

Geological Sights! North-West Scotland

2012

Harrow and Hillingdon
Geological Society



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 Geologists' Association

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Lewisian Gneiss:
Laxford Bridge
Badcall

Durness Group

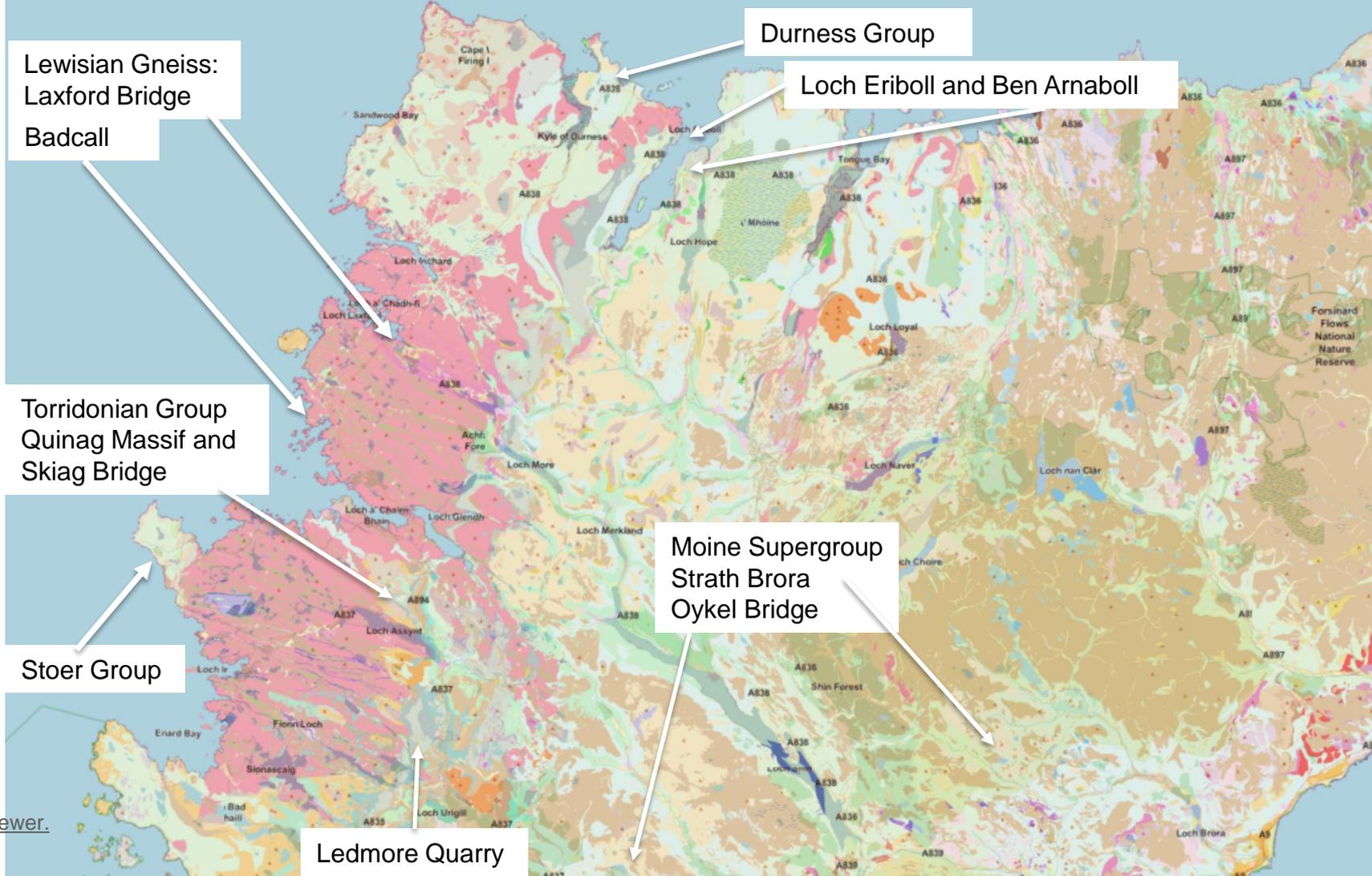
Loch Eriboll and Ben Arnaboll

Torrionian Group
Quinag Massif and
Skiag Bridge

Moine Supergroup
Strath Brora
Oykel Bridge

Stoer Group

Ledmore Quarry



During this trip HHGS visited locations to view the **PreCambrian** rocks of the **Archaean** Lewisian Gneiss (c.2,800 million years ago), the **Mesoproterozoic** Stoer Group (c.1,200 Mya) and Moine Supergroup (c.1,100 Mya), and the **Neoproterozoic** Torridonian Group (c.900+ Mya).



