Project contract no. 036851

ESONET

European Seas Observatory Network

Instrument: Network of Excellence (NoE)

Thematic Priority: 1.1.6.3 – Climate Change and Ecosystems

Sub Priority: III – Global Change and Ecosystems

Demonstration Missions

D45b – 3rd Demonstration Mission Periodic Report

Due date of deliverable: August 2008
Actual submission date:

Start date of project: 1st March 2007 Duration: 48 months

Organisation name of lead contractor for this deliverable: INGV
Lead authors for this deliverable: Laura Beranzoli

Revision [draft]

<table>
<thead>
<tr>
<th>Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissemination Level</td>
</tr>
<tr>
<td>PU  Public</td>
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<td>PP  Restricted to other programme participants (including the Commission Services)</td>
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Annex - DM Periodic Report and deliverables

LIDO

LOOME

MARMARA-DM

MOMAR-D

MODOO

AOEM
EXECUTIVE SUMMARY

Aim of this document is the reporting of the activities developing over the period June 2009 – December 2009 in the frame of WP4 the ESONET Demonstration Missions (DM, ref. ESONET NoE DoW). In addition, critical aspects for each DM are pointed out and suggestions are given in order to improve the impact of the DMs work on ESONET and to help in the fully completion of the DM activities and achievements of the results.

In this period, the DMs approved in the 1st call (LIDO, LOOME, Marmara-DM, MOMAR-D, Fig.1)) are either at the completion of the first year or in the second year of activity. The DM implementation plans have in general a first work phase which include a significant effort of the partners for the integration/adaptation of the instrumentation and devices managed by each of them. This phase is completed for most of the DM and three of these DMs are presently in the phase of the development and follow-up of the sea experiments: LiDO in the Gulf of Cadiz, LOOME around the Hakon Mosby mud volcano (Norwegian margin) and MARMARA-DM in the Marmara Sea. The first results of this experiment phase are mainly represented by the technical achievement which are in turn related to the assessment/validation of the performance of the instrumentations/platforms.

The logistics involved in the sea operations (e.g., research vessels, ROVs, etc.) has been made available by the partners in the frame of a high level collaboration and coordination effort. The running sea experiments are progressing with the acquisition of long-term measurements in the sub-sea, seafloor and water column. In particular the DMs LIDO, LOOME and Marmara-DM have been testing multisensor-platforms, either new or improved, and have been producing a significant amount of long-term multidisciplinary time series acquired in three ESONET key-sites (Hakon Mosby, Gulf of Cadiz, Marmara Sea) and related to seismic activity, heat-flow and fluid emissions, water-column temperature, etc.

The work progress presents delays for some DMs depending from the lab work or from ship time availability.

The technical results obtained so far by LIDO, LOOME and Marmara-DM are the premise for successful experiments and for the collection of long-term multidisciplinary high-quality data. The status of MOMAR-D is delayed with respect to the original implementation plan and the sea experiment is foreseen by 2010.

In the period June 2009 – December 2010 the DMs approved in the 2nd Call (MODOO, and AOEM) have started their activities of preparation of the instruments and platforms.

At the time of this report, The Grant Agreement (GA) signature process has been completed for MODOO while ESONET coordinator and AOEM coordinator are still negotiating some of the articles of the GA.

Fig. 1 – Sites of the ESONET Demo Missions (see legend)
1. MAJOR ACHIEVEMENTS OF THE ESONET DEMO MISSIONS

This section gives a short description of the first results of the operative phase of the Demo Mission in order to highlight the achievements within the scientific objective of ESONET NoE.

demo missions LIDO, LOOME, Marmara, started in 2008, got into the pivotal moment of their operative phase. These Demo Missions have either started sea operation with the deployment of instrumented modules or collected the first data acquired on the seafloor.

1.1 LIDO

<table>
<thead>
<tr>
<th>Coordinator:</th>
<th>Universitat Politècnica de Catalunya (UPC)</th>
<th>Start date</th>
<th>01.09.2008</th>
<th>End date</th>
<th>31.08.2010</th>
<th>Duration</th>
<th>24 months</th>
<th>Present Month</th>
<th>16</th>
</tr>
</thead>
</table>

Participants: UPC, UB-Marum, FFCUL/ CGUL, INGV, ISMAR, INFN, CSIC-UTM, dBS, CIBRA, Univ. of Pavia, TFH, TEC.

