



Geological structures exposed.

Cleavage vergence test

Narrator:

The last category of kinematic indicator we need to illustrate is cleavage vergence. The Dalradian metasediments exposed on the north shore of Loch Leven provide good examples.

Nigel:

What is particular about these rocks here?

John:

Well the first thing we've got to establish is that we can see bedding, and we've got a nice colour change here from a brown coarse-grained rock. And then below it we have a dark grey unit, and the boundary line between them can be traced down through here. And, in fact, that contact is mirrored by the surface of the outcrop dipping down in that direction. And in the finer-grained rock unit underneath we've got another set of planes because we have a set of cleavage planes, and they're also dipping down in the same direction, but they're dipping down more steeply.

Nigel:

Yes.

John:

Their angle of dip is steeper.

Nigel:

Yes, much more steeply, yes.

John:

When we have that situation in folded rocks we can use it to apply the cleavage vergence test. We can take the orientation of the cleavage and assess which way we have to rotate it through the acute angle into the bedding. So we have to rotate it in that direction, a clockwise sense of rotation, and clockwise in that view means that the upper arrow is pointing in that direction, which is north-westwards. So we have a north-west sense of cleavage vergence in these rocks.

Nigel:

Well we've walked about two hundred metres east along the coast and there's a rather more spectacular outcrop here, and I can clearly see bedding planes which are running steeply down this outcrop.

John:

Yep, they're dipping steeply and they're dipping to the south-east, that's important; they're dipping in the same direction as they were before. However, the cleavage now which, again, we see better in the grey unit, that cleavage is now at that angle, which is shallower than the bedding.

Nigel:

Right.

John:

So *that* is the opposite cleavage bedding relationship to the one that we saw in the first location, which means that we have indeed crossed over the axis of this synform.

Nigel:

Right, and I can also see, I think, some graded bedding. There's a change in grain size in this layer from this point here to this point here; we have coarse grains there, grading to fine grains on this side, so just the base, just overturned.

John:

Okay, that's right, that must now be the base of the bed, so that confirms that we're now on an overturned limb of this synform. The first limb the bedding was the right way up; this limb the beds are overturned.

Nigel:

So we deduce the geometry of this large fold without actually seeing its closure.

John:

Someone inconveniently built a hotel over it!