Glider Facilities and Technology in Cyprus

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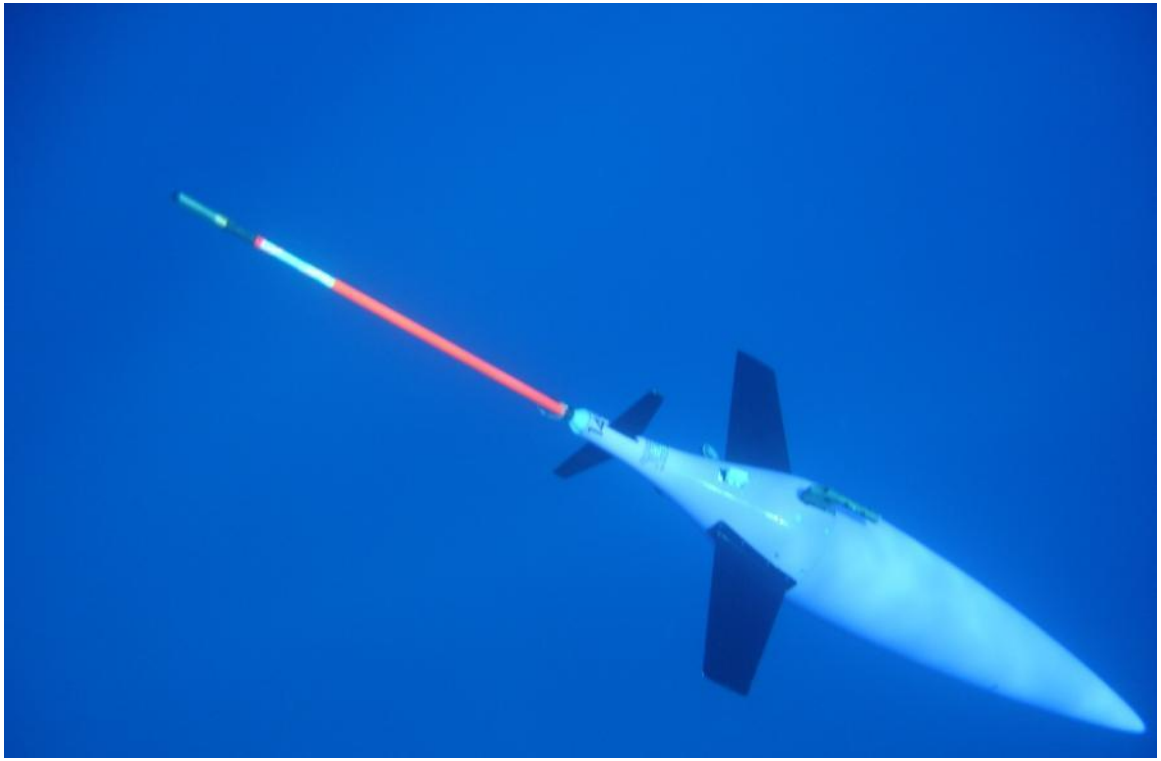
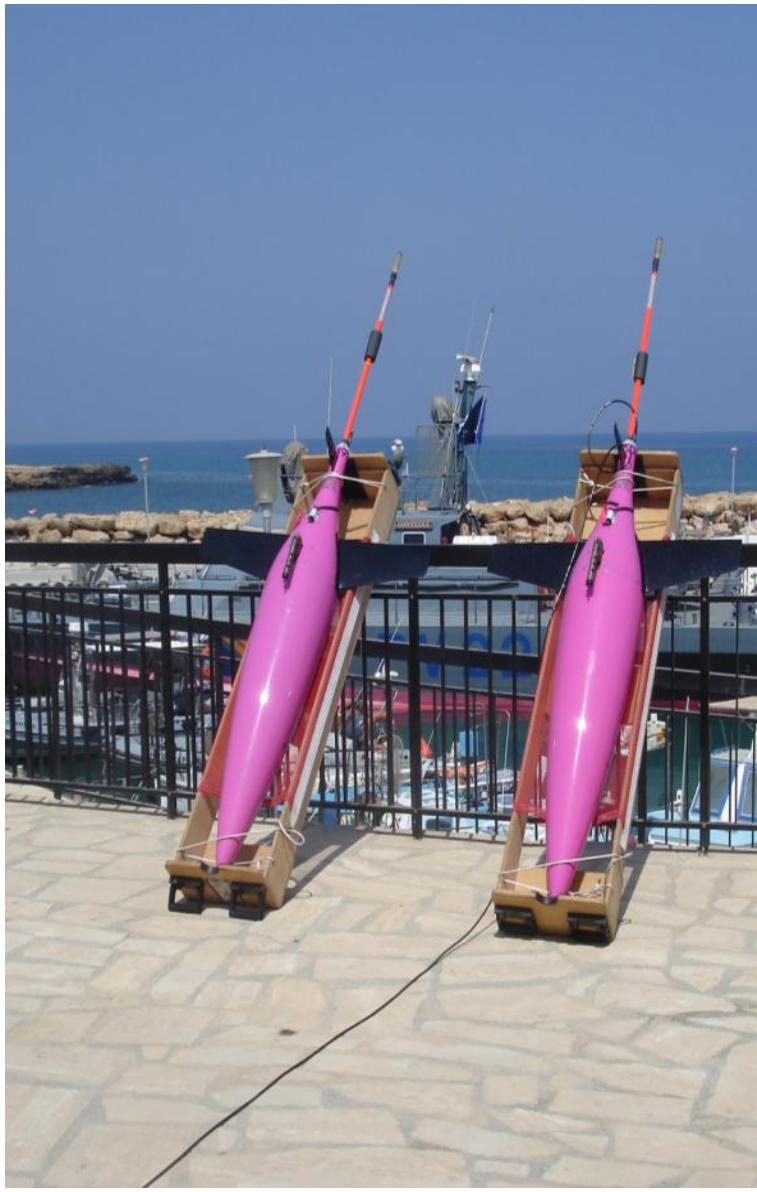