Scientific and Technological Objectives: extension of the present capabilities of the observatories working in the ESONET key-sites of Eastern Sicily (NEMO-SN1) and of the Gulf of Cadiz (GEOSTAR configured for NEAREST pilot experiment) by installing not-already-included sensor equipments related to Bioacoustics and Geohazards;

Major achievements in the reporting period

WP1 - Recovery, Refurbishment and Deployment of Observatories (resp.: INGV)
  The GEOSTAR observatory was tested and newly deployed in the Iberian Margin ESONET site for a new long-term mission in collaboration with NEAREST EC Project and with the support of MODUS deployment/recovery vehicle provided by TFH and Sarmiento de Gamboa R/V provided by CISIC.
  GEOSTAR is operating from 10 November 2009 in acoustic transmission to a surface buoy and in satellite transmission to land. The observatory has been sending periodical messages containing part of the data acquired and the warning messages of seismic events and water pressure events. From the collaboration between ESONET and NEAREST, GEOSTAR provides to LIDO an original tsunami detection algorithm.
  The refurbishment and upgrading of SN-1 observatory have advanced and the observatory is ready to undergo to a test phase before the deployment foreseen by summer 2010. The observatory now includes the same tsunami detection algorithm as GEOSTAR.

WP2 - Standardisation and spreading of acoustic sensors and tsunami detectors (resp.: dBS)
  D2.4 will further develop the description of the SWE framework implementation concept meant to serve as an architectural guidance candidate to the LIDO Data Management and hardware interface development teams.
  With respect to D2.5 the first SensorML instance for hydrophone available today is being developed and inputs are being collected from ESONET and LIDO partners. This instance will be used as a guide for and implemented within the ESONET Sensor Registry (ESONET WP2 & WP9) hydrophone registration interface.

WP3 - Public Outreach (resp.: FFCUL)
  The website for the public outreach is online (with simulated data for the Iberian Margin) at http://listentothedeep.com http://listentothedeep.org http://listentothedeep.net
  The design the publication and display of the website in OCEANOPOLIS, Brest, France
  Input for ESONET-WP7
WP4 - RT Software Development (resp.; UPC)

Modules for the automated detection, classification and localizations of biological and anthropogenic acoustic sources have been developed, tested and validated through simulations with acoustic data made available from previous experiments in deep sea (e.g. NEMO-OnDE) to reveal the presence of sperm whale clicks, ship impulses or ultrasonic cetacean clicks.

The partners have been investigating the development of efficient and accurate techniques to be used as the basis of a localisation module for an automated real-time Passive Acoustic Monitoring system. Broadband space-time methods were implemented and allowed to map the sound radiated during the detected clicks and to consequently localise both sperm whales and vessels. Hybrid methods were also developed which improved the robustness of space-time methods to noise and reverberation and reduced computation time. The capacities of the approach were validated by consistent tracks of both sperm whales and vessels.

The Real-Time Acoustic Data Management architecture was tested and validated on previous recordings at SN-1 and is now ready to be implemented.

WP5 - Technical assessment (resp.: INFN)

Test and validation of low cost acoustic arrays and recording systems to be implemented in additional locations to extend the monitoring network. The data flow from sensors to public access (low resolution data) and to authorised users (high resolution data).

WP6 - Project management (resp.: UPC)

This WP is not documented in the report.

Deliverables status at 31 Dec. 2009 (month 15)

