tem global position using the integrated GPS receiver. This position is compared to a reference stored in the buoy deployment moment. If significant changes are detected, it is interpreted as an unwanted displacement due to a broken anchor or sabotage. In this case, an alarm is released by sending SMS messages with current position.

3. BUOY DESIGNED

As important as the electronic development is the design of the mechanical structure of the buoy. The deployment of a WSN in the marine environment involves more difficulties than on land and therefore the importance of ad-hoc design to deployment characteristics [2]. Moreover it must be considered several requirements, some of these are the visibility for sea traffic, the use of the eco-material, stable behavior in adverse atmospheric conditions, low cost, lightweight, electronics housing free of the condensation phenomenon and design watertight packages. Other important factor is the mooring system to maintain horizontal the buoy and to prevent twists.

Fig. 2 shows the buoy designed. It is a vertical structure which includes the different components required [2]. The communication antenna (9), the beacon light (8), the electronic mote and battery housing (10) and solar panels (11) are situated on top of the buoy. There is a float (1) on middle of the tube (2) and a counterweight (3) on bottom of the structure to provide stability to the buoy. Moreover, an anchor (4)(5) is situated on bottom of the sea to avoid displacement of the buoy location. Finally, oceanographic sensors (6)(7), on bottom of the sea, are connected with the electronic equipment (mote) on top of the buoy.

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MONITORING THE LUCKY STRIKE VENT FIELD IN REAL TIME

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Abstract: This paper describes the deployment and first results of an acoustically-linked multidisciplinary observing system at the Lucky Strike vent field, with satellite connection to shore.

Keyword : hydrothermal vents, deep sea observatory, Mid Atlantic Ridge

INTRODUCTION

Hydrothermal circulation at mid-ocean ridges is a fundamental process that impacts the transfer of energy and matter from the interior of the Earth to the crust, hydrosphere and biosphere. The unique faunal communities that develop near these vents are sustained by chemosynthetic micro-organisms that use the hot fluid chemicals as a source of energy. Environmental instability resulting from active mid-ocean ridge processes create changes in the flux, composition and temperature of emitted vent fluids and influence the associated hydrothermal communities.

The MoMAR (which stands for Monitoring the Mid-Atlantic Ridge) project was initiated 10 years ago by the InterRidge Program to promote and coordinate long-term multidisciplinary monitoring of hydrothermal vents at MAR. It aims at studying vent environmental dynamics from geophysics to microbiology. More recently, the MoMAR area has been chosen as one of the 11 key sites of the European project ESONET NoE. MoMAR-D was selected as a demonstration mission to deploy and manage a deep sea observatory at Lucky Strike for one year. Monitoring this large hydrothermal field, located in the centre of one of the most volcanically active segment of the MAR, will offer a high probability of capturing evidence for volcanic events, observing interactions between faulting, magmatism; hydrothermal circulation and, evaluating their impact on the ecosystem.

DEPLOYMENT

The observatory infrastructure is composed of two Sea Monitoring Nodes (SEAMON) acoustically linked to a surface relay buoy (BOREL, Fig. 1), ensuring satellite communication to the land base station in Brest (France). The entire system was deployed during the MoMARSAT cruise (The Pourquoi Pas ? /Victor6000, http://www.ifremer.fr/momarsat2010/) in October 2010. A first SEAMON node, dedicated to large scale geophysical studies, was moored in the centre of the large lava lake present in the Lucky Strike vent field. This node hosts an Ocean Bottom Sismometer (OBS) and a permanent pressure gauge (JPP) that were connected underwater using wet matable connectors (Fig.2). A second node was deployed at the base of the Tour Eiffel active edifice to study the links between faunal dynamics and variations of physico-chemical factors. This node is composed of a High Definition (HD) video camera, 6 LED lights, an Aanderaa optode (oxygen, temperature) and two in situ chemical analysers. These two nodes communicate via underwater acoustics to a BOREL buoy that is moored on the ocean surface within acoustic range of the SEAMON stations. This buoy is equipped with two identical and back up data transmission channels to ensure uninterrupted data flow. Scientific and technical data (including a low-resolution photo) are transmitted daily to the data centre in Brest. Autonomous instruments (OBS, ocean bottom tiltmeter, current meters, particle trap, colonisation experiments and temperature probes) were also deployed in the LS vent field. They will store their data for the whole duration of the experiment (1 year).

RESULTS

Treatment of data sets will be conducted in two stages: in near real time for the subset that is transmitted through the SEAMON system; and after the 12 months for the whole data set. The near real time data will serve both as support for scientific interpretation, and as an indicator that an event is occurring. Volcanic (eruption, underground diking event, or rapid degassing of the magma chamber), tectonic (displacement along axial faults), or hydrothermal events are all expected to occur on the MAR. Understanding the impact of these events on biological communities is one of our key objectives. The data can be viewed online, according to ESONET data policy and European directives (now, temporary access through http://www.ifremer.fr/WC2en/allEulerianNetworks). The system should be recovered in summer 2011 after 12 months on the bottom.

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