

Marine Protected Areas

ENDEAVOUR HYDROTHERMAL VENTS

The Endeavour Hydrothermal Vents Marine Protected Area (MPA) lies in water 2250 metres deep, 250 kilometres southwest of Vancouver Island. As part of the Juan de Fuca Ridge system, the Endeavour Segment is an active seafloor-spreading zone where tectonic plates diverge and new oceanic crust is extruded onto the seafloor. In these zones, cold sea water percolates downward through the crust where it is heated by the underlying molten lava, eventually emerging through the seafloor as buoyant plumes of particle-rich, superheated fluid. The five known vent fields on the Endeavour Segment are separated along the ridge from one another by about two kilometres. Their associated plumes rise rapidly about 300 metres into the overlying water column.



Photo: V. Tunnicliffe

Hydrothermal vents in the Endeavour area consist of large hot black smokers, chimney-like structures and surrounding lower temperature sites. The fields span a wide range of hydrothermal venting conditions characterized by different water temperatures and salt content, sulphide structure morphologies, and animal abundance. Temperatures associated with black smokers are typically in excess of 300° Celsius. Formation of the large polymetallic sulphide chimneys takes place when dissolved minerals and metallic ions carried upward by the smokers precipitate upon contact with the cold sea water. Cooler waters below 115° Celsius on the seafloor and along the flanks of the chimneys support an abundance of flora and fauna. This rich ecosystem is supported by microbes whose life processes are fueled by the chemical energy from the emerging fluids in the hydrothermal vents.



Hydrothermal venting systems host one of the highest levels of microbial diversity and animal abundance on earth. The deep ocean near the Endeavour area normally only supports sparse animal abundance of about twenty worms and brittlestars per square metre. In the diffuse vent flows around the sulphide structures, these abundances can range up to half a million animals per square metre. There is an amazing abundance of life in concentrated areas around the vents surrounded by a veritable desert in the deep oceans.

Globally, hydrothermal venting systems foster numerous unique species of animals. There are some 60 distinct species native to the Juan de Fuca Ridge. Many of these species are the first in the world to be identified. Hydrothermal vents at Endeavour are home to 12 species that do not exist anywhere else in the world.

Since its discovery in 1982, the Endeavour Hydrothermal Vents have been a focus of research by Canadian and international scientists. The manned US submersible *Alvin* and the unmanned vehicle *Jason* have undertaken a number of missions in the area. Joint Canada-US studies have made use of the Canadian ROPOS (Remotely Operated Platform for Ocean Sciences). Fisheries and Oceans Canada has conducted extensive acoustic and moored instrument programs in the area since 1985.

The Endeavour Hydrothermal Vents Marine Protected Area has been designated to ensure the protection of these hydrothermal vents, and the unique ecosystems associated with them. The Regulation to establish the Marine Protected Area prohibits the removal, disturbance, damage or destruction of the venting structures or the marine organisms associated with them. The Regulation allows for scientific research that will contribute to the understanding of the hydrothermal vents ecosystem.

For further information, please contact:

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