



NATO
+
OTAN

***NURC** - Partnering for Maritime Innovation*

NURC



***NURC's contribution to the
"Seabed Characterization Experiment"
2014-2015***



Description of equipment (1)



➤ AUV Seabed Characterization

- Ocean Explorer Autonomous Underwater Vehicle (OEX AUV)
- Towed TOSSA source 800-3500 Hz, ~180 dB re 1 μ Pa @ 1m
- BENS 83 element, 30 m towed array, nested hydrophone spacing (0.21, 0.42, 0.84, and 1.05 m)
- 128 channel acquisition at 12 kHz
- CTD sensor
- Duration at least 5 hrs demonstrated during the CLUTTER'09 experiment with continuous 32-element array acquisition and source repetition rate of 2 s (1-s signal duration)
- Power consumption improved for longer duration
- Acoustic communication

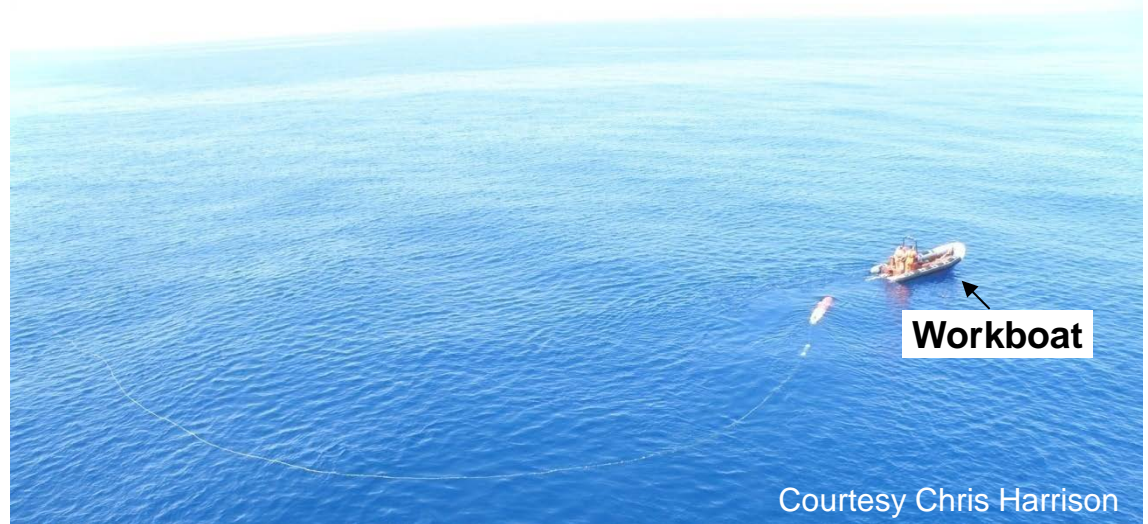
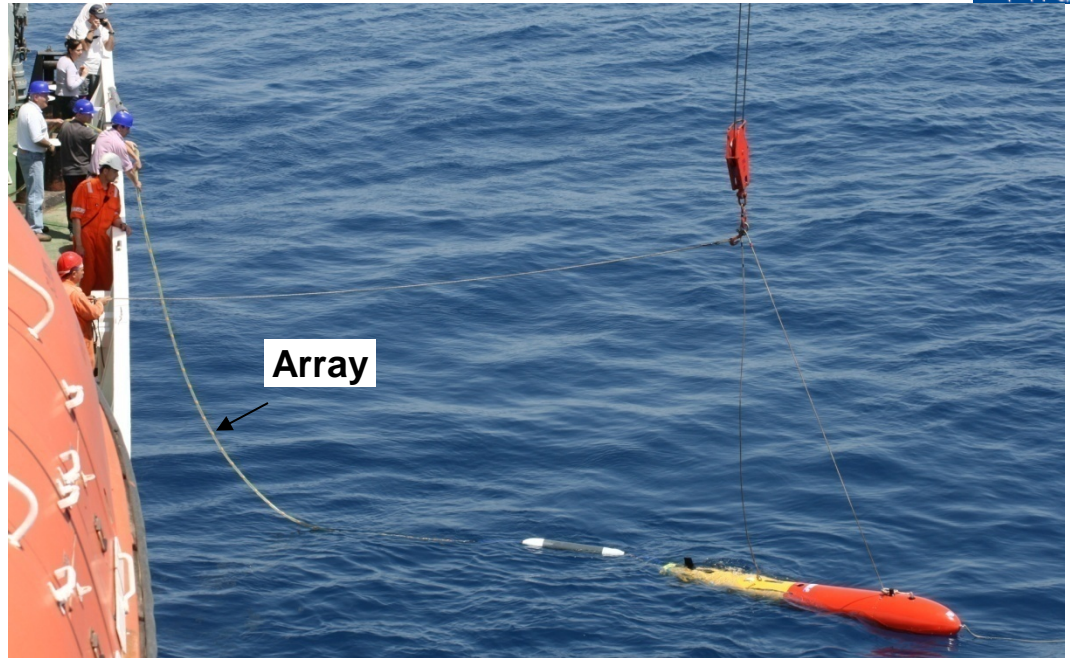
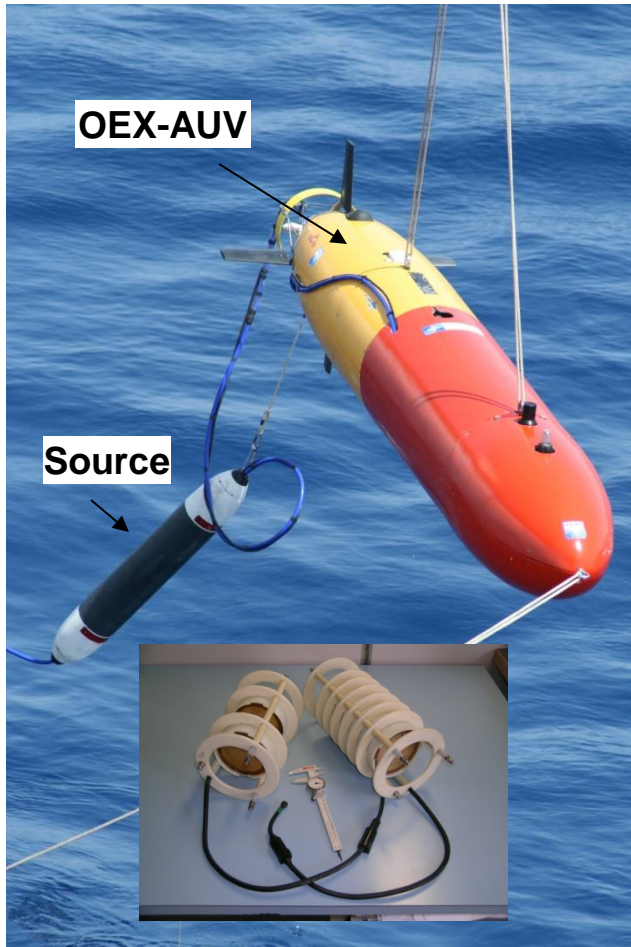


