



## **Geological structures exposed.**

*Locating synforms*

### **Narrator:**

Let's return to the Inner Zone of the Caledonian Orogenic Belt to look for more kinematic indicators, this time in folded rocks.

### **Nigel:**

Well, we've come back to Kilmory Bay, looking at the ductile structures of the Inner Zone. What can you tell us about this particular fold?

### **John:**

Well, we're seeing folds at lots of different sizes, scales and sizes here in the Dalradians, and we've found here an absolutely perfect example of an asymmetric fold pair, and we can trace a long limb coming up from the sea right the way up towards us. It then curves round into an extremely short, short limb, and then back into a long limb in the, that's in the same orientation as the first one that we saw.

### **Nigel:**

Yep.

### **John:**

So this is the type of asymmetric fold pair that we can use to assess the vergence direction, and in assessing the vergence direction we would expect to be able to predict the location of the next larger scale anti-formal synform. What is the rotation that's needed to change the orientation of the long limb into the orientation of the short limb, and from that long limb we need to rotate round through the fold hinge into this orientation. And in this case that's an anticlockwise rotation of the long limb; that means that the upper arrow that defines that rotation is towards the west in that direction. And the inference we will draw is that the vergence direction, the vergence direction of this fold out to the west is pointing towards the next larger antiform. So, antiform to the west, synform to the east.

### **Nigel:**

So if I go off in this direction I should expect to find the synform.

### **John:**

We should expect the synform just over there.

### **Nigel:**

Okay, I go and take a snoop. I follow this limb across from John; all I can see is a very nice curvature around the closure of the fold, and following up the other side. So this is a synform which is exactly what you predicted. So vergence works.

### **John:**

I'm very grateful for that.

### **Narrator:**

So far we have located a synform using the kinematics of an asymmetric fold pair. What will be the kinematics of minor folds on the other limb of the same synform?

### **Nigel:**

Well we've come round to the other side of the synform and found quite a nice minor fold. What's the vergence direction of this one, John?

**John:**

Well you've just walked up a long limb, and then the short limb is immediately below us here in this orientation, and it swings back onto a long limb again, going up behind us. So if we look at the rotation that that involves, take the long limb, and assess what rotation needs to be applied, change it round if the orientation is short-limbed, then, in this case, we can see that *that* rotation has to be clockwise sense of rotation. So a clockwise rotation and the upper arrow now is pointing in that direction, which is east, so that's the opposite sense of rotation, the opposite sense of vergence to the fold that we found on the western limb of the synform.

**Nigel:**

And that completes the vergence criteria for this fold.

**John:**

That's right, we've found all the vergence information that we could expect to find around the fold of this size.

**Narrator:**

To summarise, John has recognised minor folds on both limbs of the synform with opposite senses of vergence. In each case the minor folds verge away from the closure of the synform.