<table>
<thead>
<tr>
<th>Deliverable n.</th>
<th>Deliverable name</th>
<th>Corresponding WP n.</th>
<th>Responsible Institution</th>
<th>Status at 31 Dec. 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1.1</td>
<td>Procedures for sea operations: recovery and deployment of SN-1 and Ovde stations (East Sicily)</td>
<td>WP1</td>
<td>INGV</td>
<td>Delivered 29 feb 2009*</td>
</tr>
<tr>
<td>D1.2</td>
<td>Status of the SN-1 and Ovde stations, new requirements and technical specifications of the enhancements</td>
<td>WP1</td>
<td>INGV</td>
<td>Delivered 29 feb 2009*</td>
</tr>
<tr>
<td>D1.3</td>
<td>Developments of the enhancements and tests</td>
<td>WP1</td>
<td>INGV</td>
<td>Delayed to June 2010</td>
</tr>
<tr>
<td>D1.4</td>
<td>Sea operations procedures for recovery and deployment of GEOSTAR (Gulf of Cadiz) and refurbishment</td>
<td>WP1</td>
<td>INGV</td>
<td>Delivered 29 feb 2009*</td>
</tr>
<tr>
<td>D1.5</td>
<td>New requirements and technical specifications of the enhancements of the GEOSTAR surface buoy</td>
<td>WP1</td>
<td>INGV</td>
<td>Delivered 29 feb 2009*</td>
</tr>
<tr>
<td>D1.6</td>
<td>Demo mission planning, development and follow-up</td>
<td>WP1</td>
<td>INGV</td>
<td>Expected first draft DELIVERED</td>
</tr>
<tr>
<td>D 3.1</td>
<td>Website with real-time transmission of marine mammal acoustic signals and acoustic images from seafloor cabled observatory to public institutions</td>
<td>WP3</td>
<td>FFCUL-UPC</td>
<td>Expected In dealy</td>
</tr>
<tr>
<td>D 4.1</td>
<td>Report on functioning/misfunctioning Parts and subsystems of the recovered instrumentation</td>
<td>WP5</td>
<td>TEC</td>
<td>Delivered to 29 Feb. 2009 (predated)*</td>
</tr>
<tr>
<td>D 4.2</td>
<td>TDR of new hydrophone arrays; TDR of data acquisition, Power and data transmission systems, sea operations</td>
<td>WP5</td>
<td>INFN</td>
<td>Delivered to 29 Feb. 2009 (predated)*</td>
</tr>
<tr>
<td>D 4.3</td>
<td>Reports on testing activity</td>
<td>WP5</td>
<td>INFN</td>
<td>Delayed to June 2010*</td>
</tr>
</tbody>
</table>
Critical points, comments and suggestions for the next DM development period

The coordination (WP6) in this report was not documented. The coordination has to be more visible and effective toward the partners to improve the integration of some activities which otherwise could appear as independent. Attention to the Deliverables issue has to be paid as some of them are in delay.

The WP leaders should give more visibility to the contribution of the partners involved in the WP. A general impression on the report relates to the not sufficiently clear separation between ‘work done’ and ‘work to be done’. This ambiguity has to be removed.

The status of the bio-acoustic system for the Iberian Site is not reported. Some Deliverables will be delayed to the IV period because of the on-going development of tests for the platforms to be deployed off-shore Sicily.

According to the Implementation Plan WP2 is aimed at implementing international accepted standard methods in data acquisition and management and at establishing of a sensor inventory. It is not sufficiently clear what are practically the progresses of this WP.

2.2 LOOME

<table>
<thead>
<tr>
<th>Coordinator:</th>
<th>Start date</th>
<th>End date</th>
<th>Duration</th>
<th>Present Month</th>
</tr>
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<tbody>
<tr>
<td>Max Plank Institute - MPI</td>
<td>01.02.2008</td>
<td>31.12.2011</td>
<td>35 months</td>
<td>23</td>
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<tr>
<td>D. de Beer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Participants
KDM-Marum, AWI, IFM-GEOMAR, IFR, UiT,

Scientific and technical objectives:
Follow events of eruption with sensor package aimed downwards (acoustics), at the sediments surface (t-strings, chemo-sensor-strings, camera), and in the water column (CTD, scanning sonar). Test integration of these sensors, and endurance.

Major achievements in the reporting period
LOOME is presently in the monitoring of seabed processes. Wood pieces that were deployed in 2008 were recovered and analysed for colonization by wood eating fauna. A detailed temperature study across the hot spot with the 13 m T-lance was performed. The highest temperature gradients were recorded, indicating high seepage activity. Measurement of the primary productivity of the sulphur oxidising community. An
experiment with a photon counter was done, to test the hypothesis that bioluminescence is particularly high near the cold seep. The hypothesis had to be rejected. The recovery cruise is planned for September 2010.

WP1 – Seismic detection of eruptive events
After the recovery of Aug. 2009 the module was again deployed near an hot spot in opposite position respect to the LOOME frame in September 2009.

WP2 - Monitoring of fluid chemistry
The sensors were deployed

WP3 – Monitoring of physical sediment properties
Temperature and pore pressure in the sub-surface and sea bed (resp.: IFM-GEOMAR).
The T-lance was re-deployed near the hot spot.
The temperature lance and the pore-pressure lance were recovered. The temperature lance was re-deployed. Temperature and bottom water pressure sensing systems were integrated into the LOOME frame and deployed as a part of the main observatory module. All sensors were installed at the planned positions at the seafloor. First data was obtained via the ROV using the CLSI.

