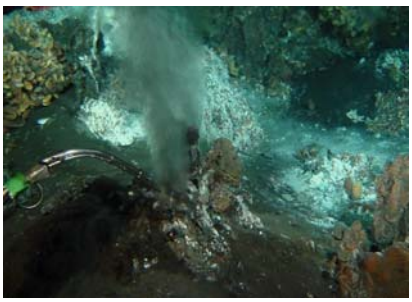
Press Release Paris, 24 September 2010

MoMARSAT 2010 Cruise:
Mid-Atlantic Ridge hydrothermal vents to be monitored for a whole year!




Led jointly by Ifremer and the IPGP[1]-CNRS/INSU, the MoMARSAT research cruise to the Mid-Atlantic Ridge off the Azores, will run from 1 to 16 October 2010. The objective of this expedition aboard the R/V *Pourquoi pas?* is to deploy an array of autonomous oceanographic instruments — connected underwater — that will continuously monitor the active hydrothermal processes on the Lucky Strike vent field. This cruise constitutes the first pilot experiment of its kind in the deep sea: the data acquired at 1700 m depth will be transmitted to a surface buoy and then by satellite to land-based research centres, several thousands of kilometres away.
By the end of the cruise, participating scientists will be able to continuously monitor the variations in temperature, physico-chemical conditions and the seismic activity in the area as well as observe the highly unusual hydrothermal fauna in action. This deep-sea observatory will be operational for one year and the instruments will be recovered in Summer 2011.

The MoMARSAT cruise is part of MoMAR[2], one of the demonstration missions of the European ESONET programme[3] that is developing a network of deep-sea observatories. Several research institutes are closely involved in this demonstration mission: University of the Azores, University of Lisbon, NOC[4], University of Bremen, CNRS/INSU with IUEM/UBO[5], OMP-LMTG[6] and UPMC/LOCEAN[7]. The objectives of these deep-sea observatories are to monitor, in real time, the natural dynamics of marine ecosystems and to identify the factors that influence environmental variation and faunal assemblages.

Join the MoMARSAT cruise: visit us on www.ifremer.fr/momarsat2010

[1] Institut de Physique du Globe de Paris (Institute of Earth Physics of Paris)
[2] MOnitoring the Mid-Atlantic Ridge
[3] The ESONET (European Seafloor Observatory Network) Network of Excellence, coordinated by Ifremer, is developing and setting up multidisciplinary seafloor observatories at 12 European sites. For more information: www.esonet-emso.org/
[4] National Oceanography Centre, Southampton
[5] Institut Universitaire Européen de la Mer/Université de Bretagne Occidentale/CNRS-INSU (European Institute for Marine Studies/University of Western Brittany/CNRS-INSU)
[6] Observatoire Midi-Pyrénées/Laboratoire d'étude des mécanismes de transfert en géologie/CNRS-INSU (Midi-Pyrenees Observatory/Laboratory of Transfer Mechanisms in Geology/CNRS-INSU)
[7] Université Pierre et Marie Curie/Laboratoire d'Océanographie et du Climat: Expérimentation et Approches Numériques/CNRS-INSU (Pierre and Marie Curie University/Oceanography and Climate Laboratory: Experimentation and Numerical Methods/CNRS-INSU)

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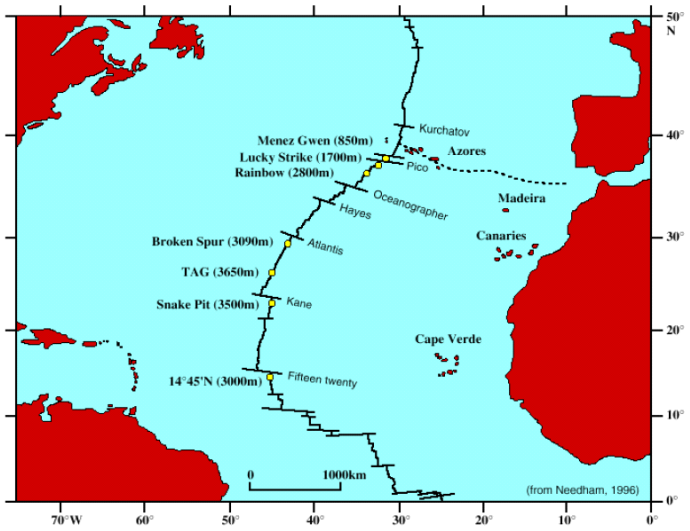
Situated near the Azores, the Mid-Atlantic Ridge is composed of four hydrothermal vent fields, each with different characteristics. The vent fields have been studied for many years by French and international scientists. Discovered in the 1990s, the Lucky Strike vent field has already been the focus of several research cruises. Located at 1700 m depth at the summit of a central seamount with a shallow magma chamber, the vent field is made up of some one hundred hydrothermal vents that surround a former lava lake.

