Geological structures exposed.
Overview of the Orogenic Belt

Nigel:
To understand mountain building Geologists need to unravel how and why rocks deform. And the best place to do that in the United Kingdom is here in the North West Highlands of Scotland.

Narrator:
The Caledonian Orogenic Belt stretches from Scandinavia, through northern Britain and across to the eastern seaboard of North America. The best studied section passes through northern Britain. We begin this video on Loch Glencoul on the north-west coast of Scotland.

Nigel:
Now let's begin our overview of the Orogenic Belt on the Foreland. What are the main components that we'll see there?

John:
There's three that we need to be aware of, there's the oldest unit which are the Lewisian gneisses of late Archaean Age, they're the true basement of north-west Scotland. And then above them we have a series of red sediments, red sandstones, known as the Torridonian that were deposited from about a 1000 million years onwards through to about 750. And they have an uncomfortable relationship on top of the Lewisian. And then on top of both of those units we have a sequence that was deposited, started in Cambrian times. Starting at the base with some clastic sediments, some quartzites passing up into a carbonate-dominated sequence, through up into rocks that were deposited at Ordovician times.

Nigel:
Okay, so if we look over on the far coast there, the lower hills would be Lewisian basement and uncomfortably overlying that would be the layers of Torridonian Sandstone with the fairly clear horizontal strata, and these would be under-formed by the Caledonian Orogeny.

John:
Those are unaffected by Caledonian events and so what we should do now is to sail eastwards from here and we'll get then into the outer zone of the Caledonian Orogenic Belt.

Nigel:
Well we've come round the loch a few hundred metres, and what's hove into view is a very clear structure which is dipping down towards the east. Maybe you could talk us through the main rock units involved in this.

John:
Okay, on our lower slopes we've got the typical hummocky ground which is formed by the Lewisian gneisses. And the structure that you're pointing out is the start of the bedded sequence, the Cambrian, the basal Cambrian quartzite-bedded sequence which is dipping down in this direction. And that's part of our Foreland that we've already been talking about. But that sequence is abruptly truncated by a clear feature that we can trace up the hillside. And above it we're back into the hummocky ground again, there is no obvious stratigraphy there. And that's because a thrust slice of Lewisian gneiss has been emplaced on top of the Cambrian succession. So we, here we have our first thrust as in the Moine Thrust Belt.

Nigel:
Well this plane is the start of the Outer Zone of the Caledonides, but how thick is the Outer Zone in this area?

John:
Well if we follow from the Glencoul thrust plan, which is identified here, around this mountainside, then we go all the way around the head of the loch to that mountain there, which is the stack of Glencoul. And on the stack there we've got a major thickness of mountised Moine metasediments that have been brought over the top of all the deformed material that we've been looking at here in the loch.

Nigel:
So that will be a thickness of what – about three or four kilometres?

John:
That's all, yes, it's pretty compact in this part of the Caledonides, which is not typical of Orogenic belts generally.

Narrator:
So far we have seen the Foreland of the Orogenic Belt and discovered a narrow Outer Zone, bounded on the east by the Moine Thrust. Now let's examine this structure in more detail at Knockan.