WP4 - Detection and quantification of gas flares.
Due to the electronic failure, the sonar is now operating autonomously. The sonar is deployed together with the frame.

WP5 - Construction of the central frame/platform
Platform is presently operating at seabed

WP6 - Underwater communication
Not clear status

WP7 - Deployment frame
COSTOFF is presently operating to acquire T-signals.

WP8 - Standardization and interoperability
Not documented

WP9 - LOOME management
Not clear status

Deliverables status at 31 Dec. 2009 (month 15)

<table>
<thead>
<tr>
<th>Deliverable n.</th>
<th>Deliverable name</th>
<th>Corresponding WP n.</th>
<th>Responsible Institution</th>
<th>Status at 31 Dec. 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Long-term seismometer</td>
<td>1, 10, 13</td>
<td>UiT</td>
<td>Delivered 29 Feb. 2009 *</td>
</tr>
<tr>
<td>2</td>
<td>Long-term chemical sensors (pH, O2, sulfide, redoX)</td>
<td>2</td>
<td>MPI-MM</td>
<td>Delivered 29 Feb. 2009 *</td>
</tr>
<tr>
<td>3</td>
<td>Long-term temperature sensors on surface. Temperature and pore pressure in the subsurface seabed</td>
<td>2</td>
<td>IFREMER/IFM-GEOMAR</td>
<td>Delivered 29 Feb. 2009 *</td>
</tr>
<tr>
<td>4</td>
<td>Scanning sonar for gas flares detection</td>
<td>4</td>
<td>MARUM</td>
<td>Delivered 29 Feb. 2009 *</td>
</tr>
<tr>
<td>5</td>
<td>Design of sensor network and</td>
<td>7</td>
<td>MPI</td>
<td>Expected</td>
</tr>
</tbody>
</table>
### Critical points, comments and suggestions for the next DM development period

*End date is over the end of ESONET; it should be reported to 31.10.2010.*

*WP titles are different from the implementation plan and this could cause misunderstanding in the assessment of the work status. It would be advisable to stick to the original titles.*

*The WP description of the status of activities is too synthetic and some time not comprehensible. The reports should be understandable to external readers.*

*WP6 and WP8 (both Responsibility of MARUM) are not documented.*

*According to the implementation plan, WP9 is ‘Management’ while it is referred to as ‘Scientific Report’. Nothing is give about the management status.*

*The deliverable reports should bring on the cover page the title of the deliverables according to the implementation plan to avoid misunderstanding.*

### 2.3 MARMARA-DM

<table>
<thead>
<tr>
<th>Coordinator: IFR – Ifremer</th>
<th>L. Geli</th>
<th>Start date</th>
<th>End date</th>
<th>Duration</th>
<th>Present Month</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>01.04.2008</td>
<td>30.09.2010</td>
<td>30 months</td>
<td>22</td>
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</tbody>
</table>

**Participants**

ITU, ISMAR-CNR, INGV, CNRS, DEU/IMAST

**Scientific and technical objectives:**

The goal of MARMARA-DM is to contribute to the establishment of optimized permanent seafloor observatory stations for earthquake monitoring in the Marmara Sea (MS) and investigate the submarine segment of the North Anatolia Fault with respect to fluids and seismicity possible relation.

**Major achievements in the reporting period**

MARMARA-DM has been performing seafloor and ship-based data acquisition of multiple measurements in time (time-series) and space (bathymetry).
WP 1 : Analysis of the available time series data and in-situ samples from the Marnaut cruise. This workpackage is almost done. All deliverables have been produced, except D1.2 (paper of fluid flow measurements).

WP 2 : Marine operations. During the reporting period, the most important activities have been conducted under this WP:

1. “Marmesonet” Cruise was conducted by IFREMER with R/V Le Suroit, from November 4th to December 14th, 2009. The cruise was divided in two parts:
   - part 1 for acoustic detection of gas emissions, AUV micro-bathymetry and seafloor deployment of BOB (acoustic gas bubble detector);
   - part 2 for high resolution, 3D seismic survey on the western high.

