

# Undersea gliders: ready to rewrite marine paradigms

## Report from SOFI Workshop on Marine Gliders

held at Scottish Association for Marine Science, Oban, PA37 1QA  
11-12 January 2011

### Purpose of workshop

- to present and profile gliders to interested UK marine scientists who to date may not have considered using a glider, or who may not feel confident or know how to go about using one.
- to develop proposals for the best way forward to manage gliders in the UK

### Convenors

Gwyn. Griffiths *National Oceanography Centre*  
Karen Heywood *University of East Anglia*  
Toby Sherwin *Scottish Association for Marine Science*

### Summary of discussions and conclusions

Undersea gliders, remotely piloted from land, are sufficiently mature that marine scientists are making major advances to tackle the historic gross under sampling in space and time of ocean and coastal waters. Speakers described early successes with sustained observations by gliders, such as their replacement of moorings at the eastern end of the 26°N RAPID Watch array (NOC-S) and the winter occupation of the Ellett Line to complement summer ship borne surveys (SAMS). New insights into marine processes included the initiation of a phytoplankton bloom in the Ross Sea ice retreat (UEA) and upwelling on the Iberian margin (UEA). Gliders have facilitated ocean process studies including deep convection in the Mediterranean (NOC-S) and turbulence in the shallow high-energy environment of the Irish Sea (NOC-L). French colleagues described an international glider fleet in the Mediterranean that provides real time data for assimilation in a regional forecast model. These missions share the characteristic of maintaining persistent and mobile high frequency real-time 3D sampling - difficult to achieve with ships, satellites or moorings alone. Other speakers highlighted the unique capabilities of gliders (obtaining multi-disciplinary observations in strong winds and high sea states, close to the ocean-atmosphere boundary and close to or beneath ice) that complement those of the Argo float array, moorings and ship-based studies.

Speakers without glider experience were quick to see the potential for gliders to enhance their research. For example, with new algorithms running on the latest ultra-low power microprocessors it is now feasible to acoustically monitor the distribution of cetaceans from gliders (SMRU). The workshop gave attendees insights into the possible paradigm shifts in our understanding of ocean processes that gliders can offer. Future sensor developments, e.g. for pH, pCO<sub>2</sub>, phosphate and zooplankton will enhance their potential. The 2011 NERC glider-sensor AO should be well subscribed, lead to creative ideas and grow the user base.

Benefits have already arisen from cooperation amongst users of undersea gliders within and across borders in Europe. In the UK benefits have included assistance in trials, undertaking joint research and developing new sensors for gliders. In France formal collaborations between institutions already exist and are now being taken further in an EU Collaborative Proposal (GROOM, which has UK work package leaders) with a design study into how best to integrate glider fleets into the global ocean observing system.

The workshop discussed ways to establish a co-ordinated UK national framework that will avoid fragmentation or duplication of effort. Activities of this framework would:

- develop UK National Capability with sustained operations, glider pool and expertise.
- share operations; e.g. piloting gliders, base-station/web access, and data dissemination.
- maintain hardware, develop sensors, provide test facilities and training for pilots.
- be a focal point for inexperienced users, international co-operation, and glider promotion.

It would thus encourage all scientists to take advantage of this important new platform, and allow the UK to play a bigger role on the international stage.

For additional details and presentations, see

[www.sams.ac.uk/sams-news/events-sams/sams-sofi-glider-workshop](http://www.sams.ac.uk/sams-news/events-sams/sams-sofi-glider-workshop)

The workshop programme is given below at [Annex 1](#) and a participants list at [Annex 2](#). Note that the latter does not include those who watched the workshop via video streaming (and were able to interact in real time via email), nor members of the Rutgers University Coastal Ocean Observation Laboratory (RUCOOL) glider group with whom we linked via a Skype session.

## **Annex 1 Workshop programme**

Tuesday 11 January

09.00		Registration
09.30		Welcome
09.40		Introductions
	<i>Session 1</i>	<i>Chair: Gwyn Griffiths</i>
10.00 – 10.15	Estelle Dumont	What is a glider?
10.30 – 10.45	Phil Knight	Experiences of using shallow water Webb Slocum gliders
11.00	<i>coffee</i>	
11.30 – 11.45	Toby Sherwin	An operational mission by a seaglider in the Rockall Trough
12.00 – 12.15	Matthew Palmer	Pushing boundaries: measure temperature to turbulence using gliders in high energy, shallow environments
12.30 – 12.45	Jan Kaiser	The most dives ever; Seaglider observations in the Galician upwelling
13.00	<i>lunch</i>	
	<i>Session 2</i>	<i>Chair: Toby Sherwin</i>
14.00 – 14.15	Bastien Queste	Seaglider deployments in the Ross Sea: lessons learned and preliminary results
14.30 – 14.45	Gwyn Griffiths	Gliders and autonomous vehicles at the NOC
15.00 – 15.15	Pierre Testor	EGO
15.30	<i>tea</i>	
16.00 – 16.15	Cool Room	Web Link
16.30 – 16.45	Karen Heywood	Thoughts about present and future sensors on gliders
17.00 – 17.15	Alex Cunningham	Optical measurements from gliders: what can we expect to learn from pucks?
17.30	<i>Break</i>	
19.30	<i>Dinner</i>	<i>Waterfront Restaurant, Oban</i>

Wednesday 12 January

	<i>Session 3</i>	<i>Chair: Karen Heywood</i>
09.00 – 09.15	Christopher Brown	Effects of biofouling on optical measurements and flight behaviour of gliders
09.30 – 09.45	Douglas Gillespie	Glider use in passive acoustic monitoring for cetaceans
10.00 – 10.15	Rafael Perez-Dominguez	'Stealth' requirements of sonar tracking
10.30 – 10.45	Richard Bates	Small platforms for remote survey work
11.00	<i>coffee</i>	
11.30 – 11.45	Justin Buck	The Argo project
12.00 – 12.15	Laurent Mortier	Roadmap for a European glider component in the Ocean Observing Systems
12.30 – 12.45	Discussion	How does NERC view glider management developing in the UK?
13.00	<i>lunch</i>	
14.00	Discussion	How do we take things forward?
15.00	<i>Finish</i>	

## **Annex 2 Workshop participants**

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