Outline

- **Review of Cyprus Infrastructure**
  - Gliders/Sensors and Oceanography in Cyprus (payload assessment)
  - Workshop Facilities
  - Ground Segment: Computer
  - Seagoing facilities (ships, access)
  - Achievements/plans
- **Present/future needs for gliders in Europe**
  - Scientific challenges: global change (T, S. CO2)
  - Environmental challenges: Marine Strategy Framework Directive
- **Best practices in glider operations**
  - Sensor calibration and inter-calibration for glider fleets (example)
- **Recommendations for glider contributions to Coastal Observatory**
  - Inter-calibration and inter-comparison (existing and new sensors)
  - Establishment of long-term monitoring missions
  - Society: global change, pollution, emergency response

Motivation

- ***Operational Oceanography***: NRT observations and forecasting
- ***Applied***: improved forecasting and monitoring means a cleaner, safer sea (pollution and trajectory modeling, data for regulatory agencies)
- ***Basic***: circulation, mesoscale variability, biogeochemical processes
- Regarding capability and cost ***gliders are most effective***: infrastructure grant from national funding body



Seaglider/sensor description (I)

- Low-drag fairing over hull of compressibility ~= seawater
- Lithium batteries, ~6 mo life (4600 km or 650 dives to 1km)
- Iridium satellite phone for data, instruction transfer
- Controlled with file exchange (commands, waypoints, config)
- CTD (unpumped)
- Dissolved oxygen (unpumped SBE)
- Chlorophyll fluorescence, optical backscatter (470 nm, 700 nm)
- Dive-average currents
- 1000 m dive capability, 5-7h dive/climb cycle

