Seagliders in the Eastern Mediterranean: Trials

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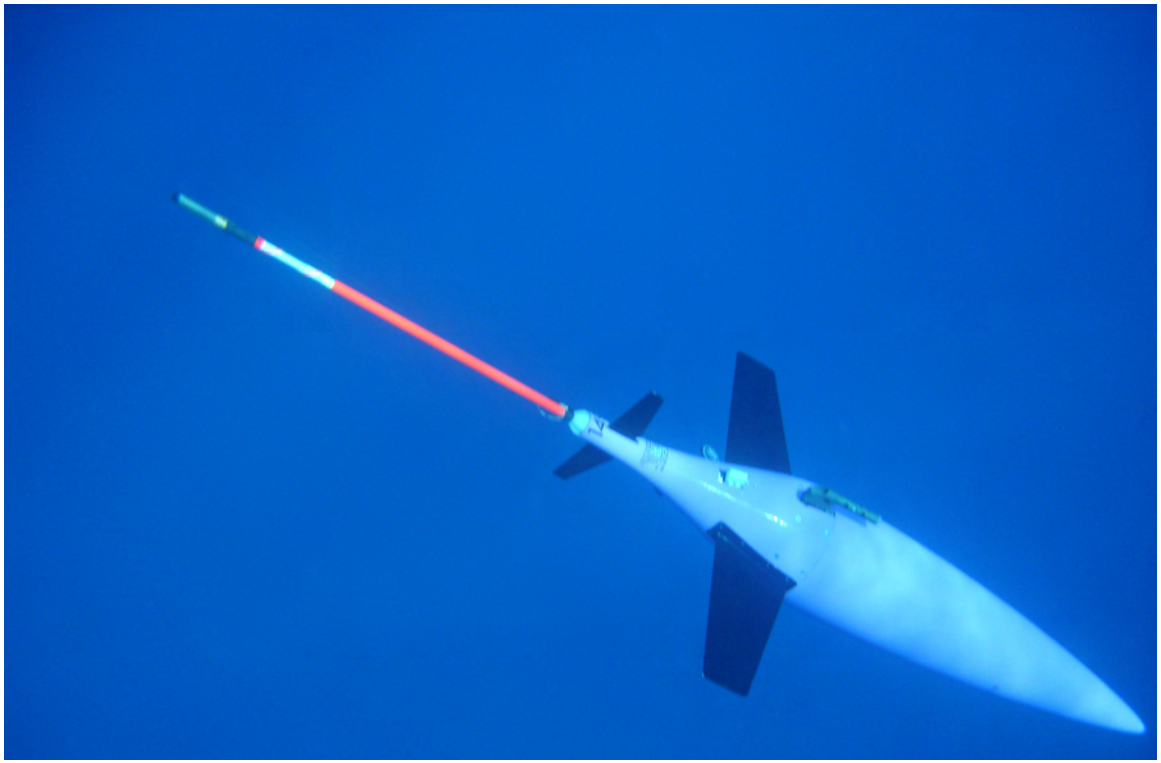

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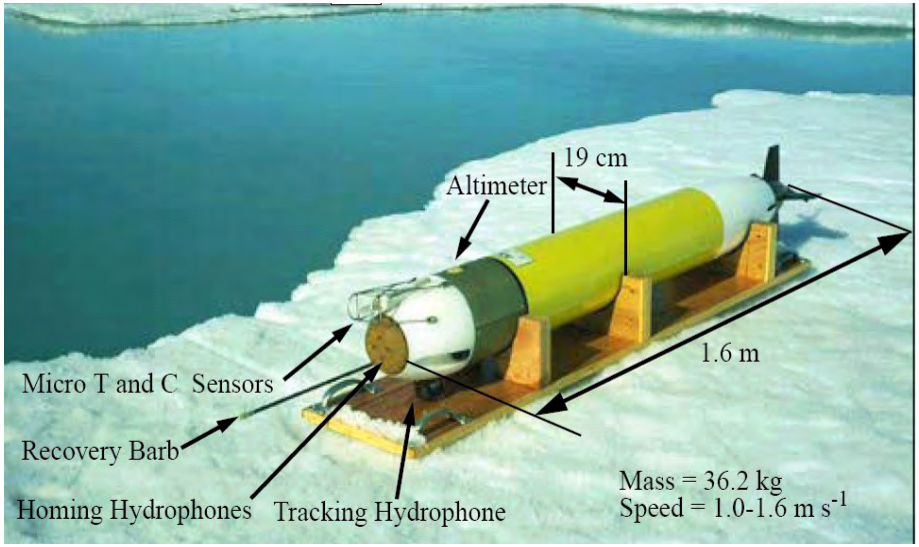
2. Dept. of Fisheries and Marine Research, Ministry of Agriculture
3. LOCEAN-IPSL, Univ. of Pierre and Marie Curie
4. IFREMER, LPO, Brest

Outline

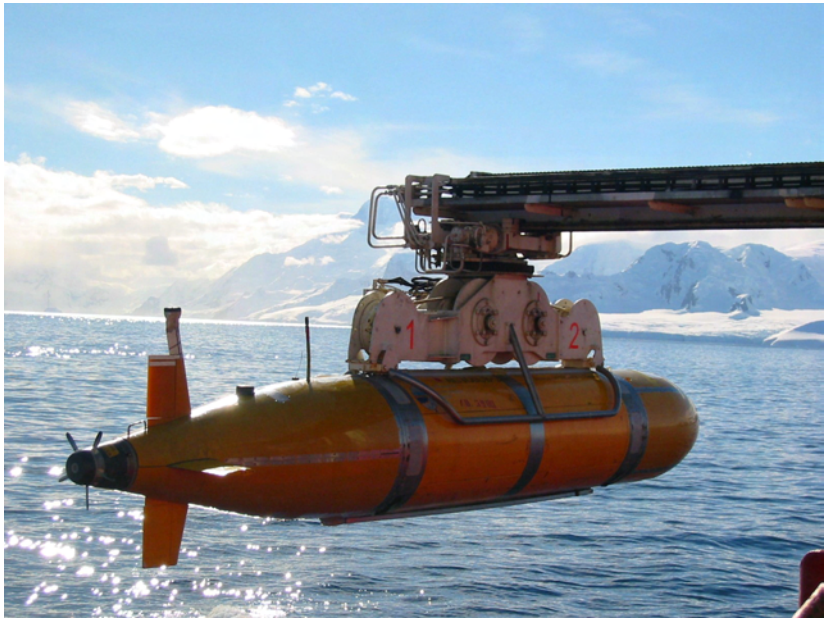
- Gliders and Oceanography in Cyprus
  - Project plans and status
  - Trials: lessons and results

My AUV experience



AMTV

-Measured mixing under Arctic sea ice



AUTOSUB

-Measured waves travelling through Antarctic sea ice

Motivation

- Operational Oceanography: Near real time observations and forecasting
- Basic: research questions about circulation, mesoscale variability, biogeochemical processes
- Applied: improved forecasting and monitoring means a cleaner, safer sea (pollution and trajectory modeling, data for regulatory agencies)
- The best way forward considering capability and cost is gliders: infrastructure grant from national funding body

Glider description

Seaglider

- Battery-powered, buoyancy-driven
- 25-50 cm/s, 16-45^{o} slope
- T,C,p,O2,FI,OBS,currents
- surface transmit/receive for data and instructions every few hours.
- 1000 m dive capability

Photo: A. Hannides

Seaglider description

- 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, configuration)