Description of equipment (2)

- Weight and dimension
 - OEX AUV: 500 kg, 4.5 m long, 21” diameter
 - Deck Signature: 4.5 m x1.0 m x 1.2 m (lxwxh)
 - TOSSA: 15 kg, 1.2 m long and 0.25 m diameter
 - BENS: length ~ 70 m, (2mx1m, 45 kg tow cable and array weight in air)
 - Battery charger: 2 Pelicase + 1 Refrigerator (1mx1mx1m, 50kg)
 - Acoustic communication: EdgeTech Modem, 1 Pelicase + 100m cable + 40kg Towfish (1mx1m on deck, 80kg Total Weight)
 - At Sea Radio Comms to AUV: 2.4GHz WiLan
 - Spare: Set of Aluminum Boxes, (4mx2mx2m lxwxh, 800kg)



OEX-AUV, TOSSA and BENS



Courtesy Chris Harrison



Description of equipment (2)



- Vertical Line arrays
 - 2 bottom moored and 32 element vertical arrays
 - ~70 m aperture, autonomous acquisition at 12 kHz
 - 2 x floats, 2 x acquisition radiobuoys, 2 E/M cables for “U” moorings
 - Acoustic releasers and ballasts
 - 18 hrs duration



Description of equipment (2)



- Weight and dimension (each)
 - Vertical Arrays: 70m length, 100 kg weight on reel, 1mx1mx1m (lhxwx)
 - Floats: 20 kg, 0.3m dia x 1.5 length
 - Acquisition radiobuoys w/batteries: 150 kg, 7 m height, 0.6 m diameter
 - BENS: 45 kg (tow cable and array in air), length ~ 70 m
 - Acoustic Releasers: 4 total, 30 kg, 0.15m dia, 0.8m length
 - Ballasts: steel, 300 kg times the number of deployments + spares
 - Battery chargers: weight and space negligible
 - Radio comms: 2.4GHz WiLan + 408MHz Satel Modem (weight and space negligible)
 - Spare: covered in the OEX AUV spares



