

## **Revealed: volcanic island beneath the Firth of Forth**

19:30 Saturday 07 April 2007 00:19 Sunday 08 April 2007

**STEEP cliffs plunge down into deep canyons gouged out by glacial ice more than 10,000 years ago.**

A craggy island of hard rock rears up between, with its long volcanic tail leading down to vast plains of softer sediments.

America's Grand Canyon and Africa's Great Rift Valley may have nothing to fear, but travelling over the Firth of Forth will never be the same again.

The remarkable picture of what lies beneath one of Scotland's most famous and historic crossings has been created by the British Geological Survey in the first stage of plans to map the underwater features of the entire UK coastline.

Multi-beam sonar equipment mounted on board a catamaran was used to create the most detailed images ever produced of the bottom of the Forth Estuary at its narrowest point, before it opens out towards the North Sea.

The superstructures of the Forth road and rail bridges were superimposed to give the stunning view of the submerged world a sense of scale.

Inch Garvie, the island, is now only known for its supporting role in holding up the central tubular framework of the iconic rail bridge. But on dry ground it would be equally as dramatic as the volcanic "crag and tail" on which Edinburgh Castle and the Royal Mile sit.

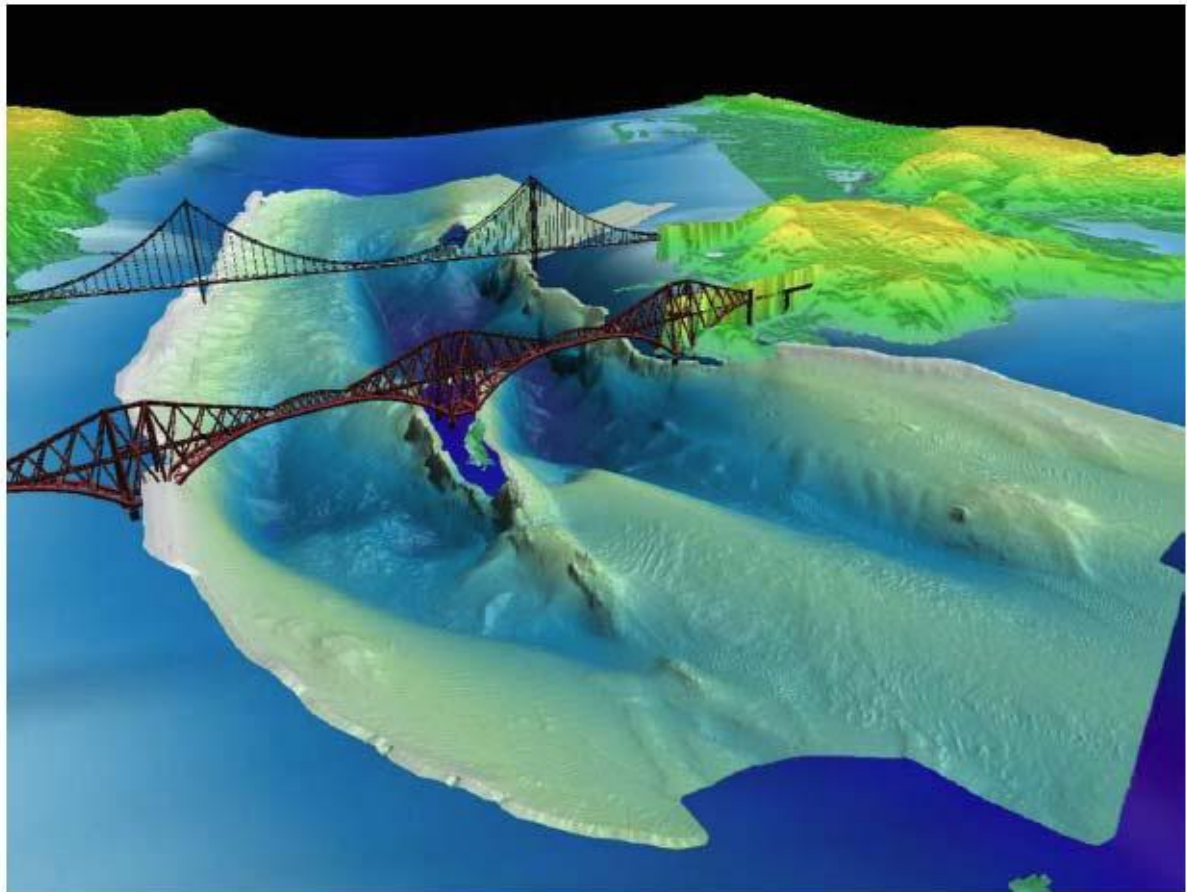
The BGS team believe they may have identified some man-made structures on the seabed that could date from 7,000 years ago at a time when the estuary was still filling up.

The wreck of a coal steamer that sank off Inch Garvie in the 19th century after a collision with a warship may also have been located.

Christian Wilson, BGS's Edinburgh-based marine geologist, said: "This is basically what the Firth of Forth looks like with the water taken out between the road and the rail bridges.

**COMPUTER SIMULATED 'FLY THROUGH' OF THE FIRTH OF FORTH BRIDGES DERIVED FROM MULTI-BEAM ECHO-SOUNDER DATA**

Rock outcrops used to support the Firth of Forth bridges obtained using multi-beam echo-sounders.



"The images reveal for the first time the detailed morphology of the area and we hope they will be of use to everyone interested in developing and managing the marine environment."

The Forth estuary was gouged out during the last ice age when Scotland was completely covered in ice sheets. Glaciers moving towards what is now the North Sea came to a narrow pinch point between the hard volcanic rocks at what is now North and South Queensferry. Here the rocky outcrops are just over a mile wide and the glaciers had to squeeze between to get through, and as a result they flowed faster and deeper, gouging out the channels - up to 75 metres deep in some parts - but leaving Inch Garvie, made of similar hard rock, largely intact. As the glaciers melted, the valley left behind gradually filled up to present-day levels.

"Until now we haven't known what lies under this part of the Firth of Forth in any great detail," Wilson said. "Now we can pick up the underwater rock structures and see the real structure of islands like Inch Garvie."

"Everyone is familiar with the crag and tail on which Edinburgh Castle and the Royal Mile are located. What they don't realise is there is a similar rock structure out in the Firth of Forth with Inch Garvie on top."

The subsea maps will be of immense interest to engineers developing plans for the proposed third bridge or tunnel at Queensferry.

"If you are planning a bridge or a tunnel then you need to know exactly what the seabed looks like and what underlying rock structures are," Wilson said. "These maps will tell engineers the sort of challenges they face."

The team from BGS, which is part of the government's Natural Environment Research Council, is currently preparing underwater images of the Clyde estuary and gradually intends to map the whole UK coast.

They will also be of use in planning the routes of proposed underwater cables bringing electricity from remote island wind farms as well as mapping planned marine national parks.

In the Forth, the BGS images picked up what appears to be a circular structure. One theory is that it may have been constructed by palaeolithic farmers towards the end of the ice age when the Forth river was at much lower levels.

The multi-beam sonar also picked up an "object" that appears to have slipped down the west side of Inch Garvie. This could be the wreck of the Abertay, a 67-metre coal steamer from Grangemouth that sank after colliding with the HMS Iron Duke in October 1892, two years after the completion of the rail bridge.

"This is the sort of thing that is of interest to marine archaeologists but the problem down there is that visibility is very poor because of the silt," Wilson said.