Firth Ice Stream overlying cryoturbated gravels with vertical clasts, near Kirkhill

2. Tunnel Valleys



Originally recognised by Andrews et al., (1990), these deep west to east trending trenches cut to >200m below sea-level, are generally 2 - 3 km in width, and vary from 10 km to over 75 km in length. They cross topographic undulations and are probably associated with subglacial meltwater release.

3. Ice stream bedforms



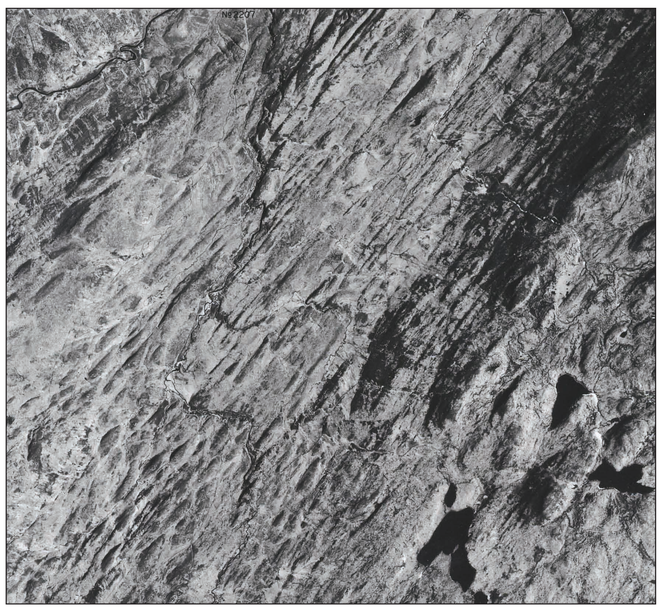
Streamlined landscape near Invermoriston. These SW to NE aligned features are cut into bedrock.

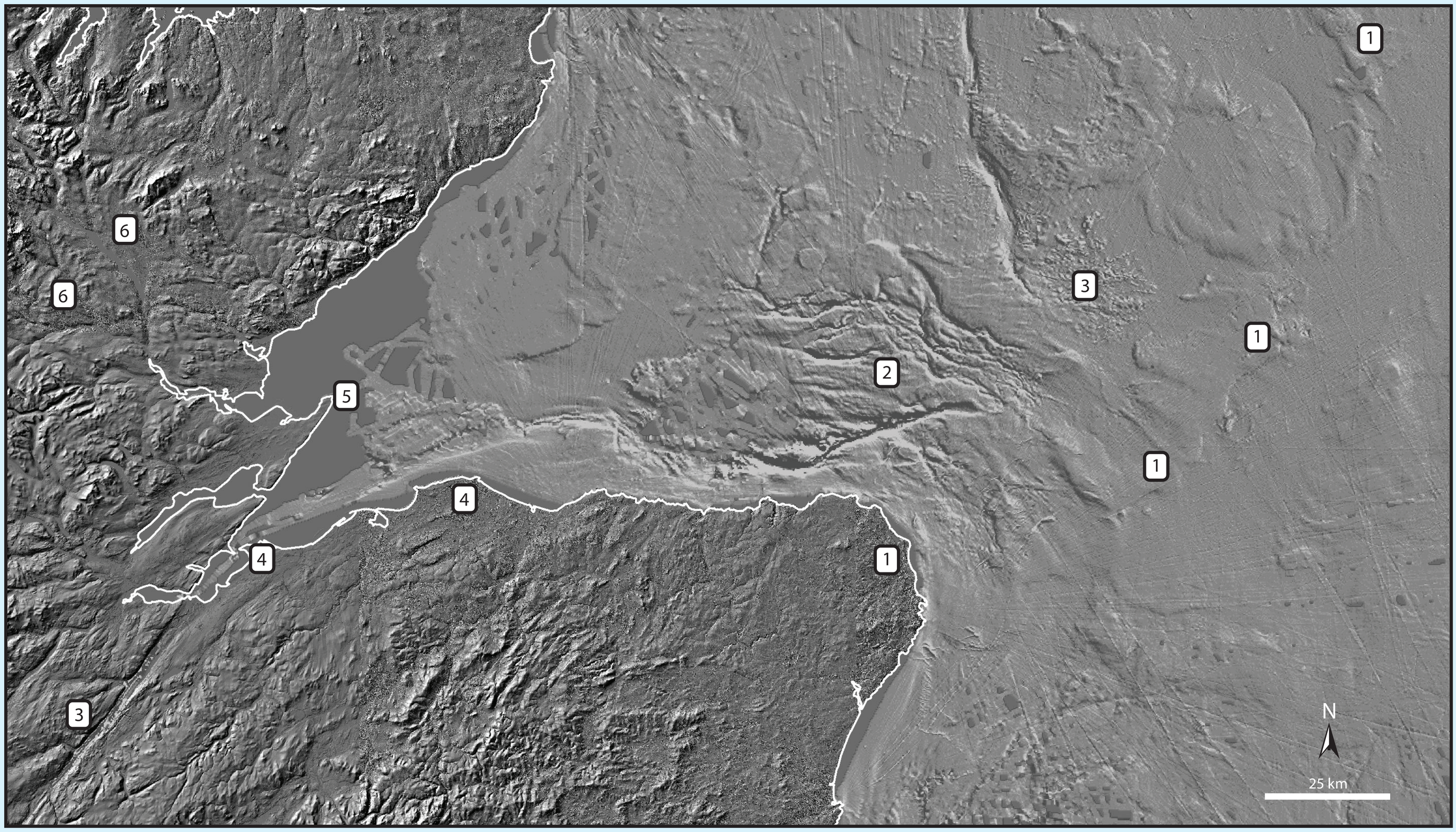
Partially buried glaciigenic features in the outer Moray Firth. Note the west - east streamlined ridges and grooves. From Graham (in review).

