Ocean Gliders: Autonomous Monitoring of the Marine Environment

6-10 February 2017
University of East Anglia, Norwich

Course Information

Overview

Marine autonomous vehicles are platforms that are deployed into the ocean in order to survey, monitor or explore the conditions in the marine environment, that have intelligent control systems allowing them to remain in the ocean for extended periods with relatively little human intervention. Such vehicles are already revolutionising marine science, allowing us to make measurements in places or conditions that were previously impossible. These vehicles require new expertise beyond the traditional skills of the observational oceanographer.

This 5-day intensive short course based at UEA will provide hands-on and practical experience with the latest marine technology, ocean gliders, and how to process and analyse glider data. Training outcomes include understanding of the strengths and weaknesses of different marine autonomous vehicles; knowledge of the payload these vehicles carry, how different sensors work and their limitations; and practical skills in glider handling, preparation for deployment and piloting. Training in ocean glider data analysis will highlight the potential pitfalls in taking glider data at face value, and identify the processing and quality control steps necessary to produce useful data for different applications. Teaching will be given by active researchers, scientists and engineers at UEA, BAS, Cefas, Kongsberg Maritime Ltd and MOST (AV) Ltd, who all work with gliders.

The course will be open to any NERC-facing early career scientist. The target audience are early career scientists who are not necessarily working with marine autonomous technology, but who might need to in the future, either in careers in industry or the public sector, or as part of their research. Some basic computing experience in displaying scientific data will be helpful.

Topics

Basic Principles
Why monitor the ocean?
Understanding buoyancy
How do ocean gliders work?
Glider mission design
Glider piloting

Sensors and Science
Temperature, salinity & dissolved oxygen from gliders
Measuring marine noise
Ocean microstructure from gliders
Chlorophyll and phytoplankton
Measuring zooplankton from gliders
New/future glider sensors; pH, p(CO₂) and nutrients
Glider deployments at Rothera
Different Platforms
Wavegliders
Slocum glider
Autonaut
Future Seaglider developments

Data Processing
Glider data processing & toolbox
Glider data analysis workshops – processing and scientific analysis of datasets from past UEA missions for presentations on the last day of the course

Practical sessions
Glider piloting in tank; challenge to fly flat and level
Hands-on glider maintenance and ballasting

Instructor Biographies

Professor Karen Heywood
Karen has been a physical oceanographer for longer than she cares to remember, and is particularly interested in observing processes in the polar oceans. She is a glider enthusiast. She has supervised more than 25 PhD students, of whom she is very proud. When not doing research, she teaches oceanography and physics to undergraduate students at UEA.

Dr Rob Hall
Rob is a lecturer and researcher in shelf sea and shelf edge physical oceanography. He has a specific interest in internal waves and internal tides, their interactions with complex topography such as submarine canyons, and their effect on turbulent mixing, biogeochemical fluxes, and primary productivity. He uses Seagliders to measure internal waves and also the turbulent mixing that results from their breaking (the waves not the Seagliders!).

Dr Carol Robinson
Carol’s research focuses on the role of bacteria, phytoplankton and zooplankton in the cycling of oxygen and carbon dioxide in the marine environment, and how this varies in space and time and with changing environmental conditions such as increasing organic and inorganic nutrient supply, temperature and CO₂ and decreasing O₂. Recent projects have included the impact of coastal upwelling on the air-sea exchange of climate relevant gases, the linkage between plankton community structure and the N Atlantic carbon sink, factors controlling the utilisation of dissolved organic material by bacteria, and the cycling and storage of carbon by zooplankton respiration and faecal pellet production in the Antarctic. Carol teaches on undergraduate modules in marine biogeochemistry, biological oceanography, marine carbon cycling and climate change, biodiversity and sustainability and the marine sciences fieldcourse. Her research group includes 3 PhD students and a postdoctoral researcher.

Dr Hugh Venables
Hugh works at the British Antarctic Survey and has successfully deployed Slocum gliders on the west Antarctic Peninsula since 2012 to expand the physical and biological sampling of the Rothera Time Series. The missions have revealed close links between the bathymetry and the distribution and mixing of warm waters at depth, with impacts for glacier melting and benthic biodiversity. Collaboration with the manufacturers has improved the ability of the gliders to cope with sea ice and icebergs.
Registration

To register for this course, please complete the registration form and return it to g.damerell@uea.ac.uk by midnight on Friday 28th October 2016. You will be informed by mid-November whether your application was successful.

Fees and Funding

Bursaries are available for up to 20 applicants, covering the course fee, 5 nights' accommodation, subsistence, and reasonable travel costs to UEA from within the UK. Priority for bursaries will be given to current PhD students and early career researchers with at least 50% NERC funding, though some may be available to students/researchers based in the UK who are not funded by NERC.

For applicants who do not receive a bursary (including overseas students/researchers), the cost is £1,000 including course fee, accommodation and subsistence, but not including travel to UEA.