GLINT'09

PARTICIPATION: NURC, MIT, NUWC
PERIOD COVERED: 29 June – 21 July 2009
GEOGRAPHICAL AREA: South of Elba

1. PURPOSE/OBJECTIVES

The Cooperative Anti-Submarine Warfare (CASW) project at NURC has been set up to investigate and research novel and innovative approaches to the ASW in response to the proliferation of quiet, small, diesel-electric submarines which pose a threat to NATO and national forces.

The general approach to the problem is the use of a cocktail of sensors, deployed acoustic and non-acoustic sensors and AUVs operating collaboratively, communicating, predominantly by means of underwater communication modems.

The program aims to demonstrate a heterogeneous network of sensors in 2010/2011 with development being driven and proved by means of two trials a year (one engineering and one scientific).

This *trials plan* details the goals and requirements for the GLINT09 scientific trial in accordance with NURC's quality procedure QP SEAT 02. This trial will be the major scientific trial for task1 of CASW (System Concepts for Littoral Reconnaissance and Surveillance).

The following are the objectives of the GLINT09 trial

- **Exhibit adaptive behaviors which**
  - Expand on what has previously been shown
  - Are relevant to active multistatic ASW

- **Gather Multistatic ASW data to**
  - Assess detection, localization and tracking capabilities

- **Demonstrate passive systems cueing active**

- **Show some operability with acoustic communications deployed at Pianosa**

2. GENERAL DESCRIPTION OF OPERATIONS

Experimental area/location

The driving constraints for choosing the area are:

- A harbor which is available every night within reasonable transit time and which is available in the busy July timeframe.
- A relatively flat bottom type of around 100 metres to allow
    - Deployment of the DEMUS source
    - Relatively shallow working for the AUV

The area identified is an area to the South-East of Elba, with berthing in Porto Santo Stefano. The area requested is defined by the co-ordinates

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42 28.2N 011 00.0E
42 28.2N 010 54.0E
42 31.0N 010 54.0E
42 31.0N 011 00.0E
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The exact area chosen was based on local knowledge of busy holiday and fishing areas which was gained by consulting the local harbor master.