Moine Thrust Zone

Durness Group

Lewisian Gneiss:
Laxford Bridge

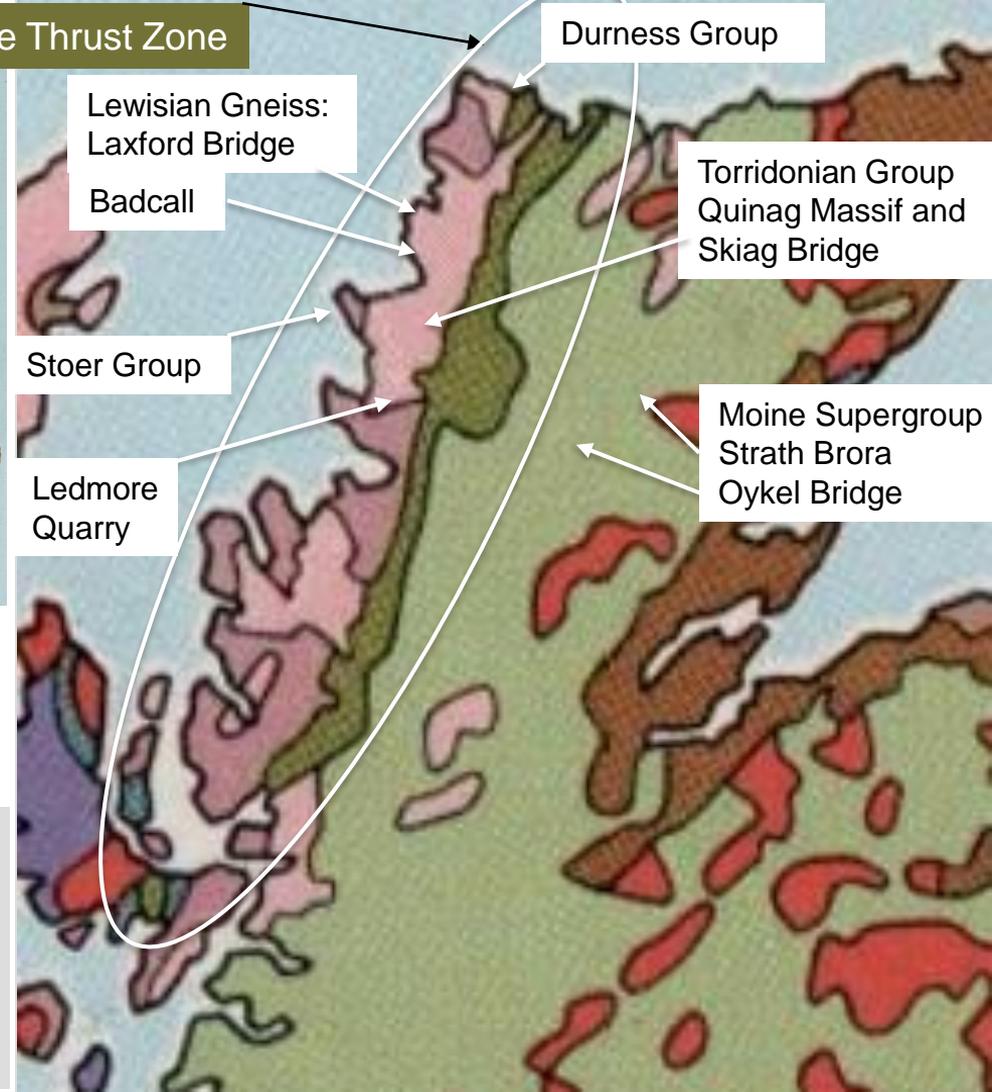
Badcall

Torridonian Group
Quinag Massif and
Skiag Bridge

Stoer Group

Ledmore
Quarry

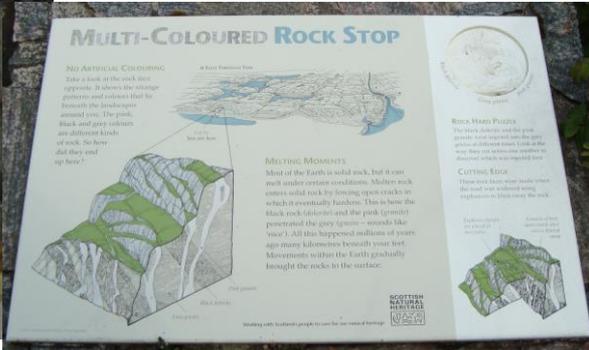
Moine Supergroup
Strath Brora
Oykel Bridge



The after-effects of the **Moine Thrust** and the **Great Glen Fault** were examined. They then explored the much later **Cambrian** Ardvreck Group (c.500Mya) and **Ordovician** Durness Group sedimentary strata (c.450Mya).



Lewisian Gneiss (2,800 Mya) cut by probable **Scourie dykes** of black amphibolite (2,400-2,000 Mya) and pink granite (1,800Mya). These intruded during periods of continental breakup and collision. North of Laxford Bridge, Sutherland.



Lewisian Group



Gneisses and amphibolites later folded during Laxfordian deformation, when the granites were intruded.



Archaean Lewisian Gneiss Complex showing quartzofeldspathic gneiss cut by black amphibolite Scourie dykes and pink Laxfordian granite.

Lewisian Group, North of Laxford Bridge, Sutherland

Bernard Skillerne de Bristowe (leader) explaining the intricacies of the Lewisian Group.



HHGS group examining a Scourie dyke cutting through the Central Region Lewisian basement. Upper Badcall, Sutherland.

Lewisian Group



Lewisian Gneiss intruded by a black amphibolite Scourie dyke, then by a sheet of white pegmatite, followed by a pink granite sheet at right angles.

Lens-shaped amphibole pods are scattered throughout the gneisses. They are derived from larger masses which were broken up during crustal tension due to continental break-up.



Lewisian Group, Badcall, Sutherland

Gully eroded along an amphibolite
Scourie dyke within gneisses.



Sheet of white pegmatite and
black amphibolite Scourie dyke
intruded into banded gneisses.

Gneisses probably formed from
igneous rocks along an active
plate margin as island arcs were
constructed on oceanic crust.
These are oldest rocks in Britain
at 3,000 Mya.