2. Marmara-2009 cruise of R/V Urania was conducted from September 22 (start in Brindisi) to October 12 (return to Brindisi), under the supervision of Luca Gasperini, ISMAR (partner 4). R/V Urania has deployed SN-4 in the east Ç?narç?k Basin, and performed en-route surveys to map and sample dissised gas in the water column. All Ifremer instruments (10 OBSs and 5 piezometers) were deployed during the Urania cruise. These instruments will be recovered in March 2010.

WP 3 : Integration of land and seafloor seismological data. The tentative work performed using OBS data from the MarNaut cruise and land data from Turkish institutions (KOERI and TUBITAK) has shown that it is impossible to merge land and seafloor datasets in absence of a detailed 3D velocity model. Hence, this WP can be considered as done at this stage.

WP 4 : Data integration and modeling. In progress.

WP 5 : Comparative study and project feasibility. In progress.

WP 6 : Public and education outreach, coordination at national (Turkish) level and fund raising. An important activity has been undertaken under this Workpackage (see specific report on WP6).

Deliverables status at 31 Dec. 2009 (month 15)

<table>
<thead>
<tr>
<th>Deliverable n.</th>
<th>Deliverable name</th>
<th>Corresponding WP n.</th>
<th>Responsible Institution</th>
<th>Status at 31 Dec. 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1.2</td>
<td>Paper on flowmeters/osmo-samplers</td>
<td>1</td>
<td>CNRS</td>
<td>Released</td>
</tr>
<tr>
<td>D1.3</td>
<td>Paper on fluid analysis</td>
<td>1</td>
<td>CNRS</td>
<td>Released</td>
</tr>
<tr>
<td>D1.4</td>
<td>D1.1</td>
<td>1</td>
<td>CNRS</td>
<td>Released</td>
</tr>
<tr>
<td>D2.1</td>
<td>Reports on DEU cruise</td>
<td>2</td>
<td>DEU/IMST</td>
<td>Expected, Delivered</td>
</tr>
<tr>
<td>D2.3</td>
<td>Urania operations and 6 months time series at 3 sites</td>
<td>2</td>
<td>ISMAR/INGV</td>
<td>Expected, In delay</td>
</tr>
<tr>
<td>D3.3</td>
<td>High Res Seismic Images at the 3 sites</td>
<td>3</td>
<td>ITU</td>
<td>Delayed, Month 30</td>
</tr>
<tr>
<td>D6.3</td>
<td>Training course</td>
<td>6</td>
<td>DEU/IMST</td>
<td>Expected, Delivered</td>
</tr>
</tbody>
</table>

Deliverable D45b
Critical points, comments and suggestions for the next DM development period

The report is detailed and the activities are very well documented as well as the resources (man-power and funds).

The deliverables have to be identified according to the implementation plan while they are often submitted without the correct title or identification number. This can cause misunderstandings.

The DM is expected to give very interesting results.

2.4 MOMAR-D

Coordinator:
IFR – Ifremer
P.-M. Sarradin

<table>
<thead>
<tr>
<th>Start date</th>
<th>End date</th>
<th>Duration</th>
<th>Present Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.09.2008</td>
<td>30.09.2010</td>
<td>24 months</td>
<td>16</td>
</tr>
</tbody>
</table>

Participants
DOP/UAÇ, FFCUL/CGUL, IPGP, NOC, CNRS – F, CNRS – C, Univ. Bremen, Ifremer, SOPAB

Scientific and technical objectives:
To study the temporal variability of active processes such as hydro-thermalism, ecosystem dynamics, volcanism, seismicity and ground deformation, in order to constrain the dynamics of mid-ocean ridge hydrothermal ecosystems. To deploy a multidisciplinary acoustically linked observing system, with satellite connection to shore. To demonstrate the overall management of this system during 1 month even if its operation will actually continue during 12 months.

Major achievements in the reporting period
Wp1, WP2, Wp7 seem to be the presently active WPs.

The cruise is now scheduled in September 2010, on the Pourquoi pas ? with the ROV Victor 6000. Due to logistic constraints of the fleet, the duration of the first cruise was reduced from 19 to 13 days to implement the observatory infrastructure on Lucky Strike. After the meeting in Brest in March 2009 and the final definition of the observatory, this period was used to start the technological work. The design and building of the sensors and nodes is in progress as well as the software adaptation of the sensors to the SEAMON technology. The objective is to start the trial step in Brest in Spring 2010. Shipping is planned during Summer 2010.

In parallel, a draft of the data management policy is circulating among the partners (see draft of D3).