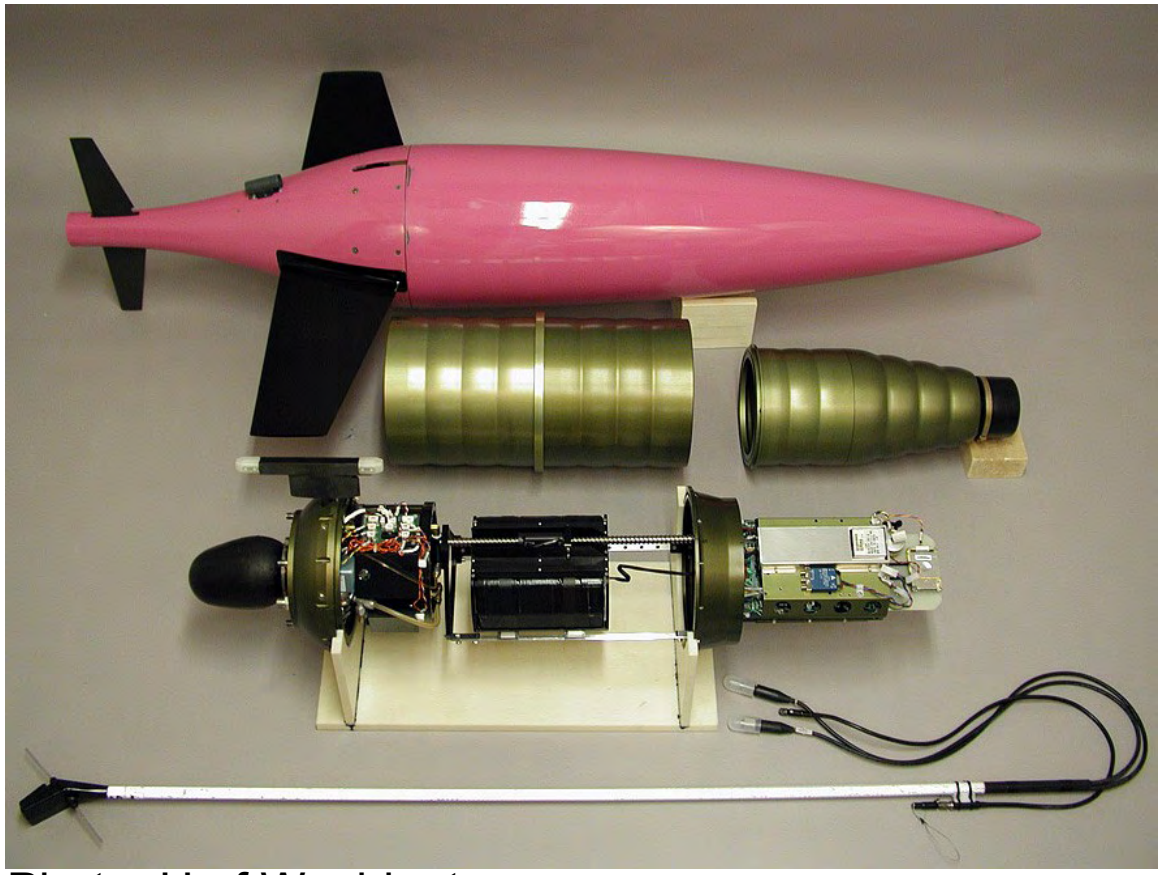
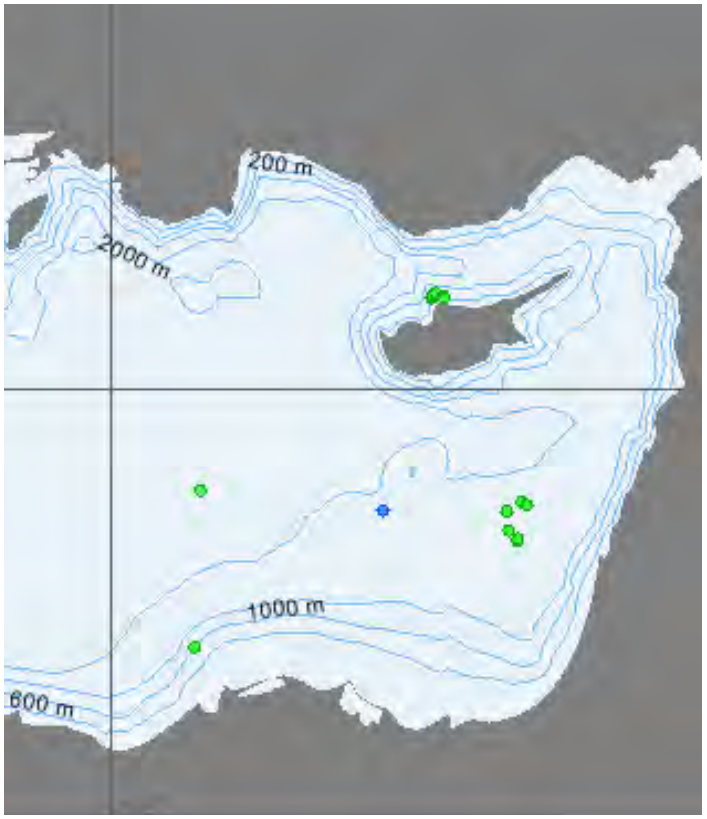


Photo: U of Washington

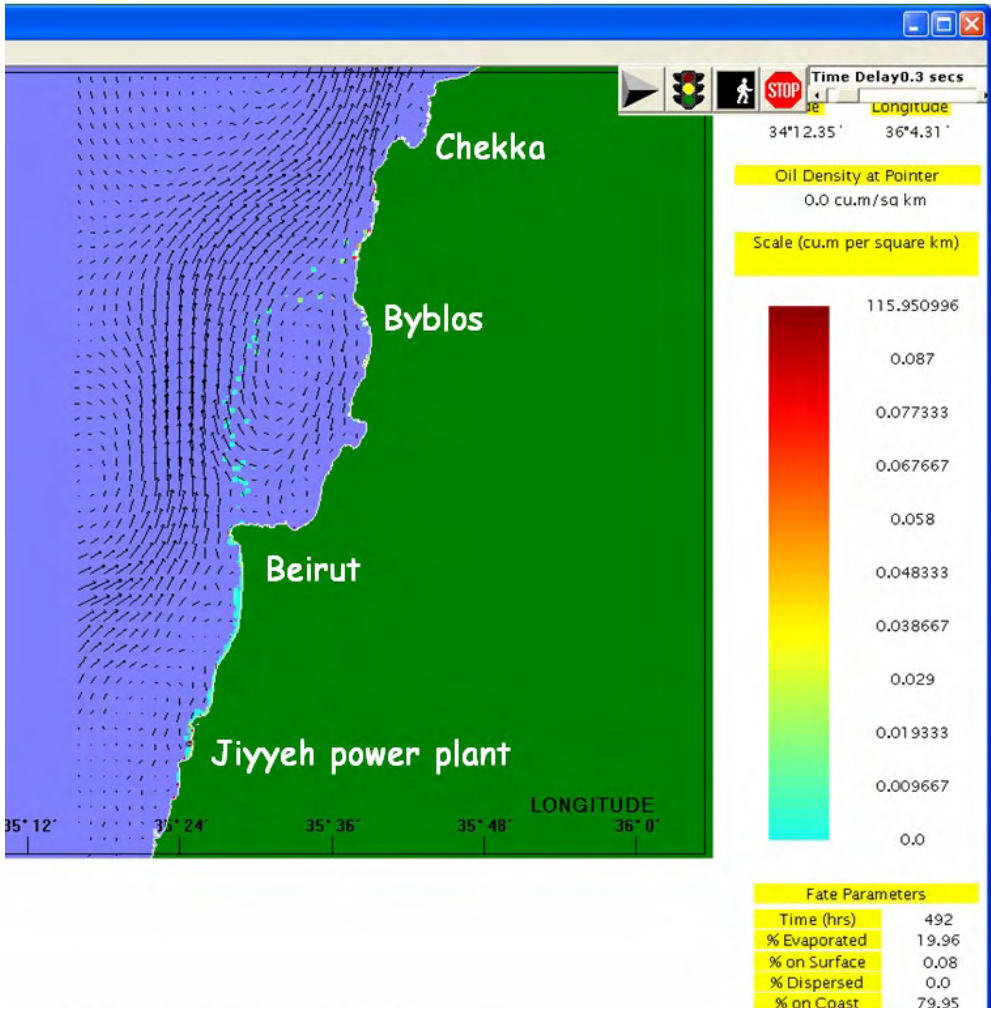
Operational Use / Near Real Time

- Near real time subsurface data is sparse.
- 15 Argo float cycles and 1 XBT, 2 drifting buoys in the last 30 days east of 30°E.
- Not under user control
- Do not constrain meso-scale fields (10-50 km size features)



