

## FACILITY 4: Australian National Facility for Ocean Gliders (ANFOG)

Narrow, highly dynamic and fast flowing currents on the western boundary of ocean basins have long been a challenge to observe. Australia is encased by strong current systems, and is unique in having two narrow poleward flowing boundary currents. The Leeuwin Current off Western Australia, and the East Australian Current which forms the western boundary current of the South Pacific.

Gliders are new autonomous technology designed to primarily measure shelf and boundary currents. Following the success of automated technologies in the Argo float program, the ocean gliders take things a step further, as they move horizontally while taking the profile, and can be piloted by someone on shore.

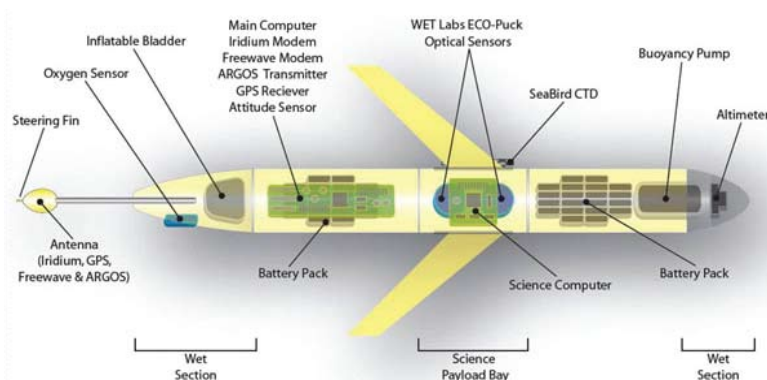


Figure 1. Inside a Slocum Glider.

### Glider instruments

The glider is similar to the Argo float, and is designed to deliver ocean profile data. In addition, the wings on the side allow it to move laterally through the water while profiling up or down, and the dive angle is determined by the battery pack position which can shift front to back as well as left to right.

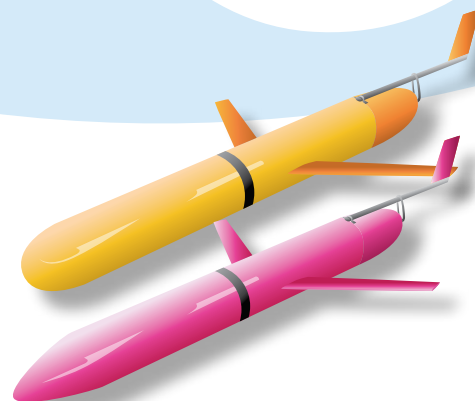
The glider is navigated by giving it waypoints. This is not as easy as it

sounds, as changes in background current have to be accounted for and waypoints modified regularly. This can mean recalculating the waypoints every few hours in strong currents.

Two types of gliders are used as part of the IMOS program. Slocum gliders are used in intensive coastal monitoring, while Seagliders are used to gather long-term environmental records.

The Slocum glider, built by Webb Research, is designed for coastal waters (less than 200 m deep) where high maneuverability is needed. The Seagliders are built by the University of Washington and are designed to operate in the open ocean to up to 1,000 m deep.

The sensor packs differ slightly for the two platforms. Currently, IMOS Slocum gliders are instrumented



with a Seabird-CTD, WETLabs BBFL2SLO 3 parameter optical sensor (measuring chlorophyll-a, CDOM and 660 nm Backscatter) and an Aanderaa Oxygen optode. IMOS Seagliders are equipped with a Seabird-CTD, WETLabs BBFL2VMT 3 parameter optical sensor (measuring chlorophyll-a, CDOM and 660 nm Backscatter) and a Seabird Oxygen sensor.

The instrument payload can be changed according to specific mission needs. Sensors such as an Acoustic Doppler Current Meter for measuring currents is also an optional add on.

### Glider data

Core data streams are temperature, salinity, fluorescence, oxygen, turbidity and surface currents, which are collected as the glider does a purpose like motion through the water. A subset of this data is transmitted during the mission, while the rest is downloaded once the glider is retrieved.



Figure 2. Inside a Seaglider.

