



## **Iceland: ridge, plume and basalt**

*Why is Iceland on dry land?*

### **Dave Garvie**

At the start of this video I posed the question: why are we on dry land when the rest of the mid-Atlantic ridge is under water? Well there's a very simple explanation for this. In Iceland we have a conjunction between a mantle plume and a spreading ridge. So how do we know there's a mantle plume beneath Iceland? Well, we can look at two immediate lines of evidence that help us to see this. First of all, if we simply calculate the potential temperature required to generate the extra melt that creates the Icelandic crust, we can see there must be an unusual area of hot mantle beneath Iceland. Secondly, geophysics. Geophysical studies in particular gravity, also show an area of unusually hot mantle beneath central east-Iceland. The mantle plume exerts a profound influence on the configuration of the Icelandic rift zones. The entire mid-Atlantic ridge in this area is moving slowly to the west, but the mantle plume remains stationary. What that means is that the rift zones are repeatedly re-located to the east, close to the mantle plume.

Currently in Iceland the western rift zone is a mature, but also a dying rift zone, whereas the eastern rift zone is young and highly productive because it's closest to the mantle plume. Provided that the Iceland mantle plume and the mid-Atlantic ridge stay in close proximity, Iceland will remain the fastest growing ocean island in the North Atlantic.