



The Fixed point Open Ocean Observatory network (FixO3) seeks to integrate European open ocean fixed point observatories and to improve access to these key installations for the broader community.



# Project Newsletter

## SERVICE ACTIVITIES SPECIAL

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29 partners, 11 European countries, 23 fixed point observatories,  
12 work packages, 4 years, 7 million Euros.

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# EMSO-Azores : Monitoring seafloor and water column processes at the Mid-Atlantic Ridge

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EMSO-Azores is a fixed-point buoyed observatory with a multidisciplinary approach (from geophysics and physical oceanography to ecology and microbiology) that acquires time-series data at and around active hydrothermal vents at the Mid-Atlantic Ridge south of the Azores Islands. Fluid fluxes that feed these vents are controlled both by km-scale hydrothermal systems powered by magmatic heat, and by smaller-scale near-surface fluid circulations and mixing between seawater and hydrothermal fluids. Currents in the water column near the seafloor also affect these fluxes. The primary aim of the observatory is to provide data for research on the impact of changes in hydrothermal fluid fluxes, fluid chemistry, and water column processes on the microbial and faunal compartments of deep sea vents, at a range of spatial (km to

microbial habitats) and temporal (seconds to several years) scales.

The current observatory setup (Figure 1) has been operated since 2010. It is composed of two seafloor nodes with connected instruments for sea monitoring (SeaMon), and of a transmission buoy that communicates acoustically with the seafloor stations and relays data (detection of seismic events, pressure at seafloor, video snapshots of hydrothermal fauna, turbidity, fluid temperature and chemistry, system status) via satellite every six hours to the EMSO data center hosted at Ifremer in Brest, France.

The FixO<sup>3</sup> project supported the observatory by making data available online in the form of two Service Activities: SA 14-1: MoMAR biology, and SA 14-2: MoMAR-geophysics. These SAs are described in the FixO<sup>3</sup> webpages (<http://www.fixo3.eu/observatory/mommar/>). Data is available online in the EMSO-Azores site: <http://www.emso-fr.org/EMSO-Azores> (provisional address).

Ecological monitoring focuses on the Tour Eiffel vents (Figure 1), a ca. 15 m-high and up to 40 m-wide sulphide mound. Two sensor packages are currently connected there: a module with HD video camera (transmitting several snapshots), optode, dissolved iron analyser and turbidimeter, and a colonizer

and low-temperature fluid sampler for microbiology (CISICS; Figure 1).

The geophysical component of the observatory is composed of a seismometer and two pressure gauges, installed within 200 m of the vents (Figure 1). It transmits a catalogue of detected seismic events, including information on their apparent local magnitude, as well as pressure and temperature data. HD video and seismometer data are stored locally and collected during the yearly maintenance cruises.

The observatory also comprises arrays of autonomous devices: ocean bottom seismometers, pressure probes, temperature probes set in venting chimneys, colonisation devices for both fauna and microfauna, and an oceanographic mooring (temperature, salinity, pressure and currents from seafloor to a depth of 900m). This is complemented by sampling of macro- and micro-organisms, rocks and fluids and by the acquisition of short time series on diffuse fluid properties, and CTD measurements in the water column during the yearly cruises devoted to maintenance of the observatory.

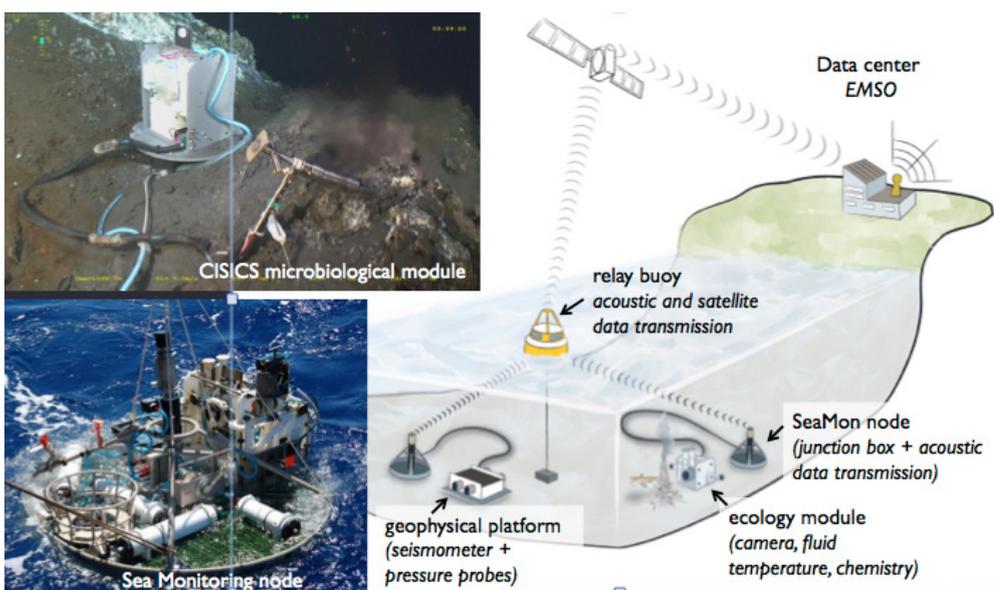
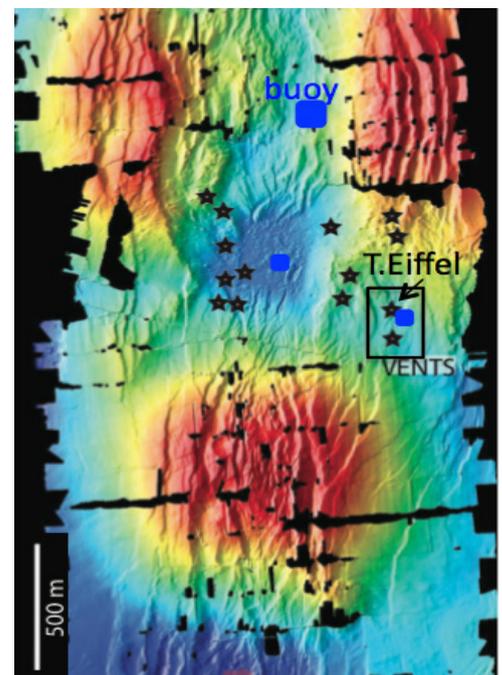


Figure 1: Current EMSO-Azores observatory setup. This setup is nested in a wider array of autonomous instruments (see text).



(Right): detailed bathymetric map of the volcano summit with the different hydrothermal vent sites (stars), the location of the Tour Eiffel edifice, of the 2 SeaMon nodes and of the relay buoy (blue squares). Seafloor depth are between -1550m (red) and -1770m (dark blue).