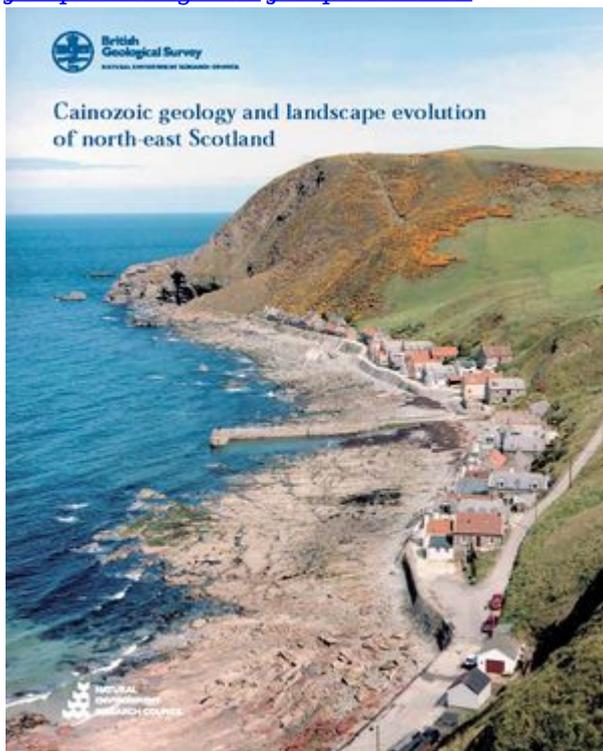


Cainozoic geology and landscape evolution of north-east Scotland. Memoir of the British Geological Survey, sheets 66E, 67, 76E, 77, 86E, 87W, 87E, 95, 96W, 96E and 97 (Scotland)

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The Cainozoic geology and landscape evolution of north-east Scotland memoir has been converted to a series of articles for this wiki. The book is available for purchase at the [BGS Online Shop](#) Its full reference is:

Merritt, J W, Auton, C A, Connell, E R, Hall, A M, and Peacock, J D. 2003. Cainozoic geology and landscape evolution of north-east Scotland. Memoir of the British Geological Survey, sheets 66E, 67, 76E, 77, 86E, 87W, 87E, 95, 96W, 96E and 97 (Scotland). Contributors: J F Aitken, D F Ball, D Gould, J D Hansom, R Holmes, R M W Musson and M A Paul.

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Cainozoic geology and landscape evolution of north-east Scotland

This memoir provides a synthesis of the Cainozoic (Palaeogene, Neogene and Quaternary) geology of a large part of the coastal area of north-east Scotland stretching from Elgin to Inverbervie and portrayed on the 'Drift' editions of eleven 1:50 000 geological sheets. The nature, origin and distribution of the superficial deposits are described, together with their use as a resource and as foundation materials. It draws on the results of surveys undertaken over the past 30 years or so, and acts as a guide to the large archive of more detailed information held by the British Geological Survey. It also incorporates and synthesises much information stemming from university research, and is coauthored by leading research workers out with BGS.

The complexity and variety of the Quaternary succession in the district is unrivalled in Scotland particularly for the record it contains of cold stages represented by periglacial deposits and the presence of sediments with a biological or pedological record of interstadial and interglacial climates. The widespread preservation of ancient peneplanation surfaces associated with deeply weathered rock and enigmatic flint and quartzite gravels is unique in north-west Europe. These features, together with a significant offshore stratigraphical record, provide unique information illustrating the effects of Pleistocene glaciation and Cainozoic landscape evolution. The area offers a broad range of future research and teaching opportunities that can draw on the definitive account presented here.

Much of north-east Scotland was peripheral to the main centres of ice accumulation in the west of Scotland during the Pleistocene glaciations resulting in minimal glacial erosion. It repeatedly witnessed the interaction between sluggish, cold-based ice flowing from an inland source and relatively fast, low-gradient ice streams flowing over deformable sediments offshore. A partial record of at least three major glaciations and intervening ice-free periods is preserved. During the last (Main Late Devensian) glaciation, the district was crossed by several distinct ice streams that partially retreated and then re-advanced on more than one occasion. This resulted in the deposition of complex sequences of glacial, glaciofluvial and glaciolacustrine deposits of varied provenance together with of a range of glacitectonic phenomena including numerous glacial rafts derived from the floor of the Moray Firth. Large rafts of Jurassic clay are particularly common. The pattern of deglaciation is also recorded in an extensive network of meltwater channels, and in the raised beach, estuarine and glaciomarine deposits, formed as a result of the considerable glacio-isostatic depression of the ground. Following a period of low sea level in the early Holocene, the Main Postglacial Transgression resulted in marine inundation of the river estuaries and the deposition of estuarine silts, sands and clays, locally over peat.

Preface

Pressures on present-day environments are continually increasing. In areas of population and industrial growth such as the coastal zone between Stonehaven and Peterhead, the need for a thorough understanding of the local natural resources, hazards and ground conditions is paramount. A major aspect of this need is a comprehensive knowledge and understanding of the geological, geomorphological and environmental changes that have occurred over the past few million years, and which were responsible for the present distribution of drift deposits and landforms. To this end the British Geological Survey is directing research towards the Quaternary period, particularly concentrating on major centres of population, as well as surveying neighbouring rural and wilderness areas where relatively little geological information is currently available.

This memoir is a synthesis of the Cainozoic (Palaeogene, Neogene and Quaternary) deposits over a wide area of north-east Scotland and represents a departure from the previous survey styles. It focusses on the nature, origin and distribution of the drift deposits, their use as a resource and as foundation materials. As such it represents part of the large geoscience database that BGS holds for the UK that is available to provide solutions to geological problems as well as underpinning the scientific understanding of glacial processes, landforms and deposits. It describes areas that have been resurveyed by BGS over the last few decades in the coastal areas of north-east Scotland and portrayed on the Drift or Solid-and-Drift editions of eleven 1:50 000 geological sheets. Much of the mapping was undertaken as commissioned research specifically for sand and gravel resource appraisal or as part of environmental geology portfolios. Although the drift deposits on some of the sheets have been documented elsewhere in BGS publications, most have not been described systematically.

Several classic concepts of the British Quaternary have been formulated in north-east Scotland over the past 150 years, including the pioneering research work of Thomas Jamieson and James Croll during the 19th century. Croll first suggested that ice ages were caused by changes in the amount of solar irradiance received at the poles as a result of changes in shape, tilt and wobble of the Earth's orbit around the Sun. This memoir summarises and builds on a wealth of research work published in the literature, particularly in publications of the Quaternary Research Association and Scottish Natural Heritage. It includes an analysis of how the landscape of north-east Scotland evolved throughout the Cainozoic era and it summarises our present understanding of the Quaternary events that have affected the district. Several research workers outwith the British Geological Survey have contributed to this memoir, in particular A M Hall and E R Connell, testifying to the co-operation of university academics with BGS's core programme. This collaboration together with the combination of publically funded and commissioned research furthers understanding of British geology and enhances the national database of earth science information available to the public.

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