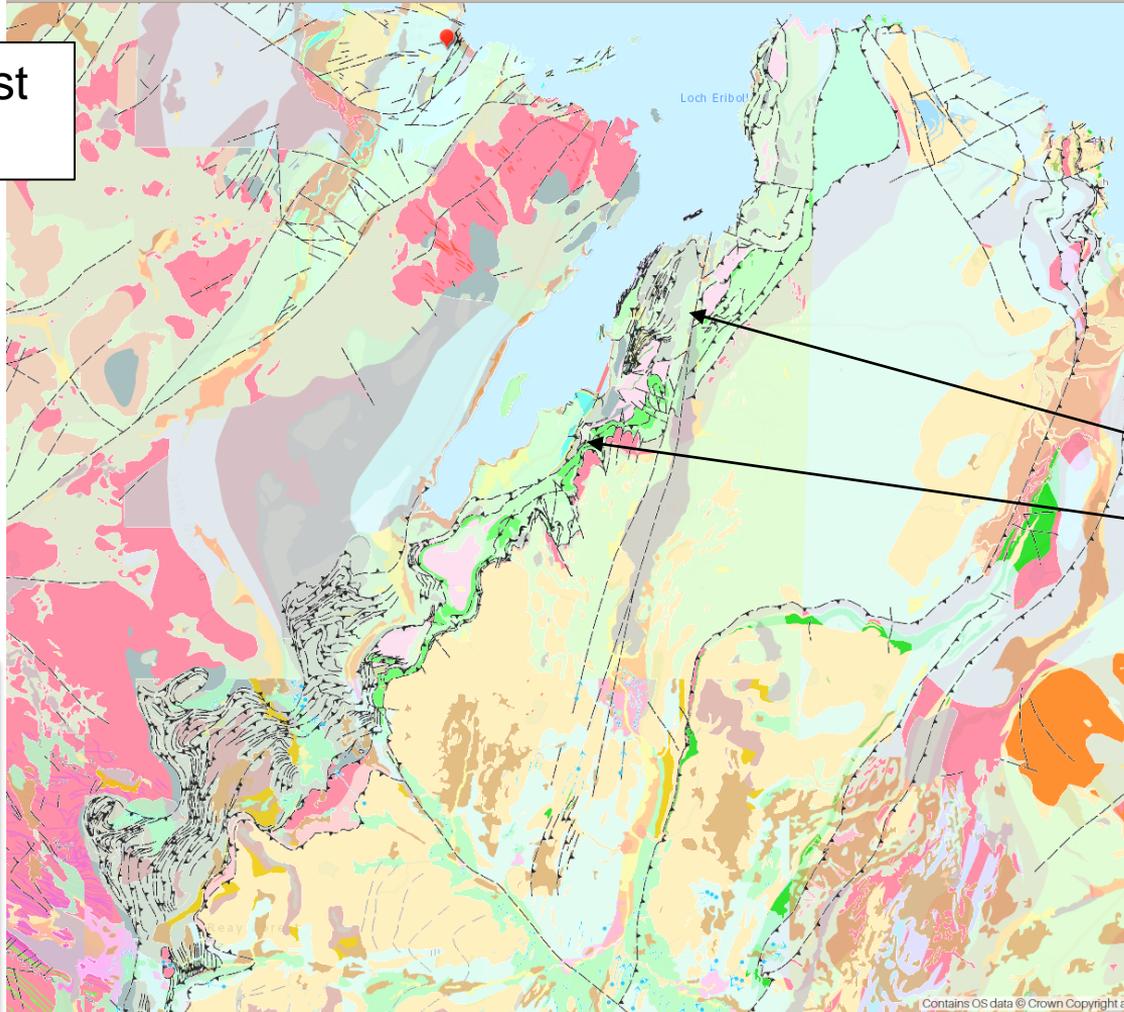


Lewisian Group, Badcall, Sutherland

Moine Thrust Zone

Pipe Rock Member - Quartz-arenite. Sedimentary bedrock formed between 526 and 508 million years ago during the Cambrian period.

Basal Quartzite Member - Quartz-arenite. Sedimentary bedrock formed between 526 and 508 million years ago during the Cambrian period.