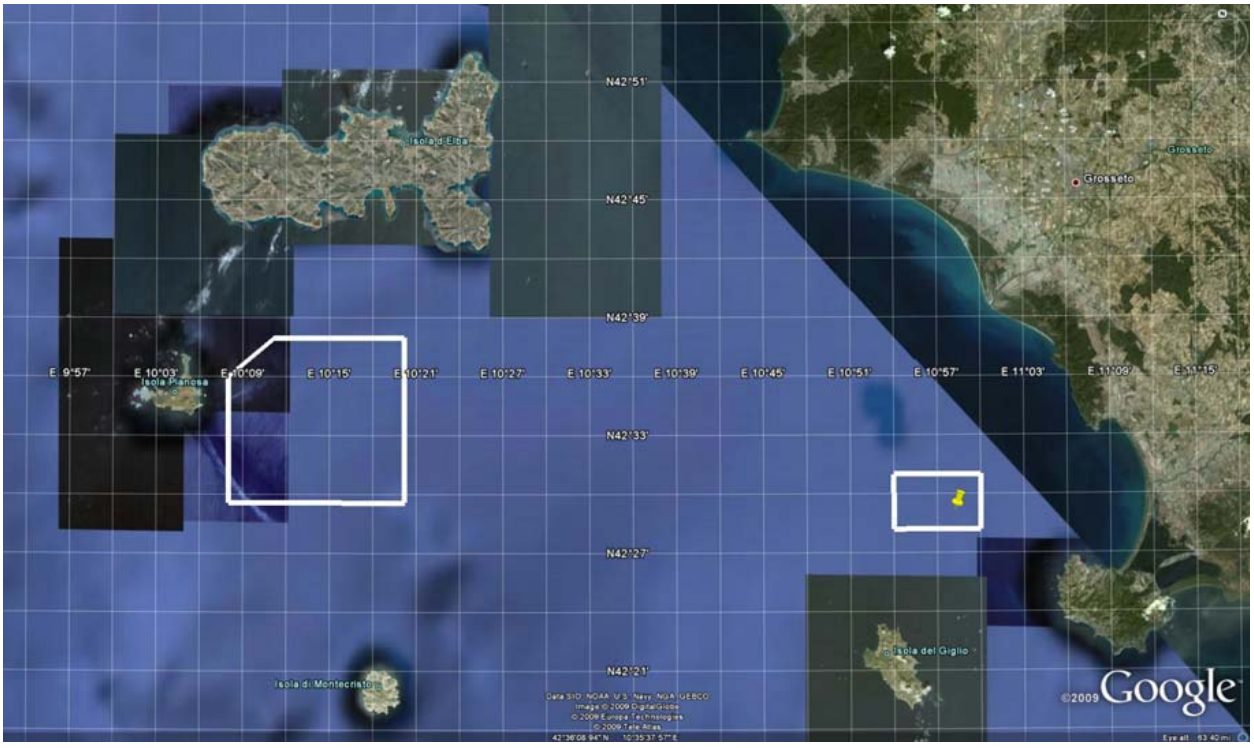

Figure 1. Area around Elba and Porto santo Stefano showing relative position of area A – near Port santo Stefano and Area B - near Pianosa.

NB a second area will also be requested near to Pianosa for the approximately 4 days of Communication experiment to occur in the final phase of GLINT09. This clearance will be as an amendment to an already existing request made for the SubNet09 experiment.

The area requested is defined by the co-ordinates

42 29.567N 010 08.000E
42 36.000N 010 08.000E
42 37.967N 010 11.200E
42 37.967N 010 20.200E
42 39.567N 010 20.200E

Approximate sequence of events

Date	Activity Vessel 1	Activity Vessel 2
25th – 26th June	Loading	Loading
29th June – 30th June	Transit and start deployments	Transit
1st July – 3rd July	Engineering Shakedown	Engineering Shakedown
4th July – 9th July	Multistatic Runs	Multistatic Runs
10th July – 15th July	Behaviors	Behaviors
16th – 18th July	Collaborative ASW	Collaborative ASW
19th July	Recovery move to Pianosa Comms interaction with SubNet	Transit to Pianosa Comms interaction with SubNet
21st July	Transit to La Spezia	Transit to La Spezia
22nd -23rd	Unload	Unload

3. DETAILED OBJECTIVES

The detailed objectives can be broken down in terms of the four major areas defined in the schedule of the table above.

Multistatic Runs

The main purpose of the Multistatic runs will be the gathering of data for off-line processing. Some data was gathered during the GLINT'08 trial which has allowed assessment of tracking capabilities of the partners. It also highlighted timing and compass issues on the AUVS. These data were gathered with very high Target Strengths, relatively close ranges and low source levels.

This year, as part of GLINT'09, the plan will be to reduce target strengths, increase distances and to carry out experiments, at least some of which are to be carried out at high source levels. Final run plans will be produced before the start of the trial. They will be developed to gather

- Passive and active components of runs.
- Active runs in noise limited and reverberant conditions.

Consideration must be taken of the fact that for the DURIP array only frequencies up to 1000 Hz can be sampled without spatial aliasing.

As well as producing data for off-line processing there will be the opportunity to test on-board processing during this phase and to examine new processes which are not relevant to the 'trajectory' of the AUVs.

Behaviors and real time processing
In the behaviors phase a set of pre-defined behaviors will be tested and refined. It is envisaged that some previous behaviors will need to be investigated and re-examined.
These include, track and trail, object avoidance etc.

One of the key steps forward during GLINT'09 should be the introduction of behaviors which are dependent on analysed data and exhibit adaptive component. To this end the efficient running of real time processing on the units will be of great importance. It is the real time processing which will provide the data on which the behaviors are based.

It is envisaged that all three AUVs will act both independently and at times interacting to investigate and demonstrate behaviors relevant to ASW.

Strict testing of behaviors and algorithms will be tested in simulation prior to being tested at sea.

Collaborative ASW
In the final phase of the experiment a combination of behaviors, processing and algorithms will be combined to show how multiple assets can be used to detect, track and prosecute an asset.

In particular during this phase, demonstrations will be carried out of the processing and technology required to cue and alter modes of operation across two or three AUVs whilst turning actives sources off and on. This phase should be considered as a first test of the required capabilities for full scale node-to-node communication in subsequent years – in particular for a demonstration of concept in 2010-2012 timeframe.

Interaction with SubNet (Communication issues)
The final days of the experiment will allow for interaction between the resources of the GLINT09 trial and the communications infrastructure which will already be in place at Pianosa – placed there as part of the SubNet09 project.