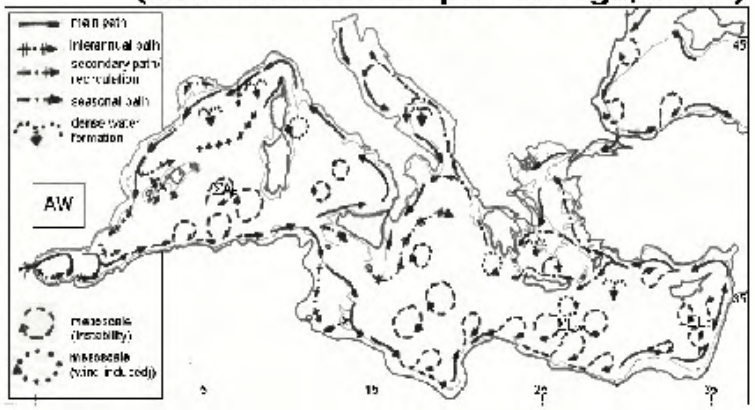
Operational Use / Near Real Time

- Support operational forecasts:
  - Data assimilation
  - Drive drift models, oil spill fate models
  - Support search and rescue operations, coastal management
- Environmental monitoring: Inform authorities, business, and public



Why do we want glider data? Basic Research

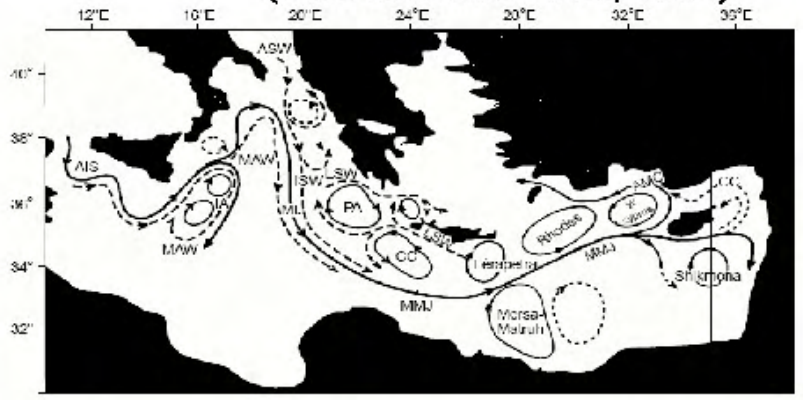
(from Millot *et* Taupier-Letage, 2005)



- High resolution data are hard to find.
- Costs of traditional methods large.
- Maps with arrows are still debated.

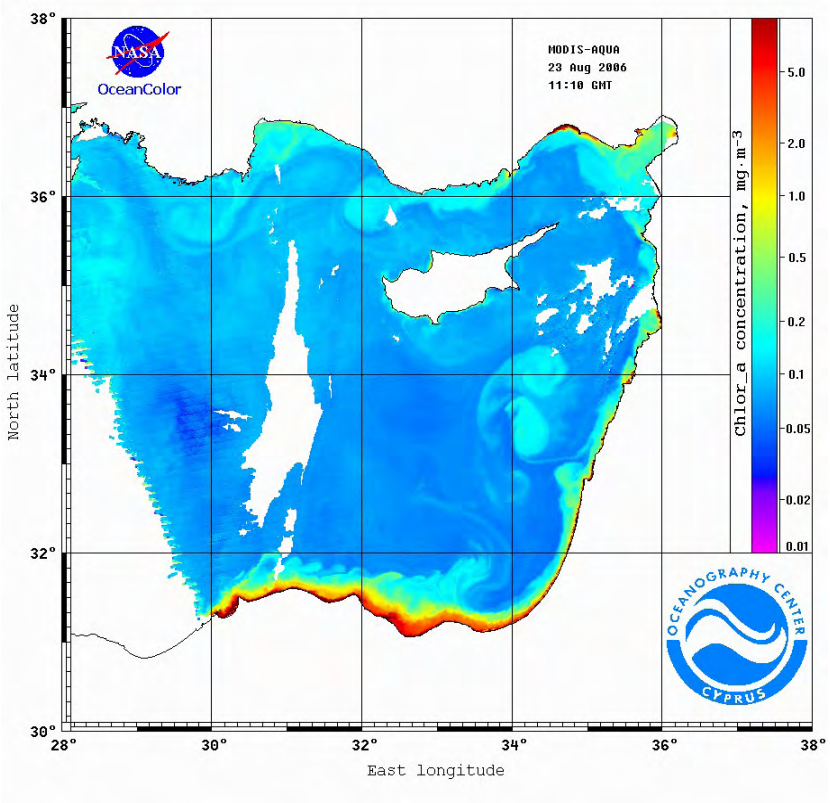
(from Pinardi *et al.*, 2004)

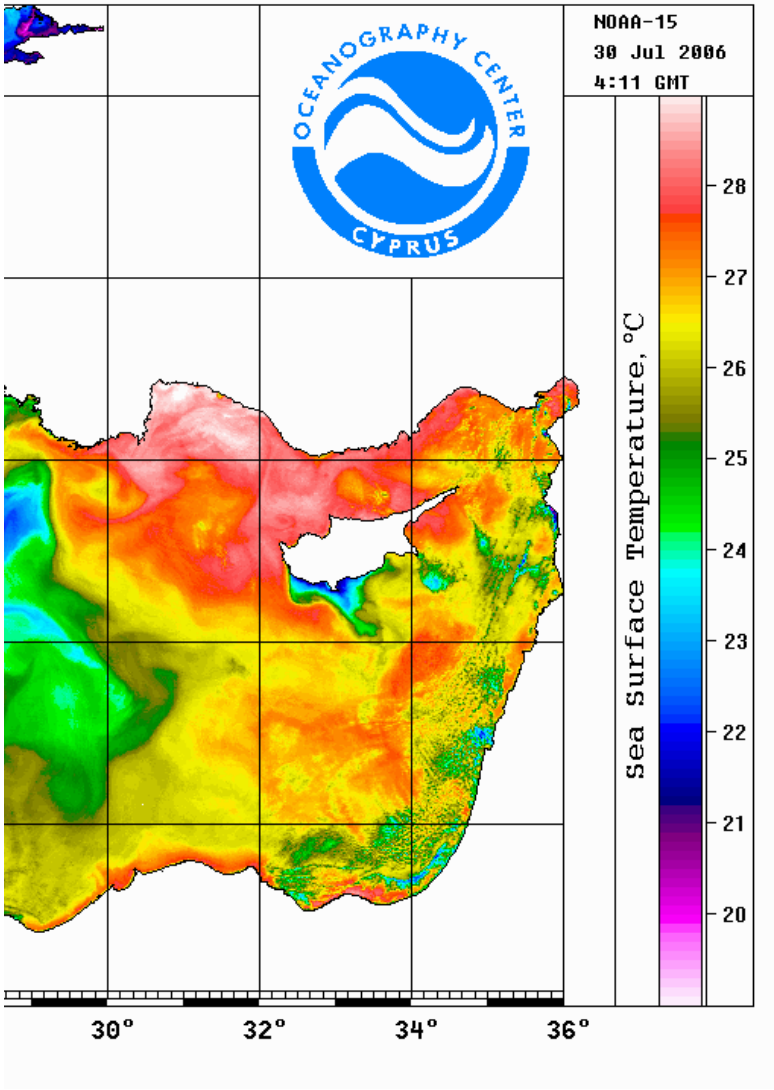
(from Robinson *et al.*, 1992)



