

# Shallow geophysics and remote sensing, Cainozoic of north-east Scotland

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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.

## Shallow geophysics

Ground geophysical surveys have been undertaken to investigate the three dimensional form of Cainozoic successions in several small areas in the district. Each investigation was designed to answer particular questions concerning the nature of the concealed sequence, in ground that had been investigated previously by drilling and trial pitting, as well as by detailed geological mapping.

Three techniques were used:

1. Conductivity surveying, using a non-contacting (EM31) terrain conductivity meter, was employed on an experimental basis to map the near surface (less than 5 m depth) extent of workable deposits of sand and gravel in 2 km<sup>2</sup> of ground in the Houff of Ury area, north-west of Stonehaven.
2. Resistivity soundings, using Offset Wenner and Schlumberger arrays, were taken to investigate the nature and thickness of Quaternary sequences encountered in sand and gravel assessments in the Inverurie–Stonehaven (Auton et al., 1988) and Strachan–Auchenblae–Catterline areas (Auton et al., 1990).
3. Ground probing radar (GPR) traverses, using a Pulse Echo IV radar system, were undertaken to investigate the thickness and lateral extent of Quaternary deposits and the form of rockhead in the Houff of Ury conductivity survey area (Greenwood and Raines 1994; Greenwood et al., 1995). Traverses were also made to elucidate the sedimentary architecture of the Palaeogene to Neogene Buchan Gravels Formation at the Den of Boddam, Moss of Cruden and Windy Hills sites. At Moss of Cruden, resistivity soundings were made, in conjunction with the GPR survey, to augment earlier resistivity measurements made in the area. The GPR traverses, which produce cross-sections analogous to shallow seismic profiles, used radar frequencies between 25 and 100 m Hz.

Detailed results of the conductivity survey at the Houff of Ury and the resistivity soundings in the Inverurie–Stonehaven, and the Strachan–Auchenblae–Catterline areas are discussed in [Results of shallow geophysical surveys](#). The results of the GPR traverses are discussed here too. They are also incorporated in the site descriptions of the [Moss of Cruden](#) and [Windy Hills](#).

## Satellite imagery

[File:P915246.png](#)

Winter image of north-east

Scotland by the Landsat  
Enhanced Thematic  
Mapper sensor in  
December 2001. P915246.

The gross geomorphology of north-east Scotland can best be illustrated using satellite imagery ([P915246](#)). The image data, which were acquired from about 700 km above the surface of the Earth by Landsat, clearly differentiate the upland areas of the Grampian Highlands and Cairngorm Mountains from the lowlands of Strathmore, Buchan and the Moray Firth coast. The major elements of the postglacial drainage pattern are also clearly visible. Winter Landsat imagery (Landsat Thematic Mapper Band 5, Scene 204-020, acquired in October 1985), characterised by a low sun-angle that highlights subtle geomorphological features, was interpreted to aid the Quaternary mapping of Sheet 87W. Unfortunately, comprehensive winter coverage was not available for the district until recently. Consequently, detailed interpretation of aerial photographs, rather than satellite images, has played the major role in mapping out Quaternary landforms in the district, on both a local and a regional scale.

## References

[Full reference list](#)

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