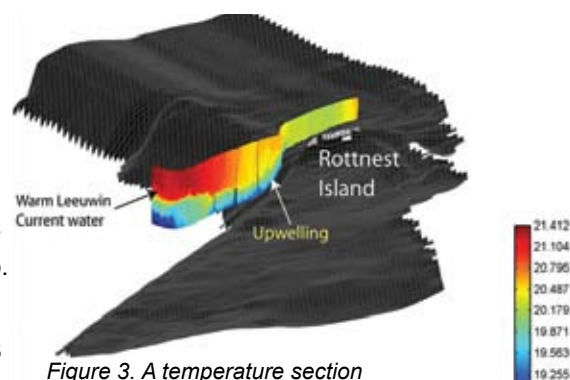


Figure 3. A temperature section offshore from Rottnest Island.

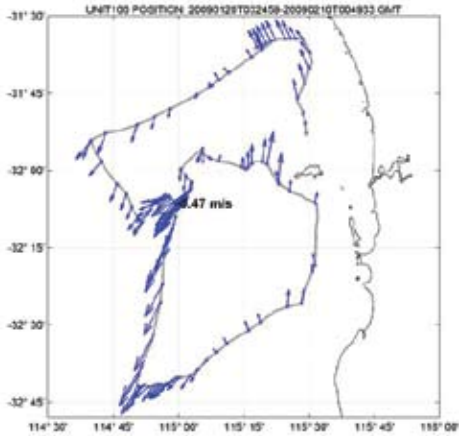


Figure 4. A glider track off Rottnest Island, with the currents measured by the glider marked.

### Applications of data

Effective measurement of boundary currents has long been a challenge in ocean observations. Western boundary currents, in particular, are narrow, eddy rich, non-linear systems which vary on short spatial scales and all timescales. Gliders may provide the first opportunity to effectively measure boundary currents, which are the main link between open ocean and coastal ocean processes.

Satellite ocean colour observations provided the first snapshot of chlorophyll concentrations in surface waters. Gliders now provide the first autonomous measurements of how the concentration of chlorophyll varies with depth.

### Focus and priorities

The use of Gliders in the boundary currents around Australia will be key to achieving IMOS's aim to observe the interaction of boundary currents with shelf processes. These include the East Australian Current on the East Coast and the Leeuwin/Flinders Current system on the west and south coasts.

### Partner

- University of Western Australia

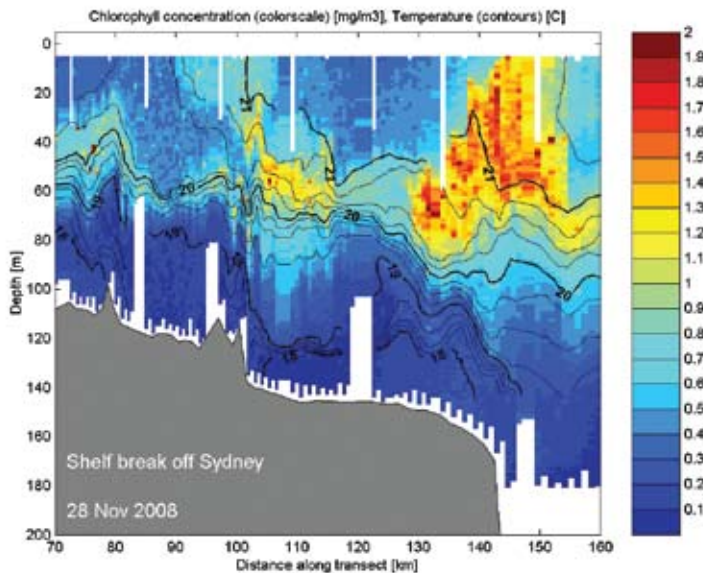
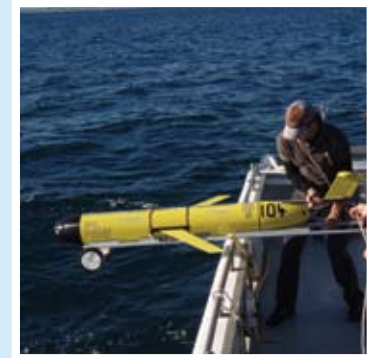


Figure 5. A section off Sydney showing the relationship between vertical temperature structure and chlorophyll (Phytoplankton) concentration.



www.imos.org.au



### More information

IMOS Australian National Facility for Ocean Gliders  
<http://imos.org.au/anfog.html>

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