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Long-term chemical monitoring at the base of Marsili seamount, ORION GEOSTAR 3 mission.

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The ORION GEOSTAR 3 EC project designed, realised and deployed two seafloor observatories to operate as network for geophysical, oceanographic and geochemical monitoring at the base of Marsili seamount, a volcanic edifice in the south Tyrrhenian Sea (3320 m w.d.), at the end of December 2003. Presently, after a short maintenance executed on land between late April and June 2004, the network is on, retrieving geophysical, oceanographic and chemical data. Data are acquired with the following scientific instruments: broad-band seismometers, scalar and vectorial magnetometers, gravity meter, hydrophone, CTD, transmissometer, ADCP, single point currentmeter, chemical analyser and a offline water sampler. The analyser is an electrode-based prototype presently equipped with a pH deep-sea electrode, and the second is a modified commercial automatic time series sampler.

The first phase of ORION mission has acquired continuous data from the 15 December 2003 to 26 April 2004.

The analyser recorded more than 260 pH continuous data, while the automatic water sampler collected 38 samples for on shore laboratory analyses on: dissolved gas in water, cations and anions, minor and trace elements, radionuclides. The water sampler was modified, by adding filters for ions and minor elements analyses. So, for such a kind of analyses, 23 sampling bags were disconnected from the common inlet, and a 0.45 nm filter was mounted directly on the inlet of each sampling bag, while for the gas analyses samples, the sampling bags configuration remained unaltered.

Temperature, conductivity and pressure data were recorded by SEACAT 16 CTD.

The analyser was configured for two measurements per day and calibration every 12 days. Calibrations were made at 13.5 ˚C, so pH data are referred to 13.5 ˚C.

Measured pH data show two main distinct periods, characterised by a substantial stability with a computed standard deviation close to 0.013 pH units for the first main period with an average value of 8,20, and 0.034 pH units for the second, where the average value is 8.41pH (at 13.5˚C). The comparison of pH with temperature and conductivity data, recorded by the CTD, points out a similar shape.

Variations of T are in the order of 0.01 ˚C and the variations of C are around of 0.02 S/m, in both cases too low to force pH variations, while the variations of pH are close to 0.3pH units.

Chemical analyses, dissolved gas, radionuclides, major, minor and trace elements are very helpful in the description of a dynamic evolution of the seawater, and their interpretation could explain the origin of these variations.