Aerial photograph of rock drumlins and large-scale glacial grooves near Invermoriston by Loch Ness. Palaeo-ice flow direction is SW to NE towards the Moray Firth (Merritt et al., in prep).

N

1 km





4. Glacier Oscillations

Based on morphological observations and stratigraphic relationships, Peacock et al., (1968) concluded that a significant oscillation of the ice margin took place at Elgin. Merritt et al., (1995) described detailed evidence for a subsequent oscillation which formed a large push moraine at Ardersier. Merritt et al., (1995) suggested that the Ardersier oscillation was caused by a temporary fall in relative sea-level.

Jamieson's Pit, Ardersier. Discrete thrust-slices within silty sands of the Ardersier Silts Formation, overlain by flow till (Baddock Till).

Jamieson's Pit, Ardersier. Sands within the Ardersier Silts Formation. Showing homogenization, folding and dislocation along clay-lined thrust planes caused by glacier-push during the Ardersier Readvance.

5. De Geer Moraines?

Geomorphology of the Tarbat Ness peninsula. From Finlayson et al., (in review).

Transverse ridges on the Tarbat Ness peninsula are morphologically similar to De Geer moraines described elsewhere. If a De Geer moraine interpretation is correct, relative sea-level must have been at least 55 m above OD during early stages of retreat of the Moray Firth Ice Stream within the Moray Firth. Consequently, rapid relative sea-level fall must have occurred prior to the Ardersier Oscillation.

6. Interior areas

Cross profile of Rogen moraine at Strath Grudie

Oblique hill-shaded NEXTMap DSM showing Rogen moraine at Strath Grudie.

Geomorphological map of Rogen moraine area near Invercassley. From Finlayson and Bradwell (accepted).

Rogen moraine located in former ice sheet core areas may suggest that a change occurred in thermal regime during deglaciation. This was possibly associated with an increase in contribution of inland ice to the Moray Firth ice stream.