Why do we want glider data?
Basic Research

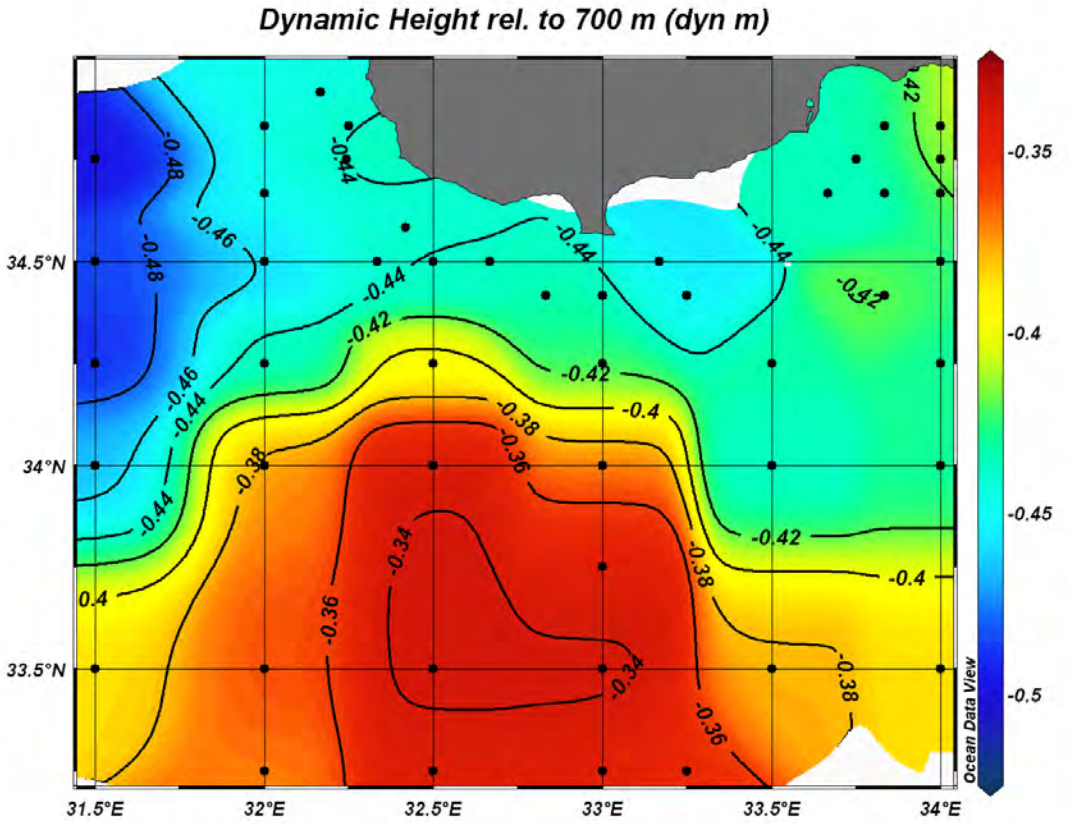
- General circulation and thermohaline structure.
- Mesoscale structure and variability.
- Long-term monitoring.





Hydrographic cruises

- CYBO-19, Sep. 2005
- 4 Water masses
- Atlantic water debated
- What is persistence or recurrence of features?
- Small-scale features?
- Coastal phenomena?



What is planned?

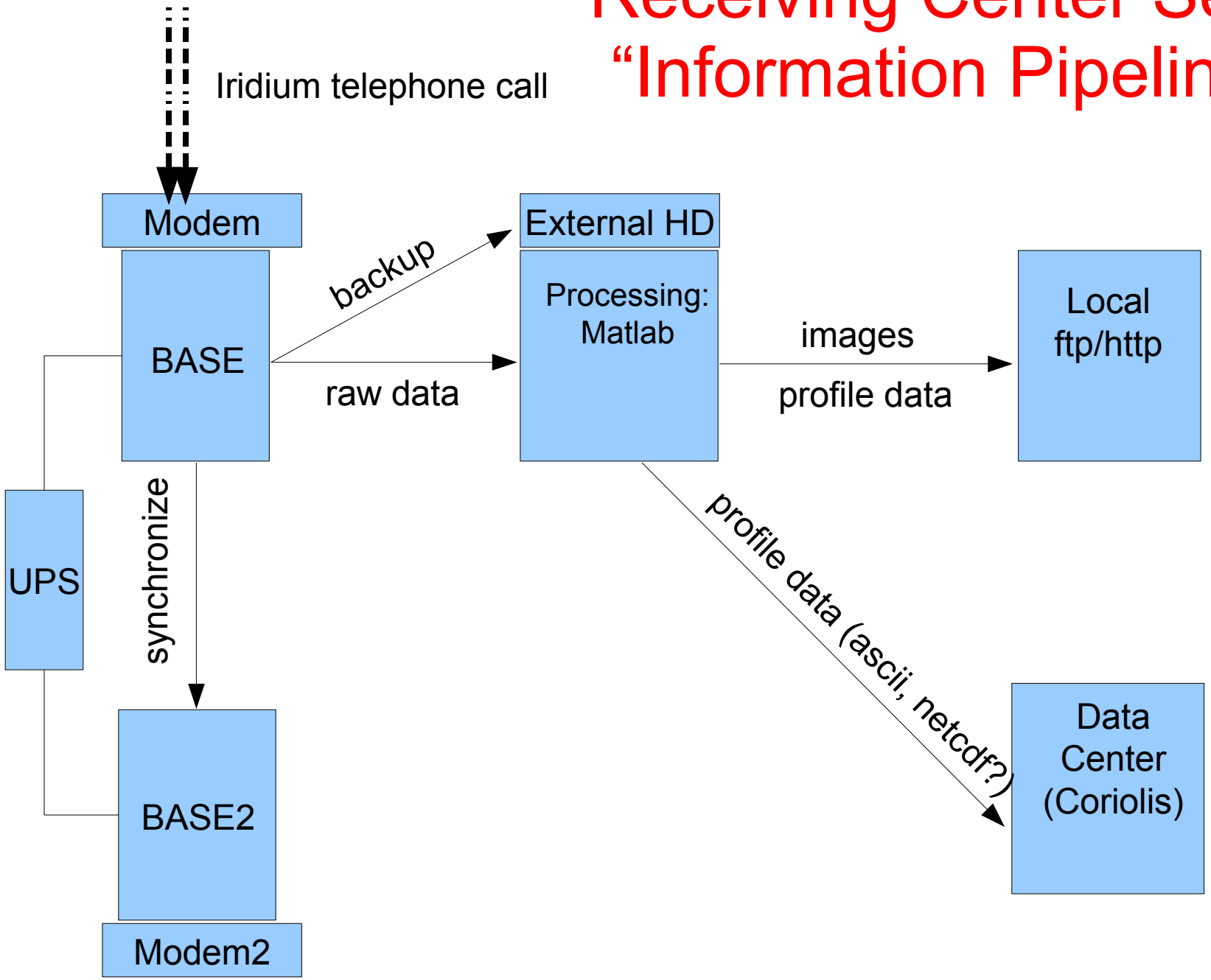
- 2 gliders
- 4 years of 3-month missions, 2000 km, 1000 m depth cycle every 5 km.
- Process studies and near coastal monitoring
- During down times and after project, will be available for other projects.

Glider Trials

- Try your patience (tenders, shipping)
- Try your computer infrastructure and administration skills.
- Try your piloting skills.
- Try your glider.