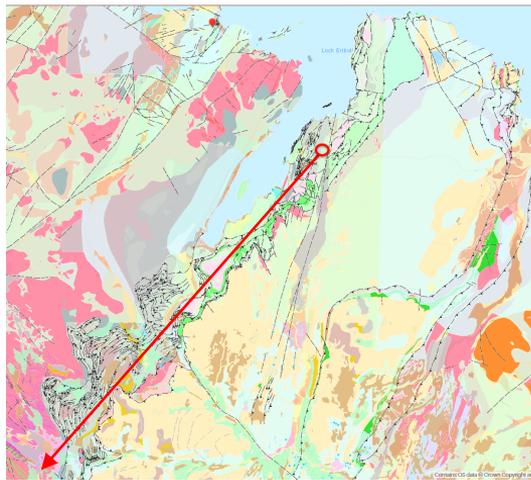
Moine Thrust Zone Mylonites Complex - Mylonite. Metamorphic bedrock formed between 4000 and 419.2 million years ago between the Archean Eon and Silurian period

Ben Arnaboll

Eriboll Estate

Altnaharra Psammite Formation - Psammite. Metamorphic bedrock formed between 1000 and 541 million years ago between the Tonian and Ediacaran periods.

Ben Arnaboll - looking south-west
along the Moine Thrust Zone.



<https://mapapps2.bgs.ac.uk/geindex/home.html?layers=BGSBedrock50,BGSSuperficial50,BGSArtificial50,BGSMass50,BGSLinearFeat50>



Moine Thrust Zone



HHGS group within Moine Thrust Zone.

Phyllonite ('Oystershell rock'), within Moine Thrust Zone.

The **Moine Thrust** occurred 435-425 Mya, during the Caledonian Orogeny, when there was a collision between the continents of **Laurentia** (including Scotland), **Baltica** (Northern Scandinavia) and **Avalonia** (including the rest of the British Isles). There was large-scale shortening of the continental crust resulting in the piling up of thrust sheets along the 200km Moine Thrust Zone.



Moine Thrust Zone, Creagan Road, Eriboll Estate

The Moine Supergroup is a sequence of Neoproterozoic sedimentary rocks that outcrop between the Moine Thrust Zone and the **Great Glen Fault**, overlying the Lewisian basement. The Moine sedimentary basin was probably located within the supercontinent of **Rodinia**, near the junction between the three collided continental blocks of Laurentia, Baltica and Amazonia. The sediments were likely to be derived from the erosion of the **Grenville** orogenic belt.