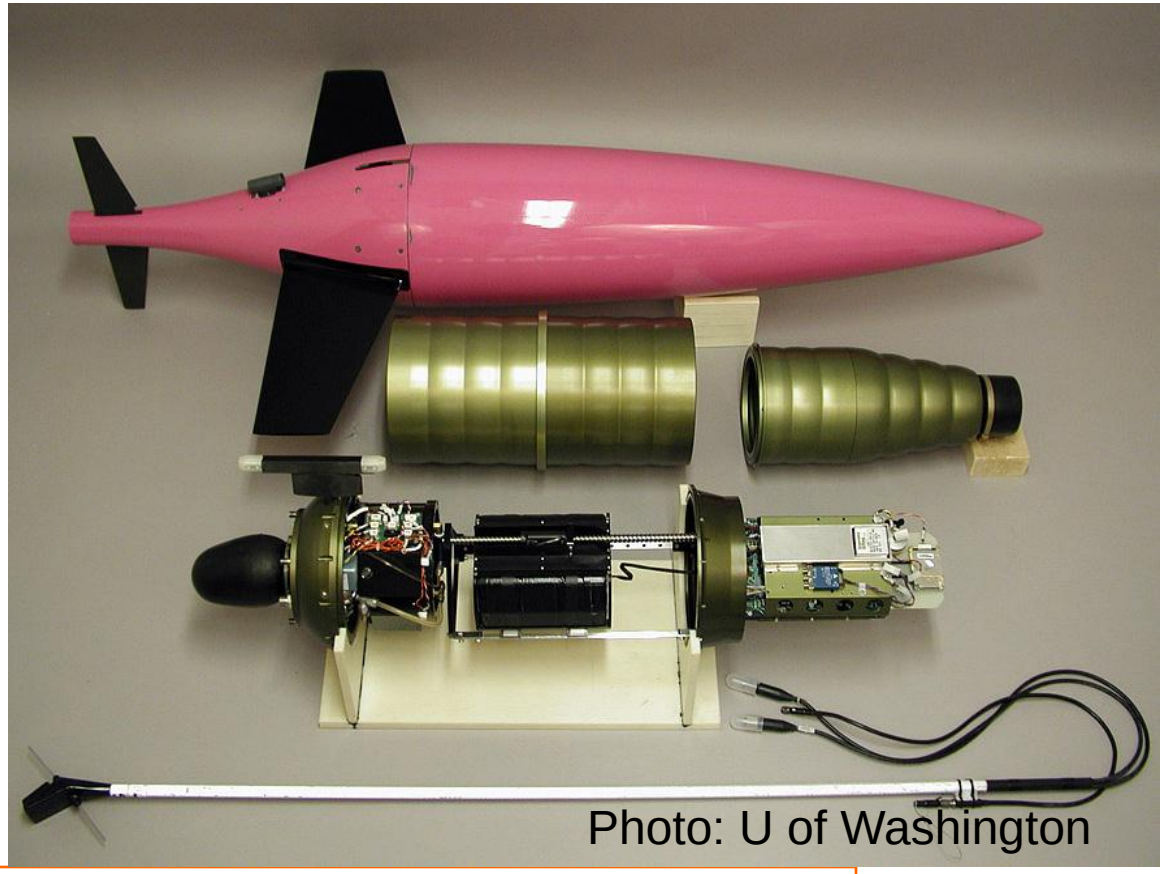
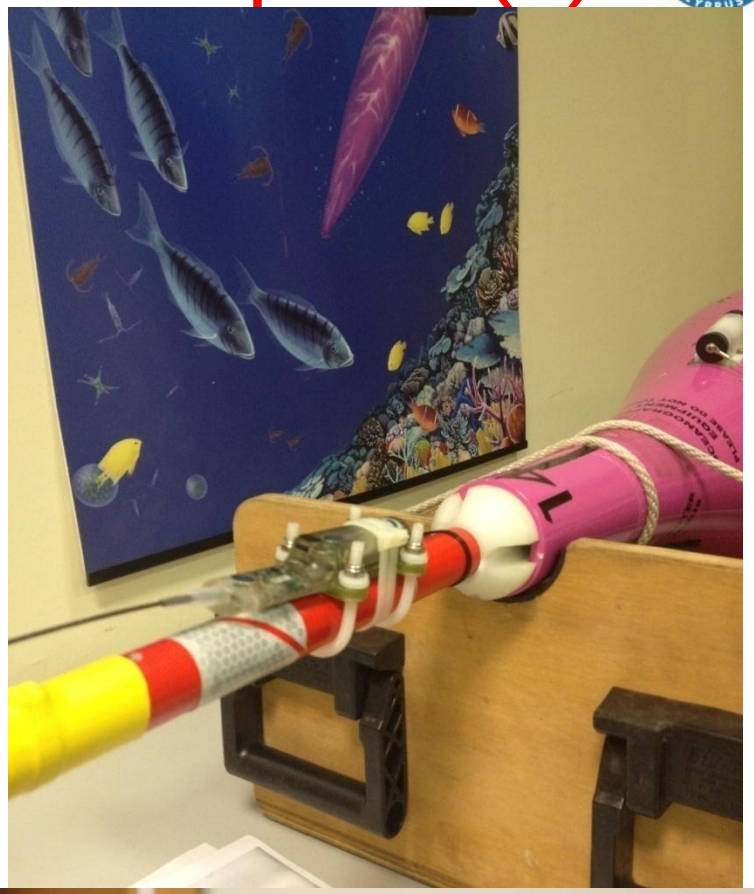
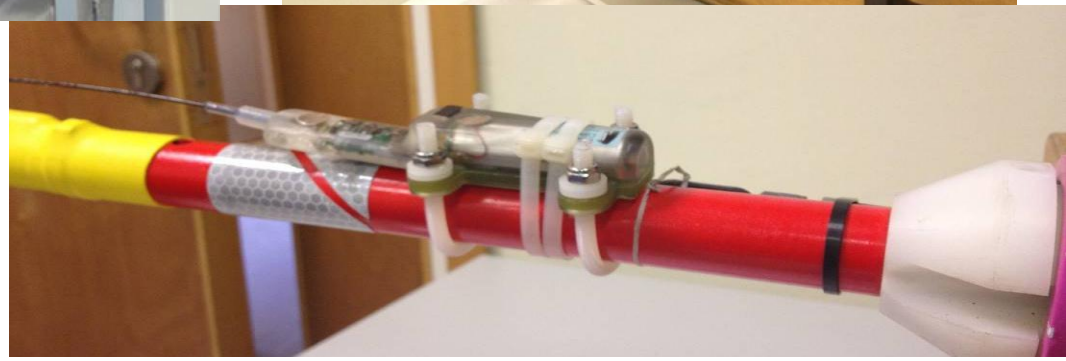