The MoMAR-D project was presented during the 4th International symposium on Chemosynthetic Based Ecosystems in Okinawa (Jpn), the ESONET All region workshop in Paris, the ESONET Best practices workshop in Brest and the Ocean Biology Observatory Workshop in Mestre (It).

The next 6 month period will be devoted to the on shore integration and trial of the system in Ifremer in Spring 2010. D3 and D4 will be finalized before the cruise. The cruise preparation reports (Agreement to work in the Portuguese waters and Technological description of the cruise) will be delivered to the French Fleet in March 2010.
Deliverables status at 31 Dec. 2009 (month 15)

<table>
<thead>
<tr>
<th>Deliverable Name</th>
<th>WP</th>
<th>Lead contractor</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruise proposal submission</td>
<td>WP6</td>
<td>M. Cannat (P#3) J. Blandin and P.M. Sarradin (P#7)</td>
<td>DELIVERED</td>
</tr>
<tr>
<td>Report Description of the operational system: interface specifications, sensors, localisation</td>
<td>WP2</td>
<td>J. Blandin (P#7)</td>
<td>Delivered</td>
</tr>
<tr>
<td>Signed agreement Data management policy</td>
<td>WP3</td>
<td>T. Carval (P#7)</td>
<td>Delayed 07/2010</td>
</tr>
<tr>
<td>Communication plan</td>
<td>WP5</td>
<td>J. Sarrazin (P#7)</td>
<td>Delayed 07/2010</td>
</tr>
<tr>
<td>On shore integration and test report</td>
<td>WP2</td>
<td>J. Blandin (P#7)</td>
<td>Delayed 06/2010</td>
</tr>
</tbody>
</table>

Critical points, comments and suggestions for the next DM development period

Some parts of the periodic report do not follow the requested template and this cause lack of clarity with respect to the work done. The description of the activity is not clear when compared to the original implementation plan and some parts are too generic. The WP leaders has to make a larger effort of synthesis instead of reporting the individual contribution of each partner. The coordination has to be stronger in order to favour an actual integration of the partners.

The DM is affected by a significant delayed that according to the report should be recovered in 2010. A check is necessary on the next six-month report.

2.5 MODOO

Coordinator: IFM-GEOMAR
J. Karstensen

Start date 01.05.2009  End date 30.09.2010  Duration 17 months  Present Month 8

Participants: NERC-NOCs, IM, NIOZ, UniAbdn, AWI

Scientific and technical Objectives:
This DM will demonstrate the functioning of a Modular and mObile Deep Ocean Observatory (MODOO) with real-time data access. The MODOO concept is that of linking and operating stand-alone observatory modules (lander, mooring) in such a way that they merge into a single observatory. The MODOO concept shall be applicable to any non-cabled environment as well as to link non-cabled with a cables site.

Major achievements in the reporting period
The first 8 month of the DM have been concentrated on outlying and building the hardware, in particular the Data Collection and Dissemination (DCD) node that connect lander and mooring. This activity is still
ongoing. In addition, procedures (e.g. data flow, testing of equipment) have to be defined. A website has been established (www.modoo.info) and linked to the ESONET NoE website (deliverable D4.1). The website will be extended to link to the real time data. Preparation for the data collection and dissemination have been taken (type of sensors, data streams expected, responsible contact). The data processing (near real time, delayed mode) has been outlined in accordance with international standards (e.g. GTS, OceanSITES).

WP1 - Lander component
In order to advance the capabilities of the BOBO lander to get it interfaced with the EuroSITES mooring via the DCD nodes and to host additional sensors, the lander configuration was outlined and information about the expected payload was collected. The passive acoustic sensor in preparation will be delivered during February 2010 for implementation into the lander.

WP2 - Mooring component
The objective of this WP is to design the EuroSITES water column observatory to incorporate the needs to the MODOO mission. In particular the inductive link based communication between the CDC node and the surface control unit must be defined and programmed. The design required for the new mooring has been almost completed and some of the hardware required has been purchased. This work is shared with EuroSITES preparation for the PAP deployment. The major enhancement is the installation of a new type of surface buoy (shared with the Met Office) which host a variety of air/sea exchange sensors, telemetry system and energy supply.