Photos: P. Testor, D. Hayes

Receiving Center Set-up
"Information Pipelines"

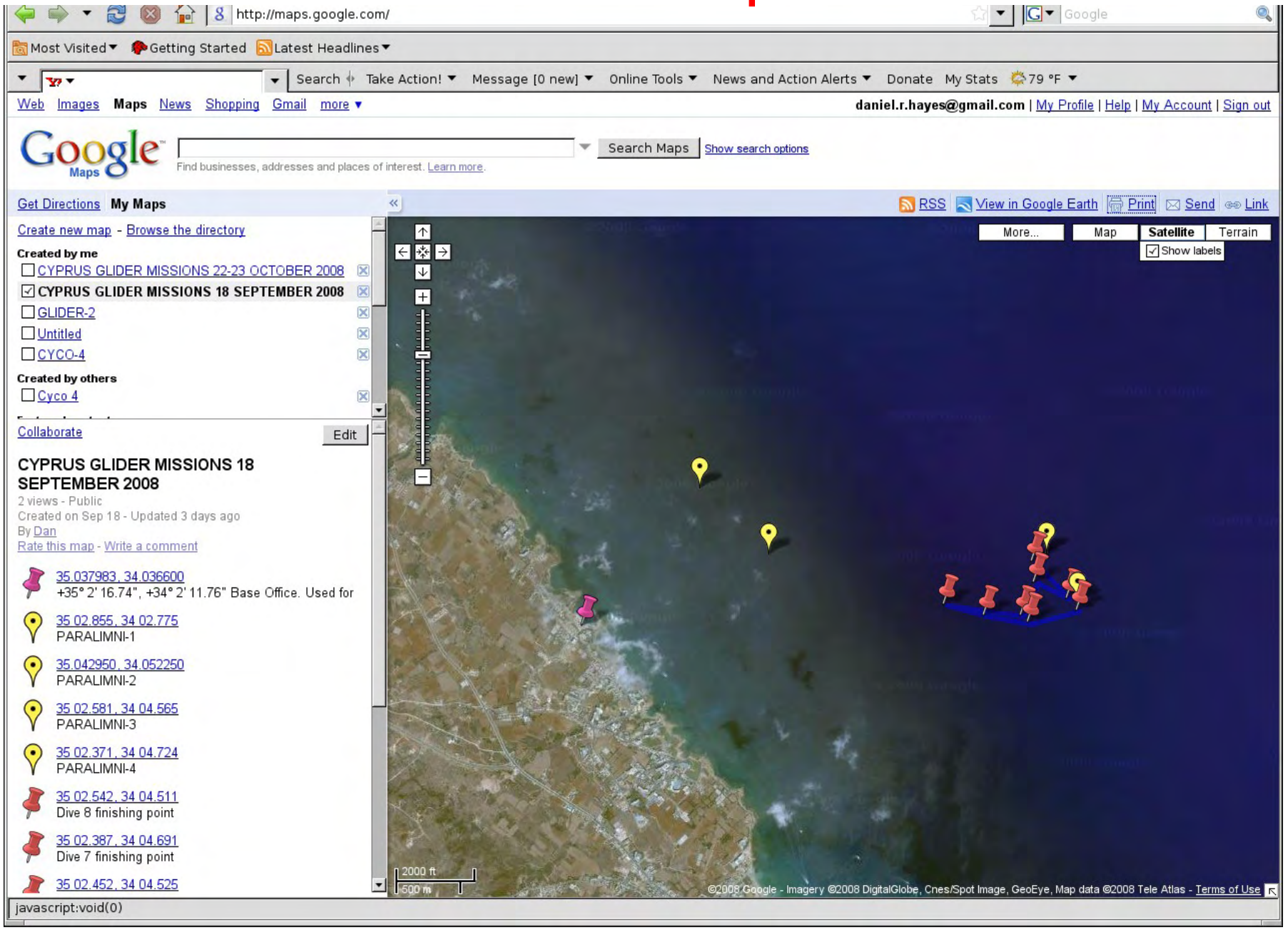


Sea Trials Set-up

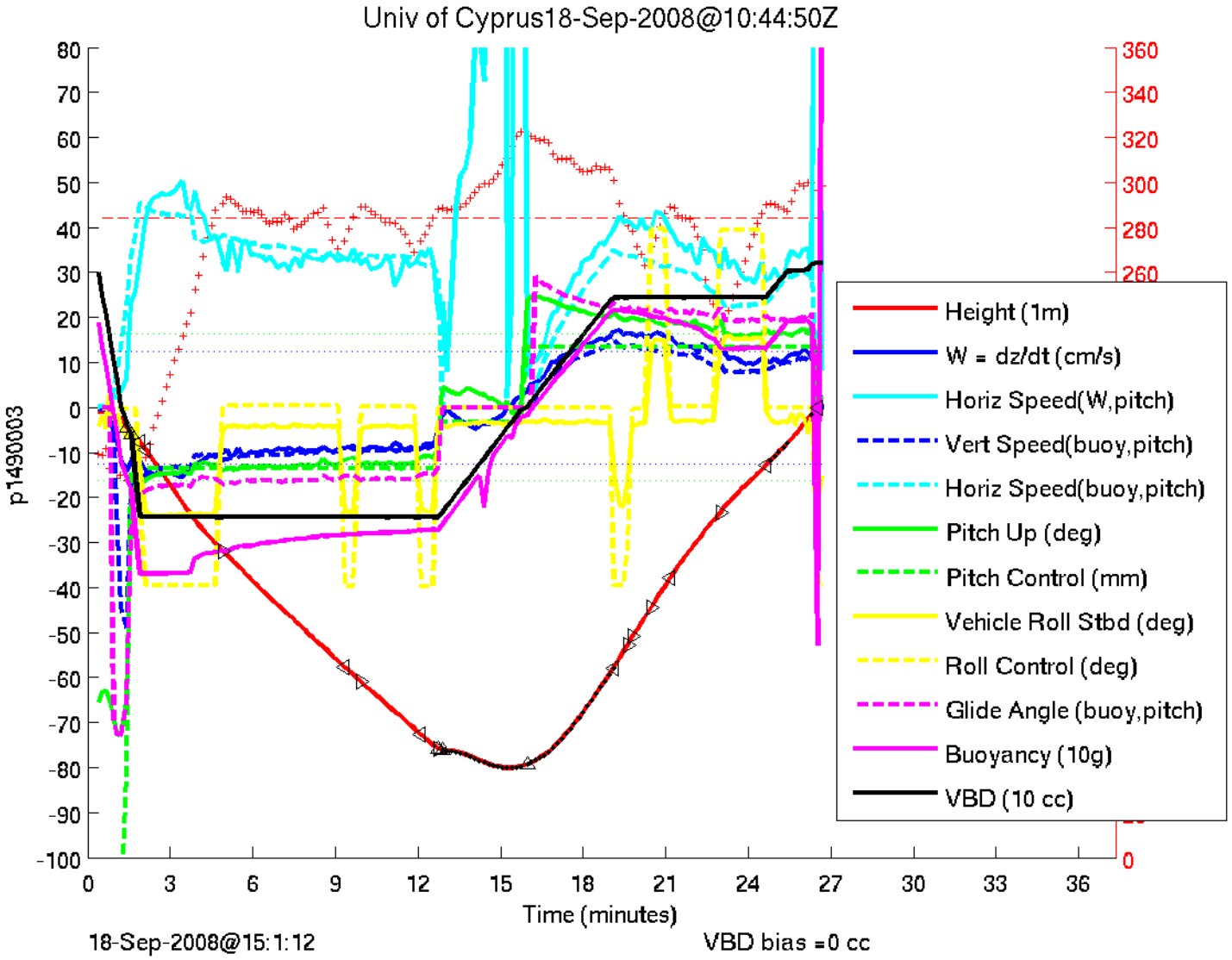
- Local agency partner supplies boat and office (but internet restricted)
- Close to deep water, currents not favorable
- Check comms, ballast, underwater acoustics, GPS
- Pilot lessons:
  - Must have scripts for backup, rsync, move data, plot data ready
  - Procedure laid out in writing beforehand
  - Navigational chart and Google maps ready