Photo: U of Washington

Seaglider/sensor description (2)

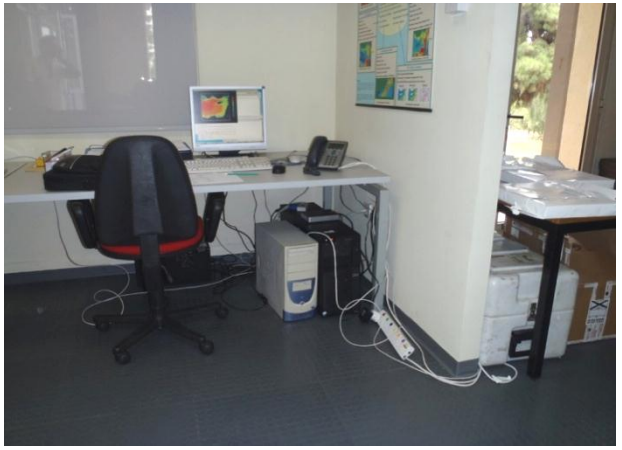
- Acoustic Transponder for recovery
- New: ARGOS beacons
- New sensors: dissolved methane and pCO2





Workshop Facilities

- One small lab with tables, basic tools, access to open sky



Workshop Facilities

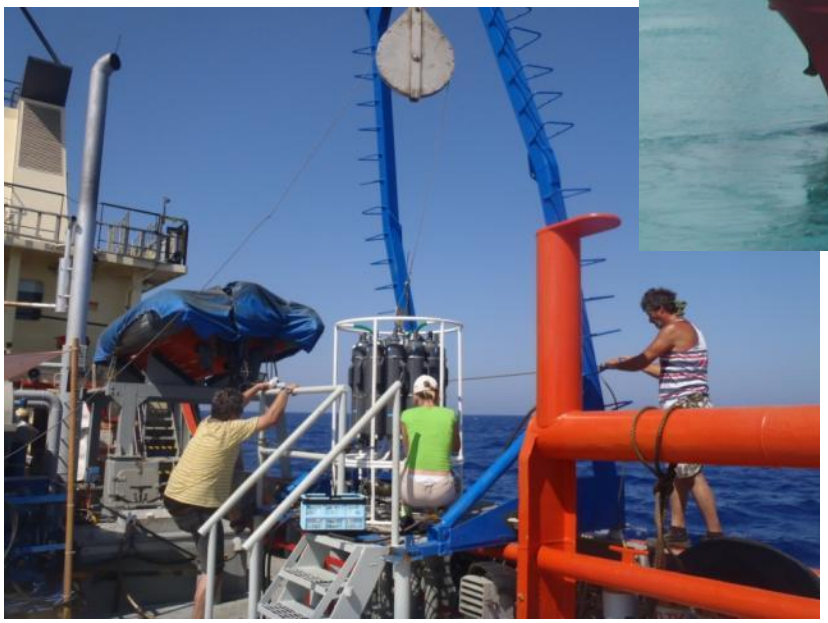
- IBM x3400 server (dual power, UPS) basestation
  - Fedora 7, 64 bit, latest basestation package
  - RUDICS recently installed, backup modem
  - Matlab scheduled scripts for visualization
  - Updates shared folder
- Field laptop
- Benthos acoustic transponder
- NO on site calibration for T, C, compass
- NO pressure testing
- NO battery change possible

