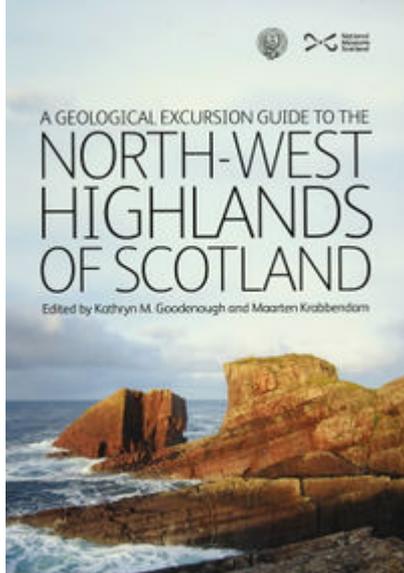


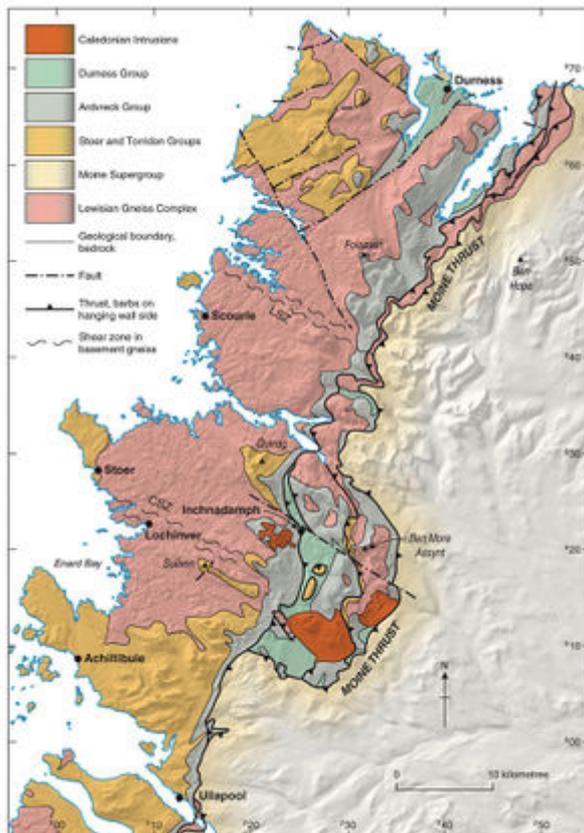
# Geological framework of the North-west Highlands

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Simplified geological map of the area covered by this excursion guide. CSZ = Canisp Shear Zone; LSZ = Laxford Shear Zone.

By Michael Johnson, Ian Parsons, Paul Smith, Robert Raine and Kathryn Goodenough

**From: Goodenough, Kathryn M. and Krabbendam, Maartin (Editors) [A geological excursion guide to the North-west Highlands of Scotland](#). Edinburgh : Edinburgh Geological Society in association with NMS Enterprises Limited, 2011.**

The North-west Highlands are internationally famous because they contain superb evidence for large-scale horizontal shortening of continental crust, as a result of the piling-up of thrust sheets along the Moine Thrust Zone during the Caledonian orogeny, in the early Silurian. The Moine Thrust Zone extends for around 200km, from Loch Eriboll to the Isle of Skye, and the total displacement along its component thrusts was at least 100km. This guide describes the northern part of the Moine Thrust Zone (Fig. 1). The thrust relationships are clearly displayed on the mountainsides, in one of the few parts of Britain in which the visitor can enjoy geological vistas that can truly be compared with the Alps. However, the thrust zone is just one of the important geological features of the North-west Highlands; the foreland succession, comprising an Archaean-Palaeoproterozoic gneiss complex overlain by Proterozoic and early Palaeozoic sedimentary rocks, has also been studied in significant detail. The area additionally contains a suite of alkaline igneous intrusions, which includes some of the most potassic igneous rocks in Britain.

The geology of the area was first extensively studied during the nineteenth century, and sparked some major scientific arguments, which have been described in detail elsewhere (e.g. Oldroyd, 1990). Although that period of debate concluded with the publication of the North-west Highlands memoir (Peach *et al.*, 1907), research into the rocks and structure of the region has continued throughout much of the last century (Butler, 2007; Law *et al.*, 2010a). Modern overviews of the geology are provided by Mendum *et al.* (2009), Trewin (2002), and Woodcock and Strachan (2000).

The stratigraphical succession in the North-west Highlands extends from the Archaean through to the Ordovician. The Archaean to Palaeoproterozoic tectonic history of Scotland is complex, but is steadily being unravelled with the application of modern geochronological techniques.

During much of the Proterozoic era, Scotland lay within a major super-continent called Rodinia. This continent broke up towards the end of the Neoproterozoic, and Scotland, together with Greenland and parts of North America, was then part of the continent of Laurentia, which existed for much of the Palaeozoic. Palaeomagnetic data show that Laurentia drifted from close to the South Pole in the late Neoproterozoic, to close to the equator in the Ordovician, thus experiencing a range of different climatic belts. During the Silurian, closure of an ocean called Iapetus led to the collision of Laurentia with the continents of Baltica and Avalonia, and the formation of the Moine Thrust Zone.

The rock units of the North-west Highlands record almost 3000 million years of this remarkable and diverse geological history, including two major Proterozoic unconformities. The area can be broadly divided into three distinct structural domains, each characterised by its different structures and lithologies (Fig. 1). These are:

- (1) The unmoved region or foreland lying to the west of the lowest thrust (the Sole Thrust). The complete foreland stratigraphical succession is shown in Table A.
- (2) The Moine Thrust Zone, which includes the Moine Thrust and the subsidiary thrusts occurring structurally below and to the west of it.
- (3) The rocks of the Moine Supergroup lying to the east of, and structurally above, the Moine Thrust.

A variety of post-Cambrian igneous rocks occur within all three of these domains. They include two

alkaline plutons, one of which represents the only silica-undersaturated major intrusion in the British Isles, and a suite of dykes and sills ranging from calc-alkaline to peralkaline in composition. Emplacement of these intrusions spanned the development of the Moine Thrust Zone, and therefore provides upper and lower age limits for thrusting.

## References

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