Photo: P. Testor

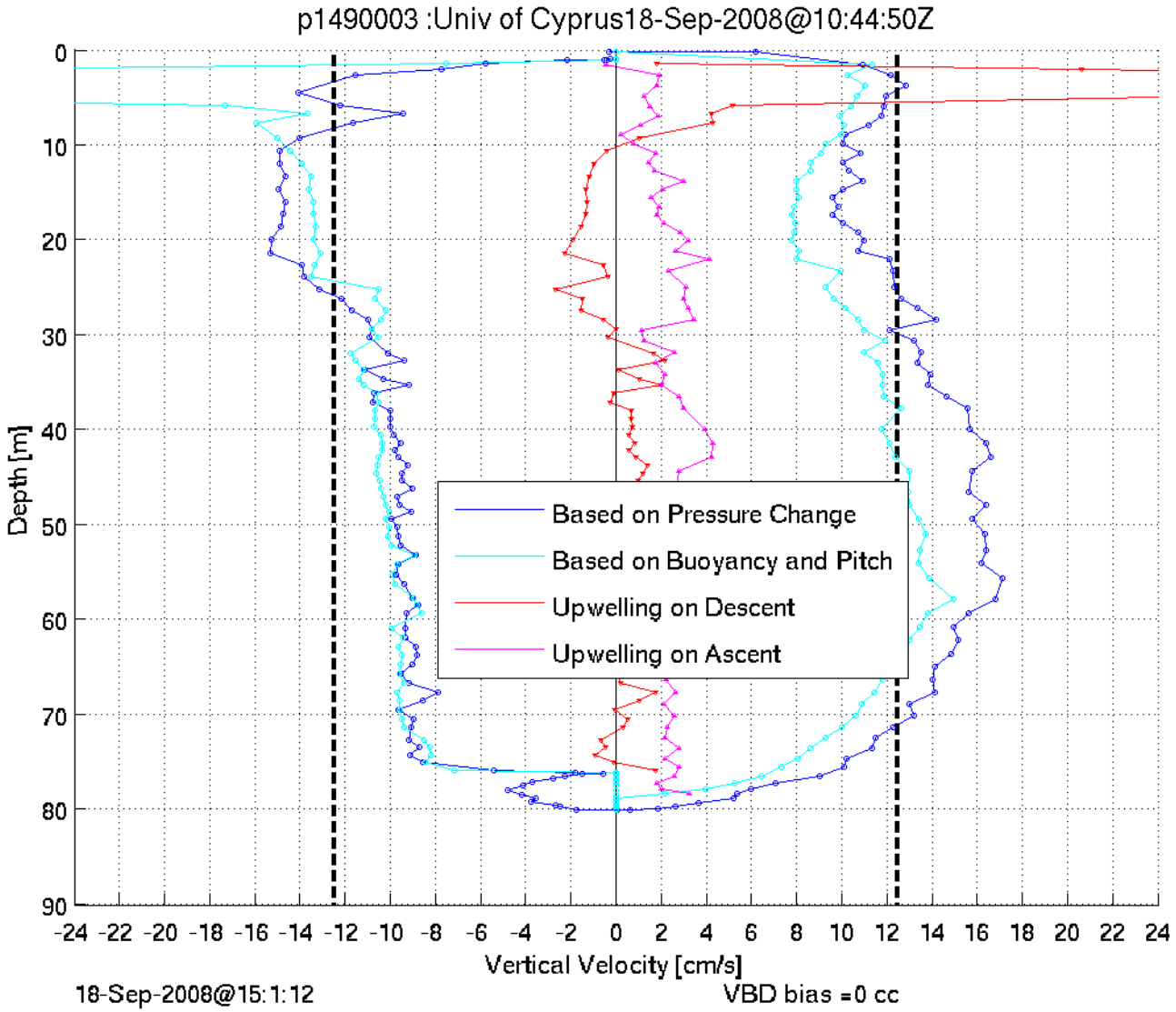
Sea Trials 18 Sep 2008



Sea Trials: Trimming

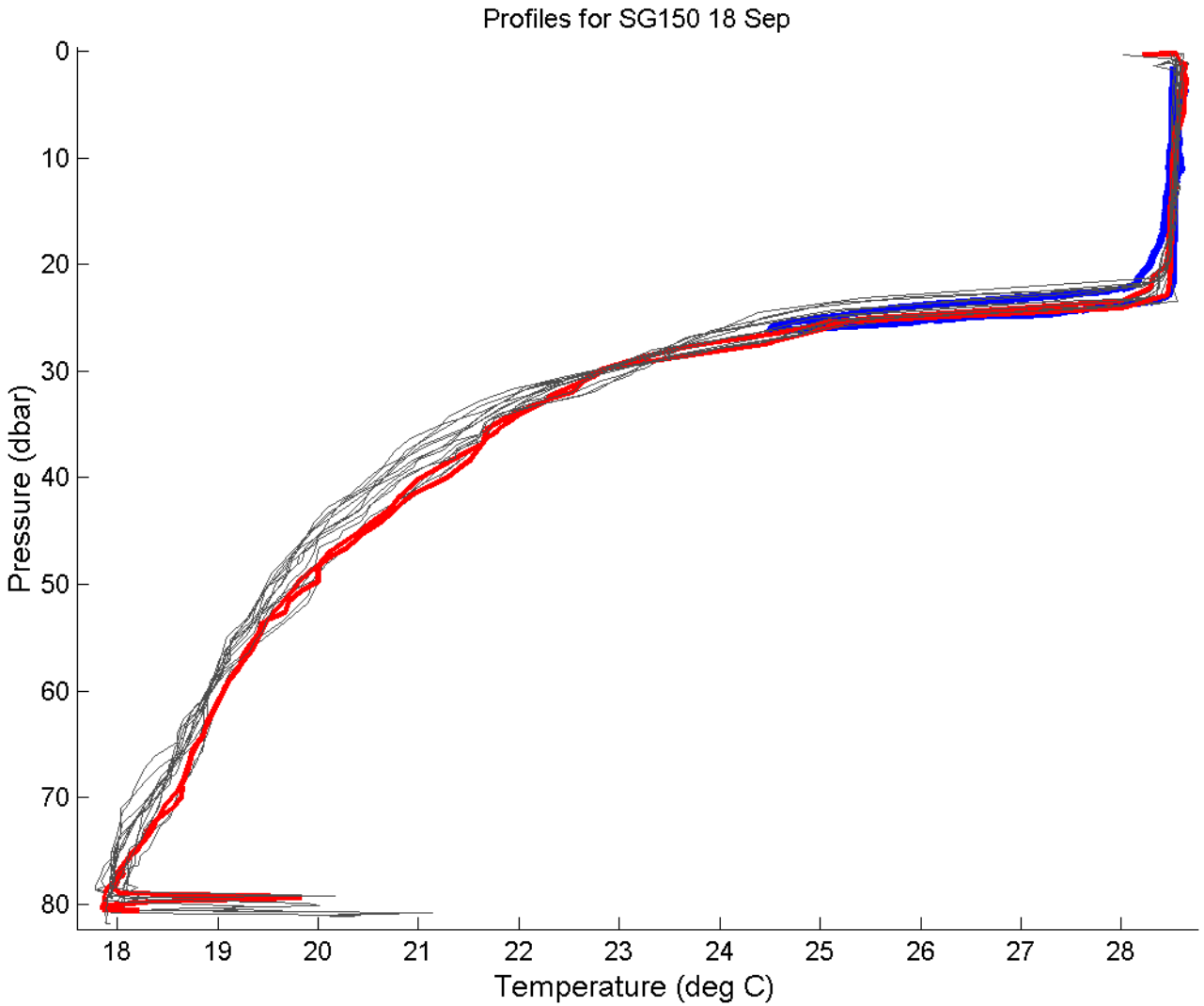


Sea Trials: Results



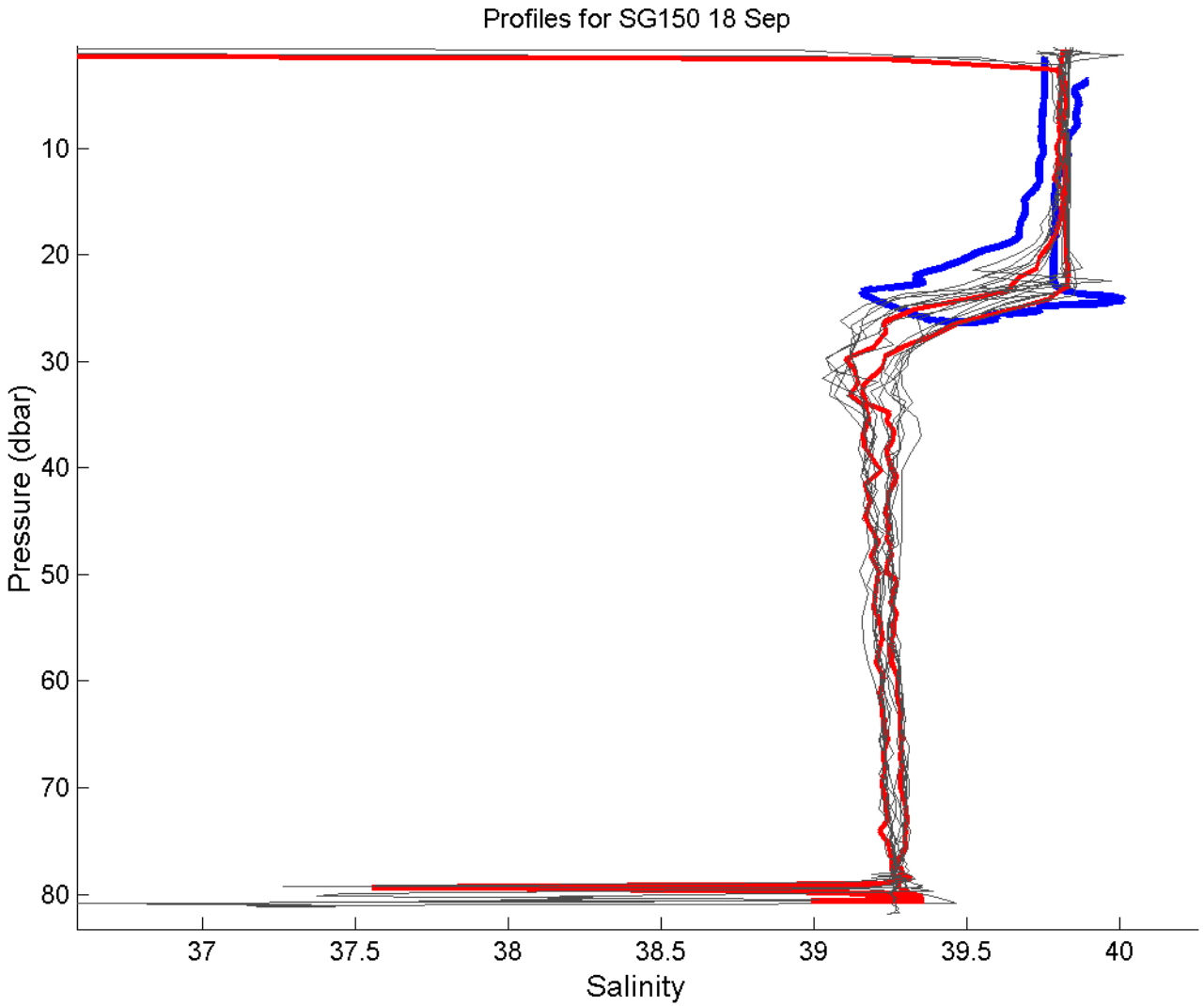