Description of equipment (3)



- FOLAGA Seabed Characterization
 - FOLAGA Autonomous Underwater Vehicle (propulsion and glider mode operations)
 - Tetrahedral array (towed 4 elements array to provide directionality)
 - Designed for passive acoustic seabed characterization
 - ONRG NICP proposal for 2012-2013



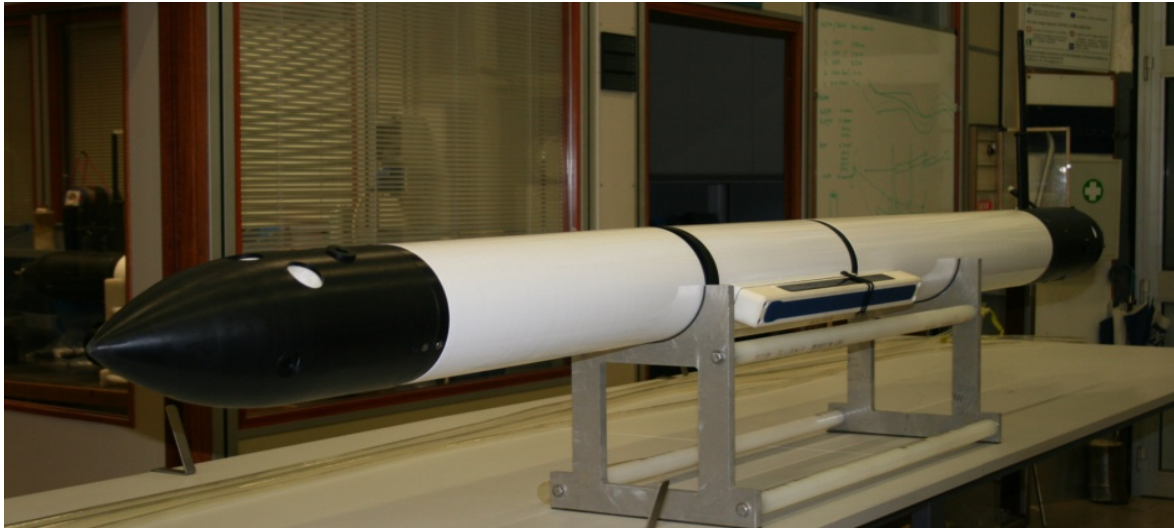
Description of equipment (2)



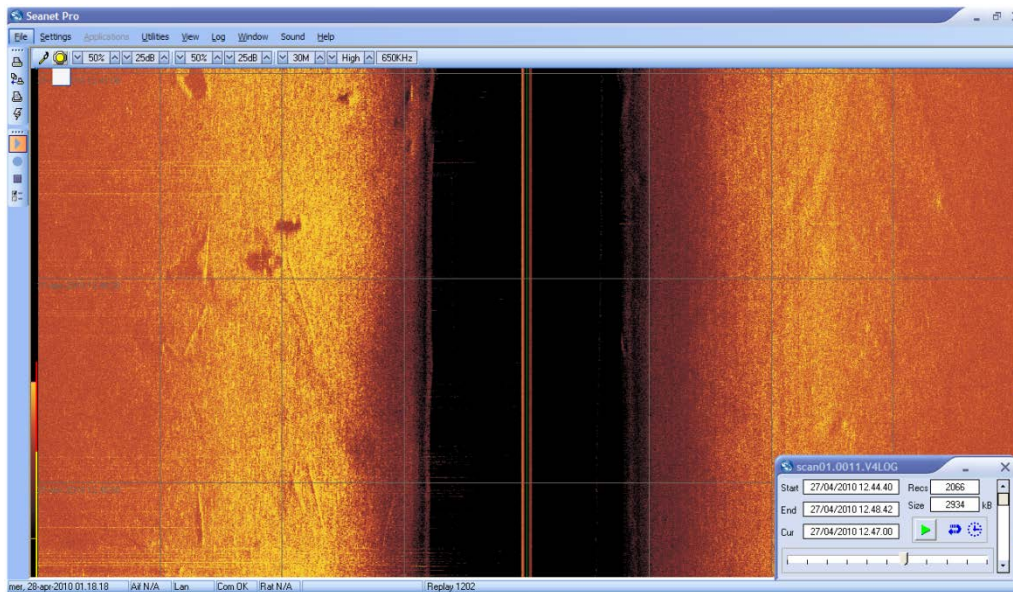
- Weight and dimension
 - FOLAGA: 32 kg, 2.22 m long, 0.155 m diameter
 - Deck Signature: 2.5 m x 1.0 m x 1.0 m (l x h x w)
 - Array and Towing Cable: weight and required space negligible
 - Battery charger: weight and space negligible
 - Acoustic communication: Micromodem System (1 Pelicase)
 - Spare: covered in the OEX AUV spares