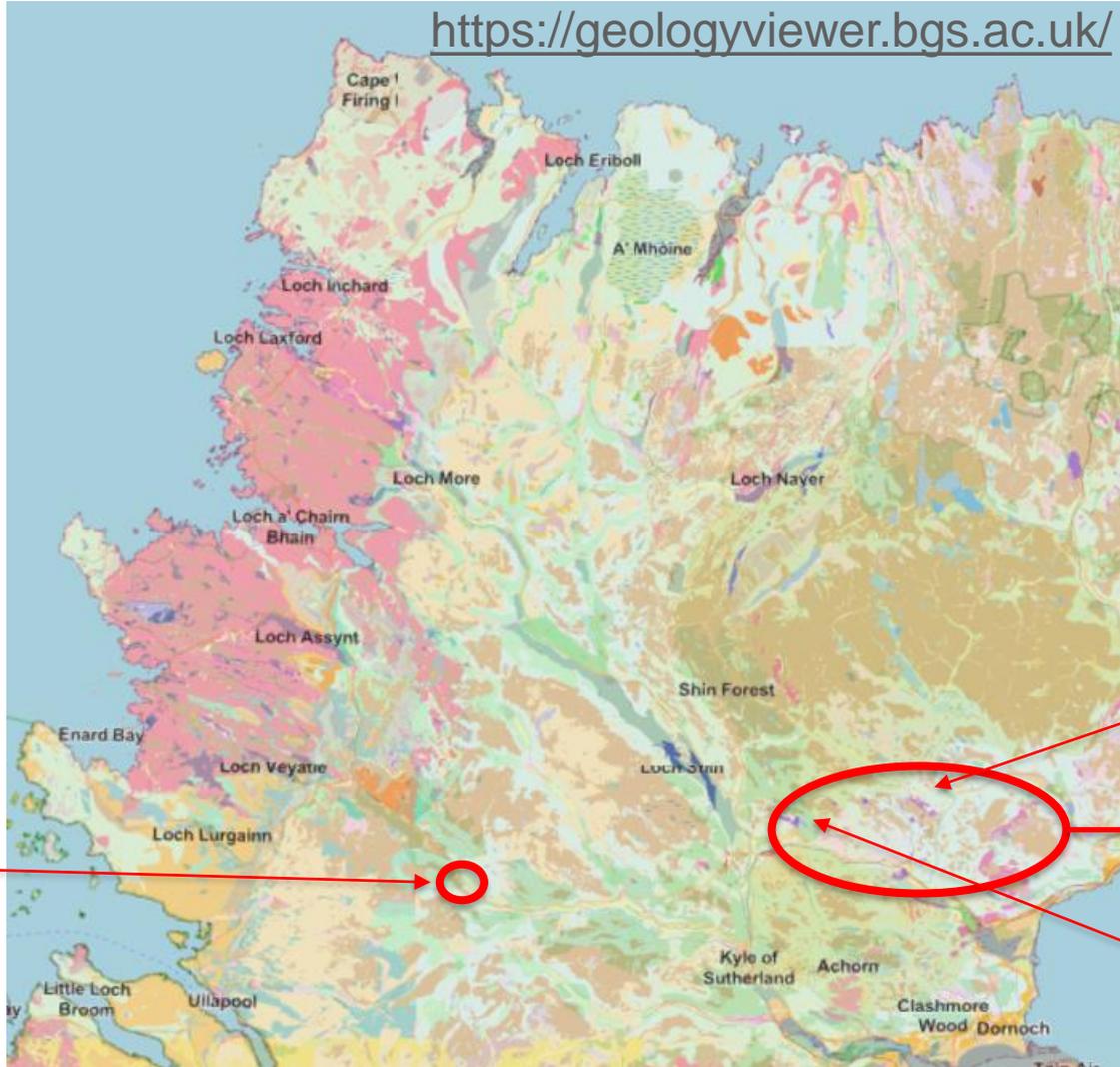


Characteristic scenery developed on the Moine Supergroup.
Upper Strath Brora, Sutherland.

Moine Supergroup

Moine
Supergroup

<https://geologyviewer.bgs.ac.uk/>



Oykel Bridge

Strath Brora

Rogart Pluton
Phase 1

Strath Fleet

Oykel Bridge, Sutherland. Metasediments of the Moine Supergroup displaying mullion structures (bottom right).



Mullion structures are linear elongated columns of rock developed by the compression of competent beds during folding and cleavage.

Moine Supergroup

Migmatite, a pre-existing Moine Supergroup host rock that was later invaded by granitic material.
Strath Brora, Sutherland.



Granodiorites, Rogart intrusion (Silurian), intruded into the Moine Supergroup during the Caledonian Orogeny. Little Rogart, Strath Fleet, Sutherland.

Moine Supergroup

Stoer Group sandstones (Mesoproterozoic), Stac Fada Member, now considered to be a meteorite ejecta blanket. Bay of Stoer.



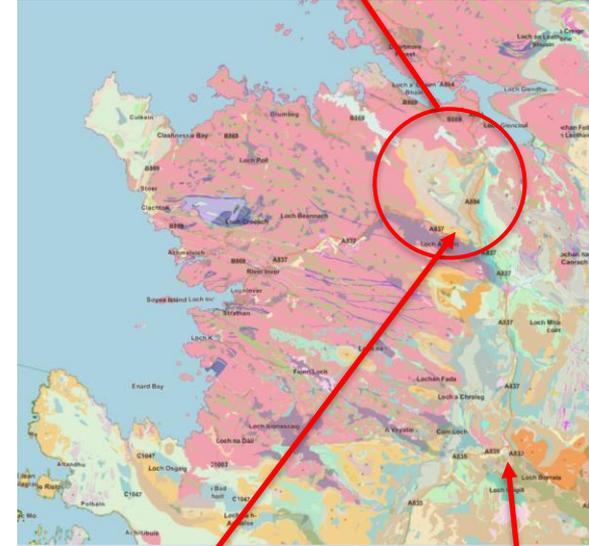
Bernard Skillerne de Bristowe (leader) explaining about the Stoer Group sandstone channel fill, Bay of Stoer.