- Vertical velocity close to desired, modeled well. Needs trim for buoyancy center.

Sea Trials: Results



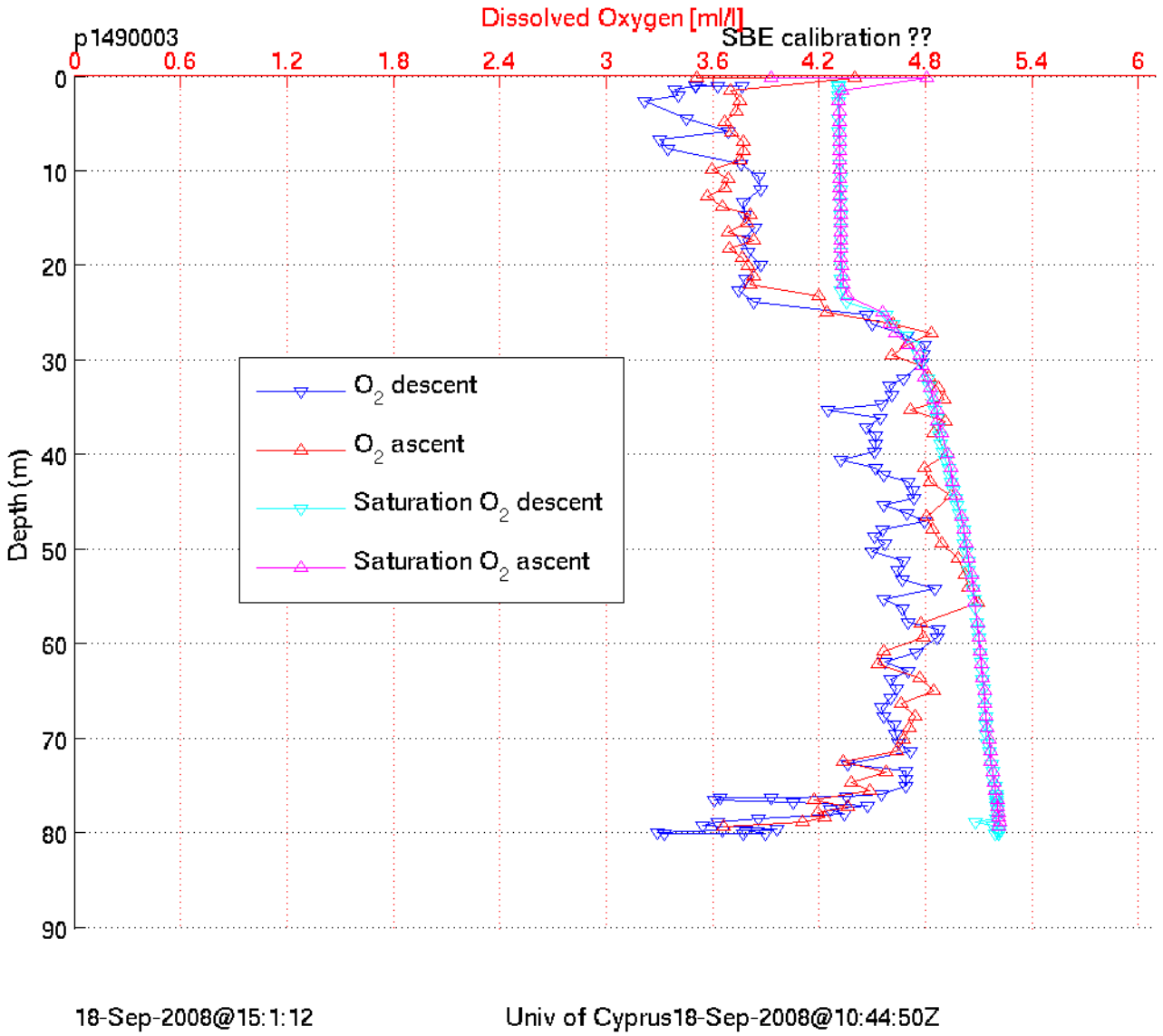
- Temperature profiles agree will with SBE 19+ (blue)