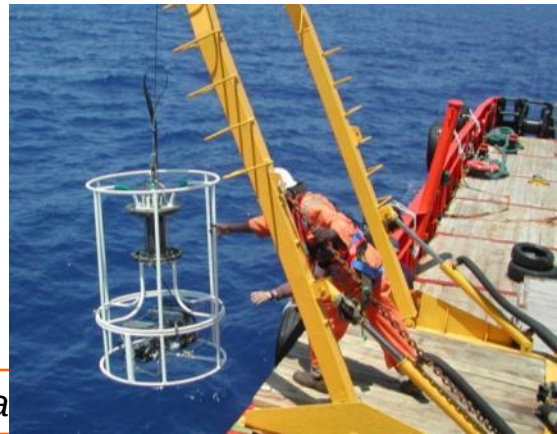
Ship Facilities

- Agreement for support from Department of Fisheries and Marine Research (inflatable or small yacht)

Ship Facilities

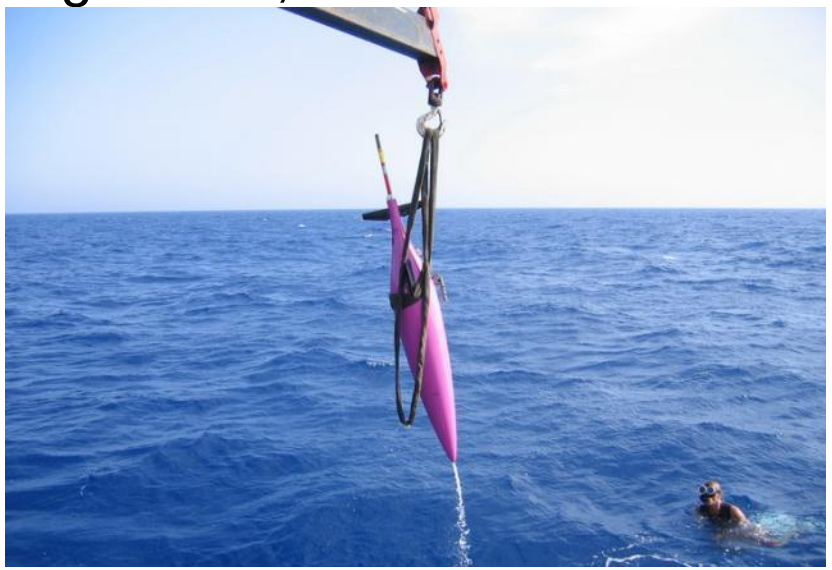
- Rent large vessels for “yearly” cruise (for T, S, oxygen) since 1995
- Can add fluorometer, water samples for lab analysis of oxygen, chlorophyll, nutrients
- Yet to deploy/recover glider