WP3 - Scientific and technological integration
The major step for the scientific integration of the observatory components is: standardization, interoperability and access to data (see also WP4). The technological integration includes the linking between the observatories (see also WP1 & WP2) and the linking of their components/sensors. The integrating devices are the “data collection and dissemination” (DCD) nodes. The DCD nodes are central to the MODOO Demomission as they fulfil the scientific and technological integration of the observatory modules. The process started with the definition of the needs (scientific and technological) followed by integration requirements. This process is still ongoing.

WP4 - Data management and outreach
The MODOO project data management will be an extension of the systems already being undertaken under the auspices of EuroSITES. This will enhance links between EuroSITES and ESONET NoE data management principles. A large range of data types will be handled in real-time, including meteorological air/sea exchange instrumentation, water column and sea floor lander. During this pre-deployment phase of MODOO meta-data such as the number and types of sensors to be used on the mooring and lander have been gathered.

WP2 - Coordination
Shortly after the official project start (01. May 2009) a kick-off meeting was organized and held (early May 2009). Other meetings also in collaboration with the “exchange of personal” MODOO connect have been held in December 2009. Preparatory work for the first report to ESONET NoE WP4 have been made. Project updates and request have been posted to the partners.

Deliverables status at 31 Dec. 2009 (month 8)

<table>
<thead>
<tr>
<th>Deliverable Name</th>
<th>WP</th>
<th>Lead contractor</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document describing NERC-NOCS Iridium</td>
<td>WP2</td>
<td>NERC-NOCS</td>
<td>Expected</td>
</tr>
<tr>
<td>MODOO web presence established</td>
<td>WP 4</td>
<td>NERC-NOCS</td>
<td>Expected</td>
</tr>
<tr>
<td>Progress reports</td>
<td>WP 5</td>
<td>IFM-GEOMAR</td>
<td>Expected</td>
</tr>
</tbody>
</table>
Critical points, comments and suggestions for the next DM development period

The report, despite of an error of paging, is very clear and accurate and account for the major activities and achievements of the DM. In particular the achievements are given in a very assessable way through time-line and tables clear updating.

Some delay have been reported, justified and corrective action have been identified.

2.6 AOEM

<table>
<thead>
<tr>
<th>Coordinator: NERC-NOCS</th>
<th>Start date</th>
<th>End date</th>
<th>Duration</th>
<th>Present Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Wright</td>
<td>01.07.2009</td>
<td>31.10.2010</td>
<td>16 months</td>
<td>8</td>
</tr>
</tbody>
</table>

Participants: AWI, FoRTH, Leibniz Institute of Marine Sciences, Nansen Environmental and Remote Sensing Center, UiT

Scientific and technical Objectives:
Demonstrate and deploy observatory lander technology for dissociating hydrate studies in high-latitude, but warming Arctic Ocean shelf sites. Design and evaluate data acquisition and real-time transmission methodologies for Fram Strait oceanography, including an acoustic network for future ocean tomography and glider navigation and docking.
Develop the scientific and policy case for the Arctic ESONET site to become a sustained cabled observatory network within ESONET / EMSO initiatives, and Norwegian SIAOS and EU ESFRI programmes.

Major achievements in the reporting period
Although some activities have been started by the partners of this DM, the workplan reports the starting of the activity by January 2010 when the problems related to the agreement on the arrangement of some parts of the Grant Agreement between the DM partnership and the ESONET Coordinator are expected to be completed.

Deliverables status at 31 Dec. 2009 (month 15)
The deliverables issue is foreseen starting from May2010.

Critical points, comments and suggestions for the next DM development period

Because of the early stage of the DM, comments and suggestion are not applicable. The recommendation is however that the formalities within ESONET NoE be completed soon to allow the DM to have its course and be completed in due time.
Conclusions

Three sea experiment are running within LIDO, LOOME and MARMARA Demo Missions. Three experiments are in preparation for the 2010 within MOMAR, MODOO and AOEM.

The next 6 months will be important to check the topology and quality of the data acquired and the data management by the running experiments and to verify the work of preparation and the actual cruise plan for the foreseen experiments.

While some of the DMs (Marmara and MODOO) are well documented and the work is easily assessable, for other DMs, such as LIDO LOOME and MOMAR, a major effort has to be in this sense. Deliverables have to issue in agreement to the implementation plan and eventual delay have to be explained and the new delivery dates indicated. In addition, the deliverables have to be clearly indicated with the title and identification number reported in the original implementation plan to avoid misunderstanding.

For MOMAR and AOEM the next months will be crucial to check the achievement of the implementation plan within October 2010.
Annex - DM Periodic Report and deliverables