Sea Trials: Results



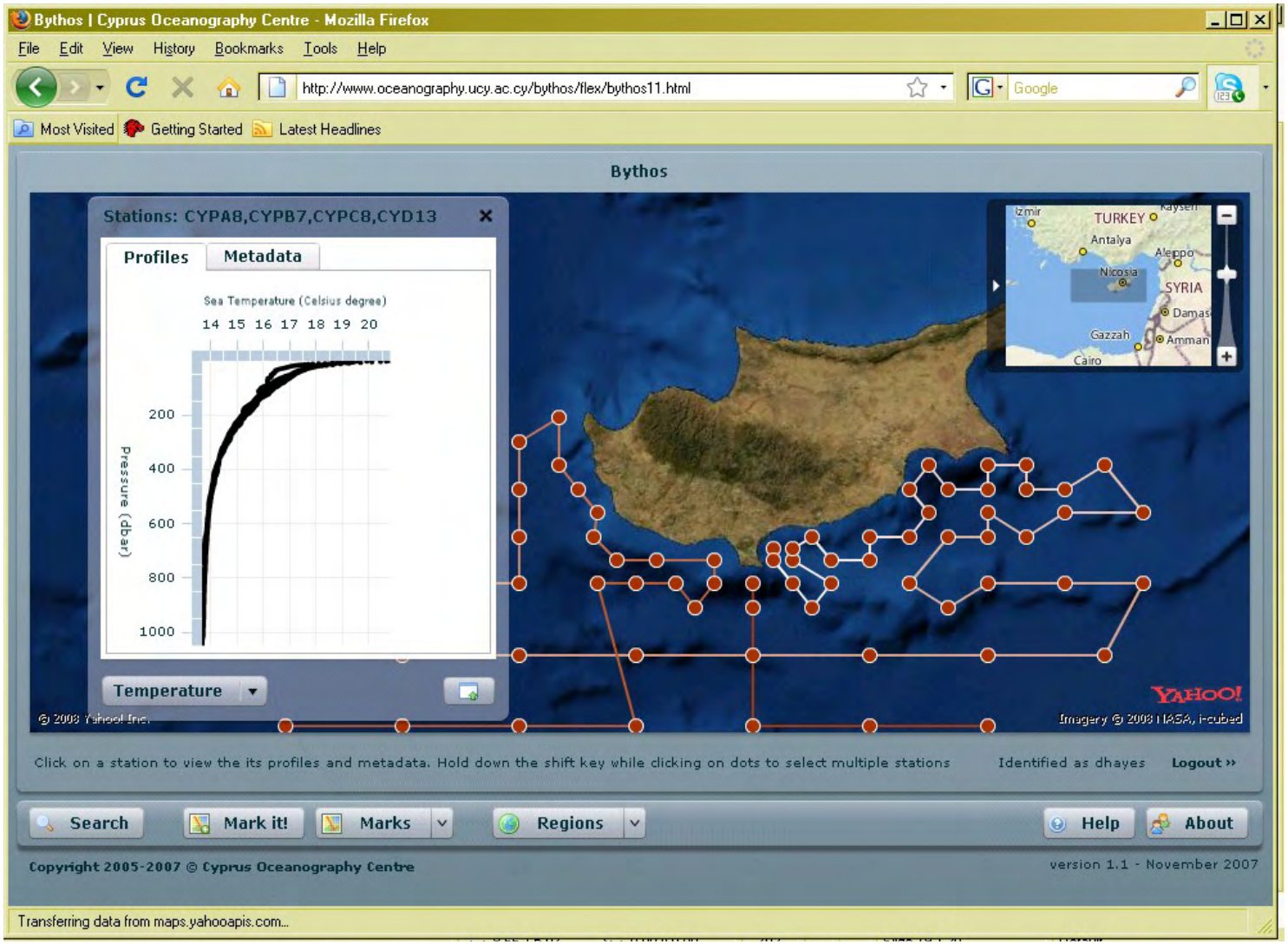
- Salinity profiles consistent, but with spikes. As realistic as SBE 19+. How to implement QC?

Sea Trials: Results



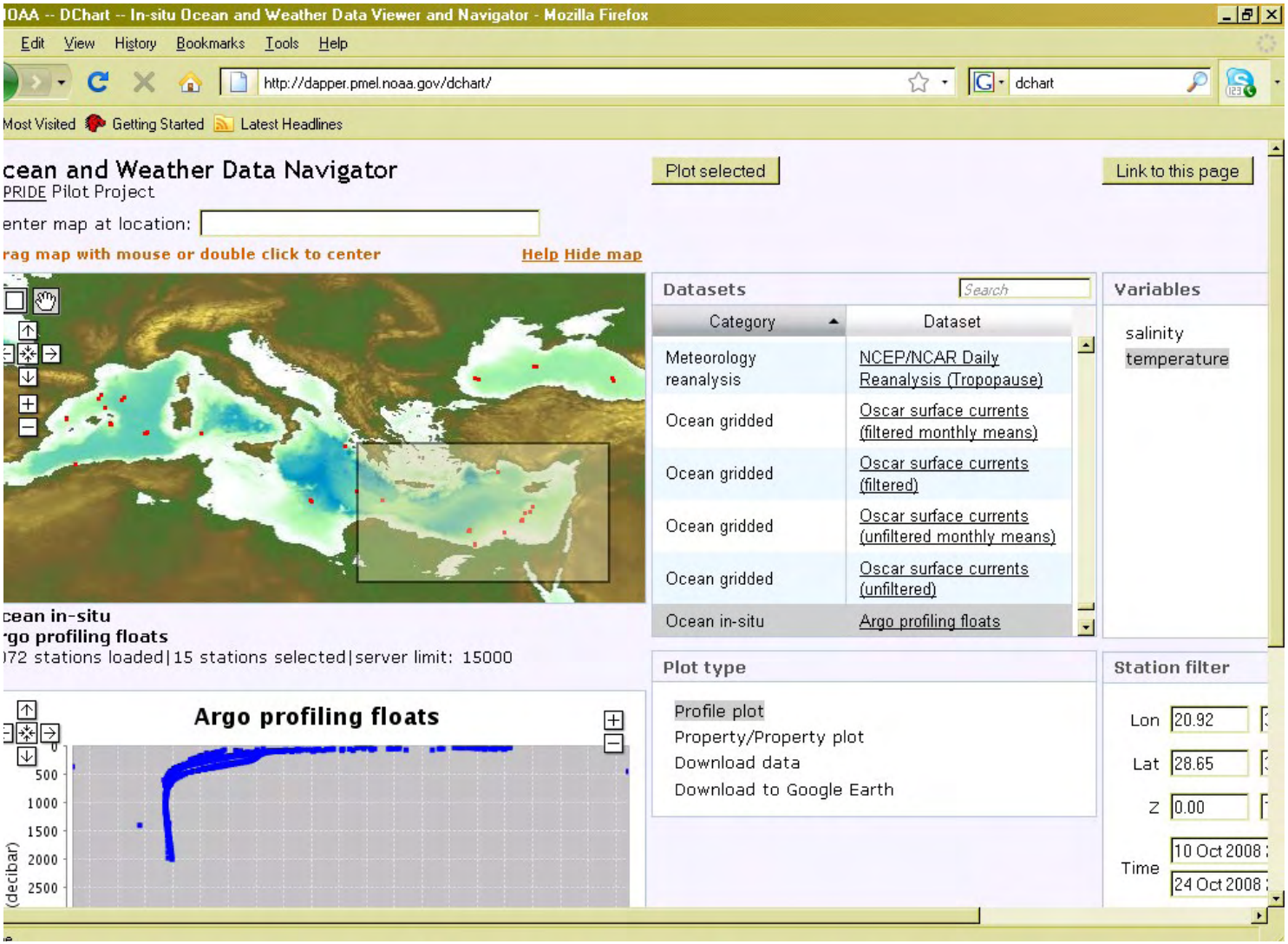
- Oxygen realistic, possible benthic boundary layer?

Data Visualization



- A quick way to access and visualize for anyone: OC-UCY Bythos
- Medatlas or ODV format required

Data Visualization



- A quick way to access and visualize for anyone: Dchart/Dapper?
- Netcdf format required

Conclusions

- Trials are probably the most critical and most challenging aspect.
- In our case, pilot and supporting infrastructure are on trial more than the gliders.
- Glider flight needs trimming.
- Local maintenance facilities.
- Sensor QC and intercomparisons.

Photo: A. Hannides