FOLAGA with Sidescan



Sidescan sonar:
SeaKing 675kHz DST ROV





Personnel requirements



- 4 NURC staff to prepare, deploy and operate proposed equipment (OEX AUV, VLAs and FOLAGA)
- 2 ship personnel for deployment and recovery of equipment
- All equipment deployment and recovery requires RHIB



Preparation time of equipment

- Load-unload on R/V
 - 4 hrs load and 4 hrs unload
- Deployment-recovery time required (each)
 - 1 hr for OEX AUV deployment and recovery
 - 2 hrs VLA deployment and recovery
 - 1 hr FOLAGA deployment and recovery
- Preparation time for second deployment
 - 24 hrs for data transfer and recharge batteries
 - 1 hr for mission planning
- Required Lab and Workshop spaces
 - Desk hosting 4 people
 - 4m x 2m workshop with bench



Possible future additions

(depending on NURC situation)



- Towed array for the OEX AUV
 - 128 channels/hydrophones
 - Twice as long as present BENS array
- Sound source
 - High-performance source with respect to omnidirectionality and frequency response
 - Wide band for broader frequency coverage and time resolution
 - Frequency range 1-7 kHz



NATO
+
OTAN

NURC - Partnering for Maritime Innovation

NURC



Seafloor Characterization Using Gliders

Jim Miller

NATO Undersea Research Centre

La Spezia, Italy



Efforts to measure sediment properties with gliders in 2012



- NURC will be carrying out two sea tests in 2012 with gliders to measure sediment properties:
 - NATO exercise Proud Manta 2012 off the coast of Sicily: NURC will deploy SLOCUM gliders with a single hydrophone to measure ambient noise for measuring sediment properties (Feb. 2012)
 - NURC experiment GLASS 2012 off the coast of Italy will deploy a FOLAGA glider with a tetrahedral array of hydrophones in tow. (July 2012)



Assets for *PROUD MANTA* and *GLASS** 2012



SLOCUM glider fleet at NURC to be used in NATO exercise *PROUD MANTA* in Feb. 2012: Single towed hydrophone.



FOLAGA hybrid AUV/glider to be used in NURC *GLASS** experiment in July 2012: Tetrahedral towed hydrophone array and active down looking sonar

*Glider Acoustics Sensing of Sediments

[About us](#)[Activities](#)[Projects](#)[Media Gallery](#)[Home](#) > [Underwater applications](#) > [Folaga AUV](#)

Project

- [Underwater applications](#)
 - [Technical Assistance - Services - Sea Trials](#)
 - [Modular system for monitoring, inspection, surveillance in Underwater environment](#)
 - [Folaga AUV](#)
 - [Eurobot wet model](#)
 - [Amadeus Dual Arms Cell](#)
 - [Nearshore Wave-Current Meter](#)
- [Robotic system](#)
- [Research projects](#)

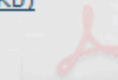
Folaga AUV

Low Cost Platform; Surface Navigation Capability; Pitch/Yaw Control by Hydro-jet; Buoyancy change (glider); Transportable by car; Payload Versatility; High Maneuverability and Hovering; Surface Communications; Designed for Cluster Work

- **Diameter:** 155 mm
- **Length from:** 2000 mm
- **Weight in air:** 31 kg
- **Energy Storage:** NiMh Batteries 12 Volt 45 Ah
- **Speed:** 2 knots (up to 4 knots if required)
- **Control:** pitch/yaw thruster, movable ballast, active buoyancy control
- **Endurance:** 6 hours at max speed
- **Maneuverability:** any bearing and trim with no active surfaces
- **Gliding Scope:** 0 - 50 m
- **Max depth:** 80 m (underwater navigation)
- **Software:** Windows Command and control interface

Brochure

- [Il Secolo XIX \(1402.5 Kb\)](#)
- [Folaga \(1622.2 Kb\)](#)



Folaga AUV Gallery