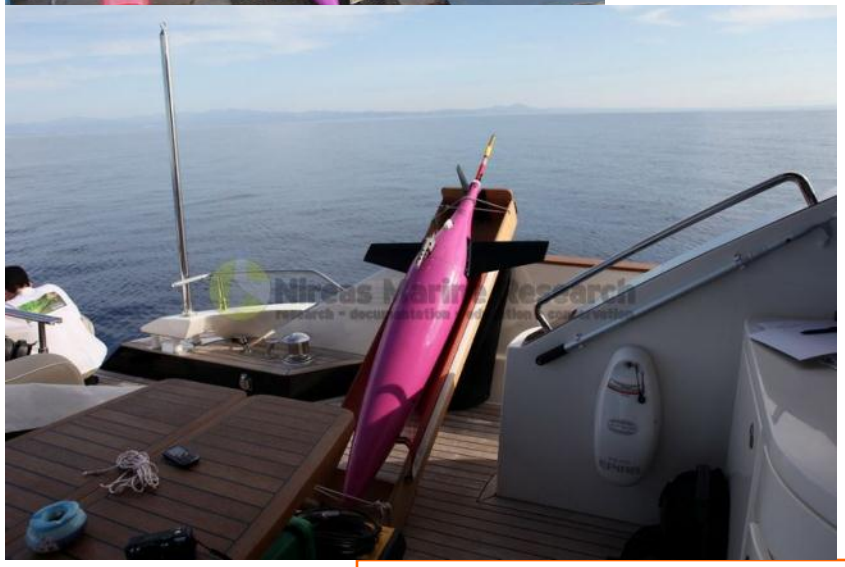




Ship Facilities

- MOU with NGO for sailing vessel, or another rental





Personnel

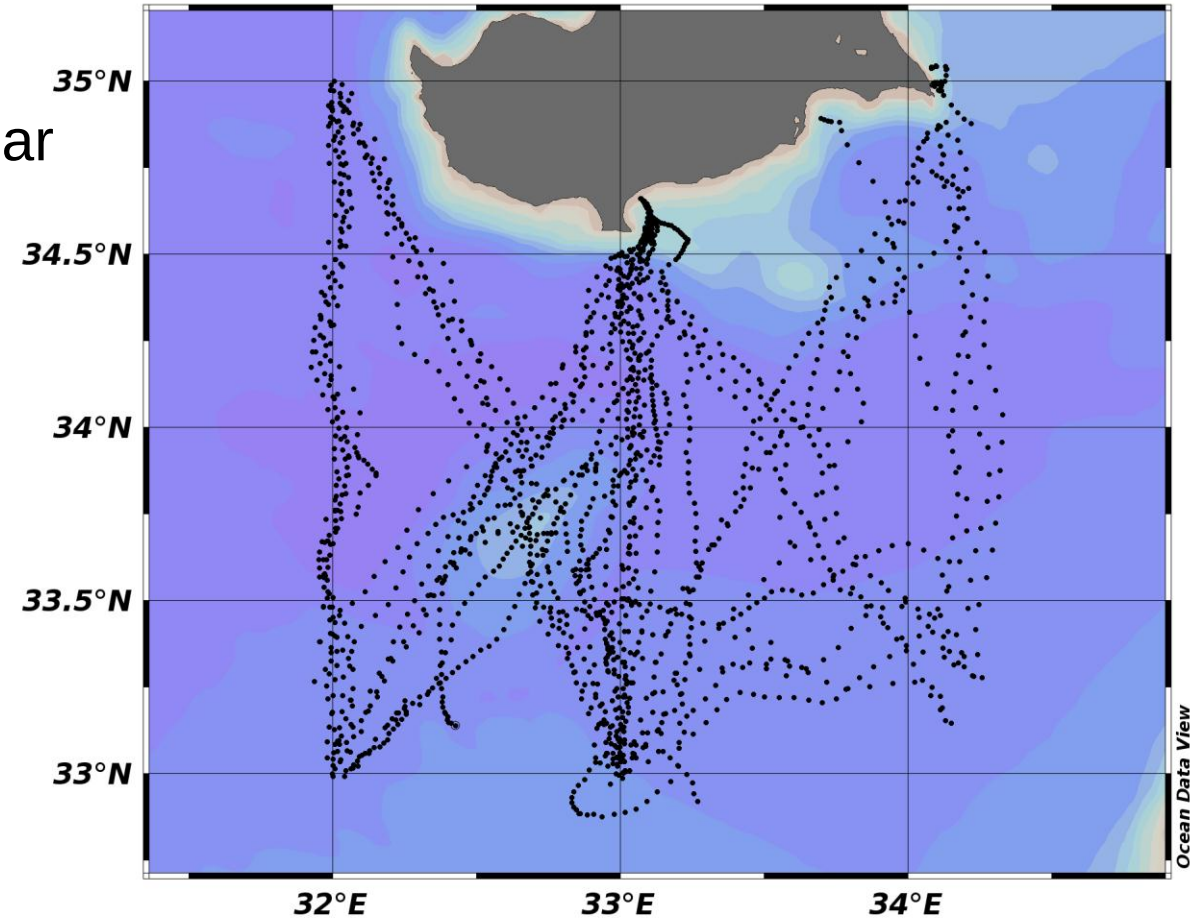
- PI, 1 technician, 2 part-time IT/web/programming support
- Small zodiac has crew from Department of Fisheries and Marine Research
- Search and Rescue and Marine Police

Problems faced

- Shipping nightmares
- Glider malfunctions
- Iridium reliability poor—ARGOS for redundancy, RUDICS for reliability, now OK.

What has been achieved?

- 2 gliders received July 2008
- From July 2008-March 2009, glider/pilot/basestation trials
- From March 2009-present, 5 missions > 1 month (1957 dives, most to 1000 m)
- 4 missions ended near catastrophically
- helicopter recovery, Marine Police, emergency rental, Israeli fisherman



Future Plans

- Continue lines, in cooperation with hydrographic cruises whenever possible (CYBO)
- Validate oxygen, chlorophyll and suspended matter with traditional methods for our region
- Extend lines or join with lines to neighboring countries
- Supplement the gliders with new types of sensors.
- Continue data assimilation in Cyprus regional operational model.
- In-depth analysis of the Cyprus Eddy