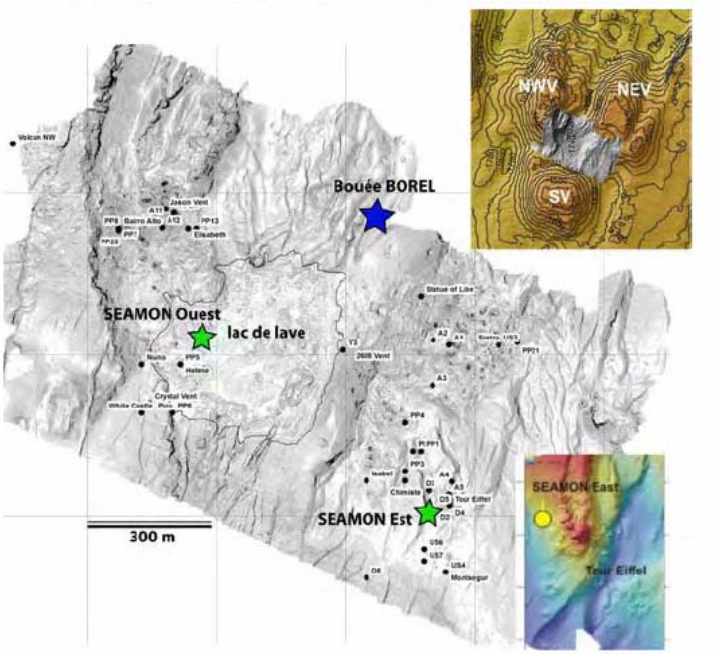
Temperatures range from 330°C at the hottest vents to barely 20°C at diffuse emissions. The chemistry of the hydrothermal fluids indicates a complex hydrothermal system. The biological communities associated with smokers are composed of hydrothermal vent mussel beds colonised by microbial mats or, in the hottest areas closest to the chimneys, swarms of vent shrimp. The food chain is based on chemosynthesis, i.e. microorganisms at the base of the chain utilise energy from the chemical compounds present in hydrothermal fluids to synthesise organic matter.



Installing a 1700 m deep observatory

The remotely operated vehicle (ROV) *Victor 6000* will first dive to conduct a reconnaissance of the areas that will be instrumented on the Lucky Strike hydrothermal field at a depth of more than 1700 m.

The infrastructures of the observatory will then be deployed and set up. To do so, the ROV will dive down with and moor two sea-monitoring (SEAMON) nodes — SEAMON East and SEAMON West — in the Lucky Strike field on either side of the lava lake. Seismic, pressure and temperature sensors, *in situ* chemical analysers, current meters as well as [video] cameras, developed to meet the constraints of long-term deployment, will be installed and connected at these two SEAMON nodes.



Lucky Strike hydrothermal vent field and prospective locations of SEAMON observatory nodes and the BOREL buoy. Adapted from Ondress et al. 2009.

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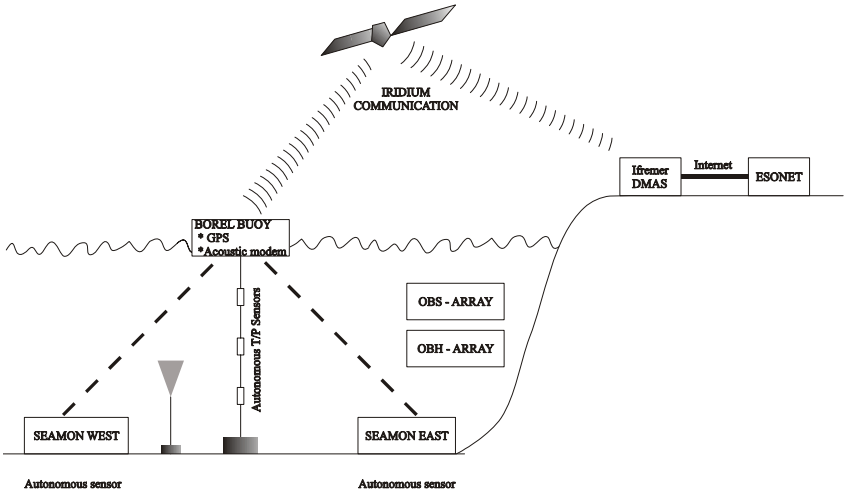

The two SEAMON nodes will send data from the instrument array moored on the seafloor to a surface relay buoy using an acoustic modem. The surface BOREL buoy will then send these data to the on-shore data centre located at the Ifremer Centre in Brittany via an Iridium satellite connection.

Innovative sensors to address specific questions

Specifically adapted for long-term monitoring, the various sensors will simultaneously acquire real-time data on the ecology, geophysics, physics and the chemistry of the deep-sea environment.

The East node is devoted to ecological studies. Chemical fluxes will be assessed using two *in situ* analysers that will sample and analyse the fluids emitted by the hydrothermal vents. The TEMPO biological observatory, positioned on the 'Tour Eiffel' sulphur edifice, will perform video surveys and observations on *Bathymodiolus azoricus* vent mussel beds. Along with gathering other valuable information, TEMPO will help determine how hydrothermal fauna behave with regard to the variation in their chemical environment. Two photos will be sent daily to the land-based observation team for one year.

© Ifremer / MoMARETO 2006 - *B.azoricus* vent *mussels*

The West node is geared to the study of geophysics. The instruments connected at this node will measure seismic activity in the area as well as the deformation of the ocean floor. Autonomous temperature probes will also be deployed at the point of fluid emissions at some ten active edifices. Together, all the data acquired using this multidisciplinary observatory approach will lead to a better understanding of the functioning and the dynamics of deep-sea hydrothermal ecosystems. For example, scientists hope to demonstrate the influence of seismic activity on the chemical composition of hydrothermal fluids and its consequences for the fauna that depend on these fluids.

Victor 6000 dives will be advantageously used to sample fluids, fauna and rocks and this data will contribute to our knowledge on hydrothermal ecosystems in the Mid-Atlantic Ridge.

Deployment of the ROV *Victor 6000* during the MoMARETO 2006 cruise.
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