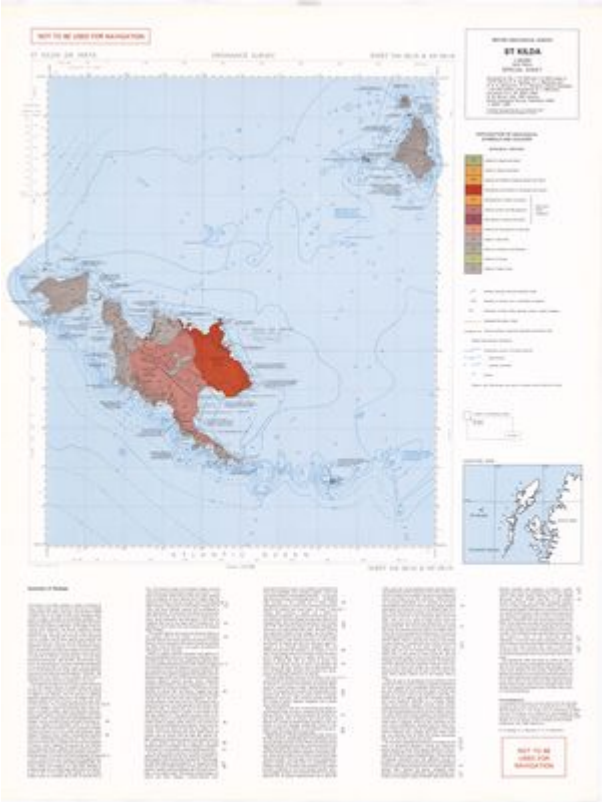
Introduction - St. Kilda: an illustrated account of the geology

From Earthwise
Jump to navigation Jump to search

From: Harding, R.R. and Nancarrow, P.H.A. 1984. St. Kilda: an illustrated account of the geology. BGS Report Vol. 16, No. 7. Keyworth: British Geological Survey.].



St. Kilda 1:25,000 Solid Edition Special sheet. 1984.

Introduction

The islands of St Kilda lie 65 km WNW of North Uist at the edge of the Outer Hebridean shelf. This part of the earth's crust is composed largely of Precambrian gneisses, with Mesozoic sediments in the Flannan trough and a thin impersistent cover of Recent sediments. At the edge of the continental shelf Mesozoic and Recent sediments thicken westwards to more than 2 km at the north end of the Rockall Trough. Although the structure of the submarine rocks is complex near St Kilda, seismic data indicate that basic intrusions are close by, and St Kilda lies close to a significant change in direction of the continental margin. From the latitude of St Kilda the margin runs due south for 350 km to the latitude of northern Ireland, and to the north' it trends NE for 900 km towards Norway. Very old shear directions trending NE–SW and NW–SE have been mapped in the Precambrian of the Outer Hebrides and detected in the submarine shelf by seismic work, and the intersection in the St Kilda area of a major shear trending NW from South Uist with tensional faults trending N–S and NE–SW indicate that the location of the volcanic centre was influenced by ancient planes of weakness in the crust.

The first comprehensive account of the geology of St Kilda was written by A. M. Cockburn in 1935 and he gave summaries of the earlier accounts of Macculloch (1819), Ross (1884) and Sir Archibald

Geikie (1897) before providing detailed descriptions of the rocks he had mapped during the summers of 1927 and 1928. Since then aspects of the glacial features of the islands have been discussed by Wager (1953) and Sutherland and others (1982); aspects of the petrology and geochemistry have been published by Harding (1966; 1967; 1982) and Meighan (1979); the regional setting of St Kilda was described by Jones (1981); and summaries of the general geology have appeared in numerous books and articles whose main theme has been some other aspect of St Kilda's natural history. A list of references and suggestions for further reading is given at the end of the report.

The importance of St Kilda from cultural, regional and scientific points of view is now recognised and one of the fundamental requirements for making decisions about future developments affecting the islands is a source of reliable scientific data. To fulfill the geological aspect of this requirement, a team was formed in 1978 to produce a geological map and detailed report on the geology of the island group. Field mapping was carried out by the authors during the summers of 1978 and 1979 and sample collecting for laboratory analysis was shared with those contributing special chapters. The map contains its own summary of the geology and four itineraries to enable certain aspects of the geology to be seen in half or full day periods. The Report has been designed along modular lines and the list of contents shows that in general each major topic occupies a double page.

Geological history

1 Formation of early mafic complex

A Initiation of magmatism in the vicinity of St Kilda, located at the intersection of lines of weakness in the Precambrian crust. Crystal accumulation from mafic magma to produce the Western Gabbro E^{W}

B Intrusion of the Cambir Dolerite into solid but still hot E^{W} to form basic granulites and spinel-amphibole assemblages.

C Intrusion of dolerites and gabbros and disintegration of E^{W} with general uplift of these rocks during formation of the igneous breccia EK. Intrusion of basalts and explosion microbreccias at a high level (probably less than 5 km deep) accompanying surface volcanism. Hydrothermal activity during cooling and solidification of the EK breccia.

2 Formation of complex comprising a range of mafic rocks and major granitic components

A Renewed surface volcanism followed by collapse of block of cold EK breccia into a basaltic magma chamber formed at a high level in the crust. Development of thick chilled zone round this block and formation of the Glen Bay Gabbro.

B Crushing of Glen Bay Gabbro followed by intrusion of Glen Bay Granite and then by porphyritic felsite dyke.

C Development of Mullach Sgar Complex involving at least four major intrusive phases each with felsic and mafic components. Intrusion of Glen Bay Dykes.

D Intrusion of Conachair Granite at a high level in the crust, with N or NNW fracturing of the Mullach Sgar Complex.

3 Uplift, loss of volatiles, minor intrusion and cooling

A Consolidation of Conachair Granite followed by NW faulting and hydrothermal activity at temperatures between 260° and 100°C.

B Intrusion of dolerites and felsites as cone sheets and dykes; NE faulting.

C Zeolite-grade hydrothermal alteration accompanying final cooling of the St Kilda complex in reversed polarity geomagnetic field.

4 Erosion

A Uplift and erosion during much of Tertiary time, with circumstantial evidence of some deposition.

B Erosion by glaciers and deposition of glacial and periglacial sediments; rise in sea level.

References

> At all times follow: The Scottish Access Codeand Code of conduct for geological field work

Category:

- 2. Northern Highlands

Navigation

- Main page
- Recent changes
- Random page
- Help about MediaWiki

Tools

- What links here
- Related changes
- Special pages
- Permanent link
- Page information
- Cite this page
- Browse properties

- This page was last modified on 5 November 2019, at 21:13.

- Privacy policy
- About Earthwise
- Disclaimers
- British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
- Powered By MediaWiki Semantic MediaWiki