Sedimentary Rocks - Stoer Group



Quinag massif, composed of Neoproterozoic Torridonian sandstones (1,000 Mya). They rest unconformably on the Lewisian Gneiss. The braided rivers that deposited the sediments eroded them from mountains of the Grenvillian Orogeny.

Quinag Massif,
Assynt



*Skiag
Bridge*

*Ledmore
Quarry*

<https://geologyviewer.bgs.ac.uk/>

Sedimentary Rocks – Torridonian Group

Diabaig Formation, sandstones & shales,
Torridonian, A837, 1.5km NW Skiag Bridge.

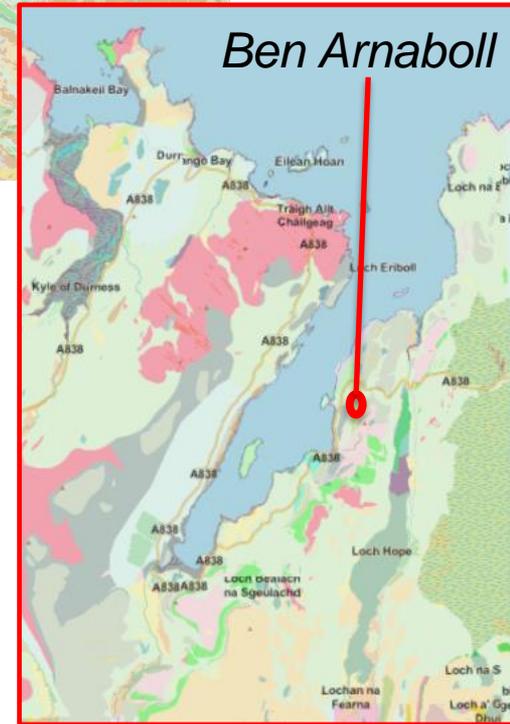


Diabaig Formation – alternating
sandstones and breccio-conglomerates of
pebbles in a muddy matrix.

Sedimentary Rocks – Torridonian Group



<https://geologyviewer.bgs.ac.uk/>



Ben Arnaboll - Cambrian quartzites (c.500Mya) within Ben Arnaboll thrust sheet.
 Inset – explanation of the Pipe Rock *Skolithos* worm burrow fossils in Cambrian quartz sandstone. Skiag Bridge.

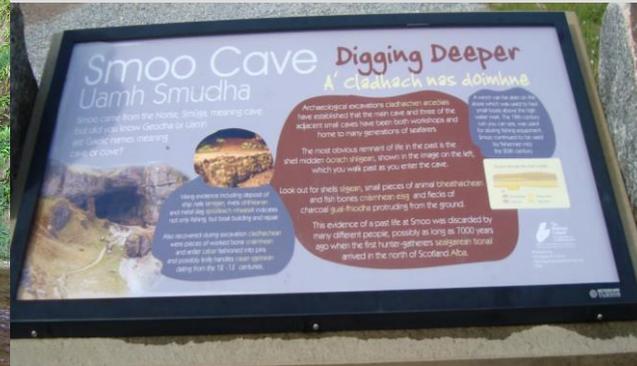
Sedimentary Rocks – Cambrian

<https://geologyviewer.bgs.ac.uk/>



Smoo Cave, Durness.
Collapsed sea cave in
Ordovician limestone.

Ordovician Durness Group
dolomitic limestone altered to
marble by an igneous syenite
intrusion. Ledmore Marble
Quarry, Assynt, Sutherland.



Sedimentary Rocks - Ordovician