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Deepest volcanic vents discovered

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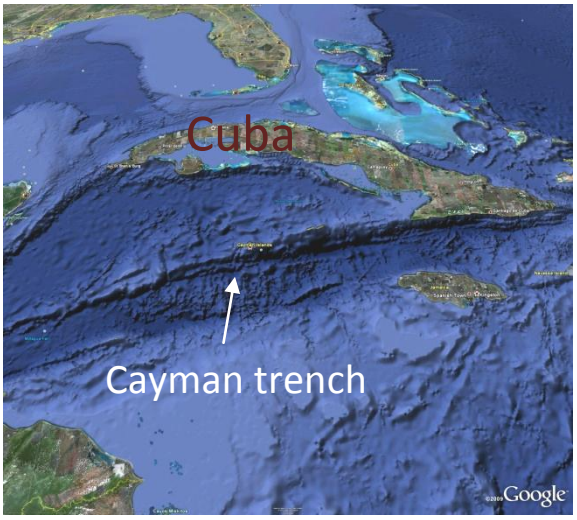

What are believed to be the world's deepest undersea volcanic vents have been discovered in the Caribbean.

The vents, known as black smokers, were located 5,000m (3.1 miles) down in the Cayman Trough.
The volcanic chimneys, which spew out water hot enough to melt lead, were caught on film by a British-led team.
Marine biologist Dr Jon Copley said: "Seeing the world's deepest black-smoker vents looming out of the darkness was awe-inspiring."
He added: "Super-heated water was gushing out of their two-storey-high mineral spires, more than three miles beneath the waves."
Expedition leader Doug Connelly said: "We hope our discovery will yield new insights into biogeochemically important elements in one of the most extreme naturally occurring environments on our planet."
The team, led by the National Oceanography Centre (NOC) in Southampton, is sailing across the Caribbean and the Southern Ocean on the scientific research vessel the James Cook.

"*It was like wandering across the surface of another world*"
Bramley Murton, scientist

Follow the team's voyage

Previously, the deepest smokers were found in the Ashadze vent field in the mid-Atlantic Ridge at a depth of 4,040m.
The discovery was made with the help of two deep-sea vehicles.
Firstly, a robotic submarine called Autosub6000 enabled the team to map the seafloor of the Cayman Trough in fine detail. Then a vehicle called HyBIS equipped with hi-definition cameras, was lowered down and captured detailed images of the smokers.
"It was like wandering across the surface of another world," said geologist Bramley Murton, who piloted the HyBIS underwater vehicle around the world's deepest volcanic vents for the first time.
"The rainbow hues of the mineral spires and the fluorescent blues of the microbial mats covering them were like nothing I had ever seen before."

Deep sea mining

By studying life around the hydrothermal vent systems, which are dotted along the deep sea mountain range that girdles the planet, the team hopes to increase the understanding of the way marine communities interact. This, in turn, could aid efforts to better protect endangered marine species.
Senior researcher Dr Alex Rogers, from the Zoological Society of London, said: "The densities of animals and the biomass of life around these hydrothermal vents is just staggering."

However, scientists will not have these extraordinary environments to themselves for long.
Gold, silver, copper and zinc are all present in the mineral-rich emissions of the vent systems and recent advances in deep-sea oil exploration are giving miners the chance to exploit these areas for the first time.
Nautilus Minerals, a small Canadian company backed by the giant mining company Anglo-American, has just received an environmental permit from the government of Papua New Guinea to conduct the world's first deep-sea mining in the vent fields of the Bismarck Sea.
Giant undersea excavators will be built this year, and ore could be rising from depths of 1,600m by 2012.
Conservation biologist Professor Rick Steiner, formerly of the University of Alaska, was called in to examine the company's original environmental impact assessment study.
He is concerned about the dumping of thousands of tonnes of rock on the seabed and about the danger of spillages of toxic residue, but his real objection is more fundamental.
He explained: "The site that they mine, they're going to destroy all these vent chimneys where the sulphide fluids come out."

He added that it could cause the extinction of species that are not even known to science yet.
"I think that, from an ethical stand-point, is unacceptable," he said.
Steven Rogers, CEO of Nautilus, said that he accepted that the mined area would be damaged, but said he was convinced that it could recover.
He believes deep-sea mining will be less damaging to the environment than mining on land.
He said: "I think there's a much greater moral question…. here we have an opportunity to provide those metals with a much, much lower impact on the environment."
The success of the Nautilus enterprise is dependent less on questions of morality than of profit.
Steven Rogers estimates that this first mining site could yield anything from tens of millions of dollars up to $300m in value.
But Professor Steiner believes that success in the Bismarck Sea will provoke a "goldrush" at vent systems around the world, most of which have yet to be properly studied.

'Crucial crossroad'

Dr Jon Copley is well aware of the moral and political questions being thrown up by the team's ground-breaking work.
He believes that we are at a crucial crossroads in the use of the deep ocean.
He can see a future where nation states squabble over natural resources, but he is optimistic that the international co-operation demonstrated on his current voyage will lead to sensitive study and sustainable exploitation of the deep sea's riches.
"Hopefully there's a different path forward if we've got the courage and determination to take it," he said.

Costing the Earth investigates the deep sea vents on Wednesday 14 April at 2100 BST on BBC Radio Four, or listen to the podcast here.

http://news.bbc.co.uk/2/hi/science/nature/8611771.stm