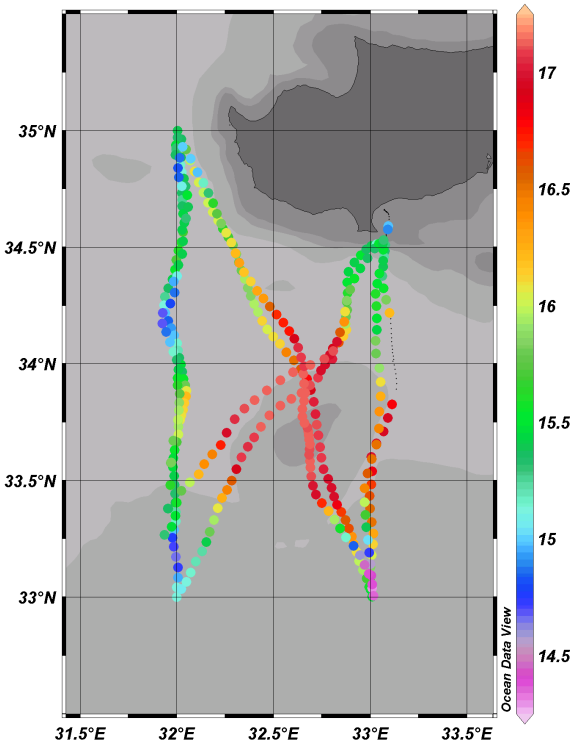
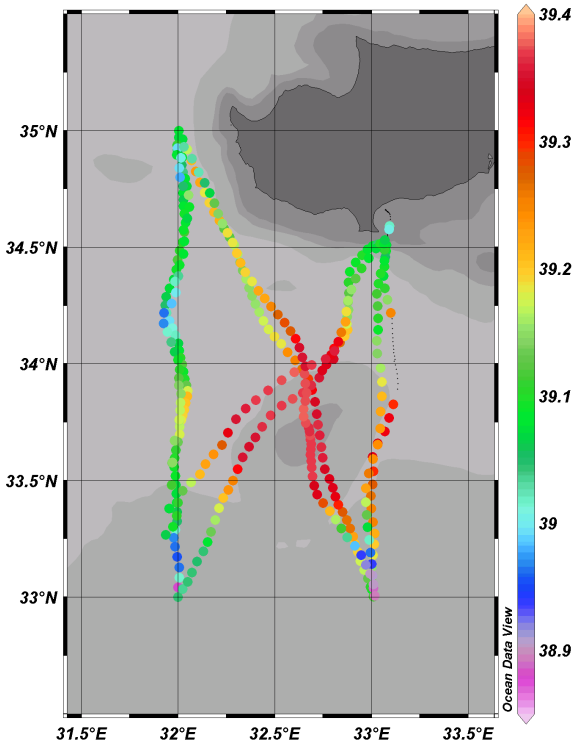
Glider Transects in the Levantine Sea: Characteristics of the Cyprus Eddy

Temperature [degrees Celsius] @ Pressure [decibar]=300



Salinity [psu] @ Pressure [decibar]=300



May-August '09 data show Cyprus Eddy

D. Hayes, P. Testor , G. Zodiatis, G. Konnaris, A. Hannides, L. Mortier, L. Beguery, F. D'Ortenzio, E. Mauri, F. Lekien, R. Gerin, P. Poulain and A. Lazar

Outline

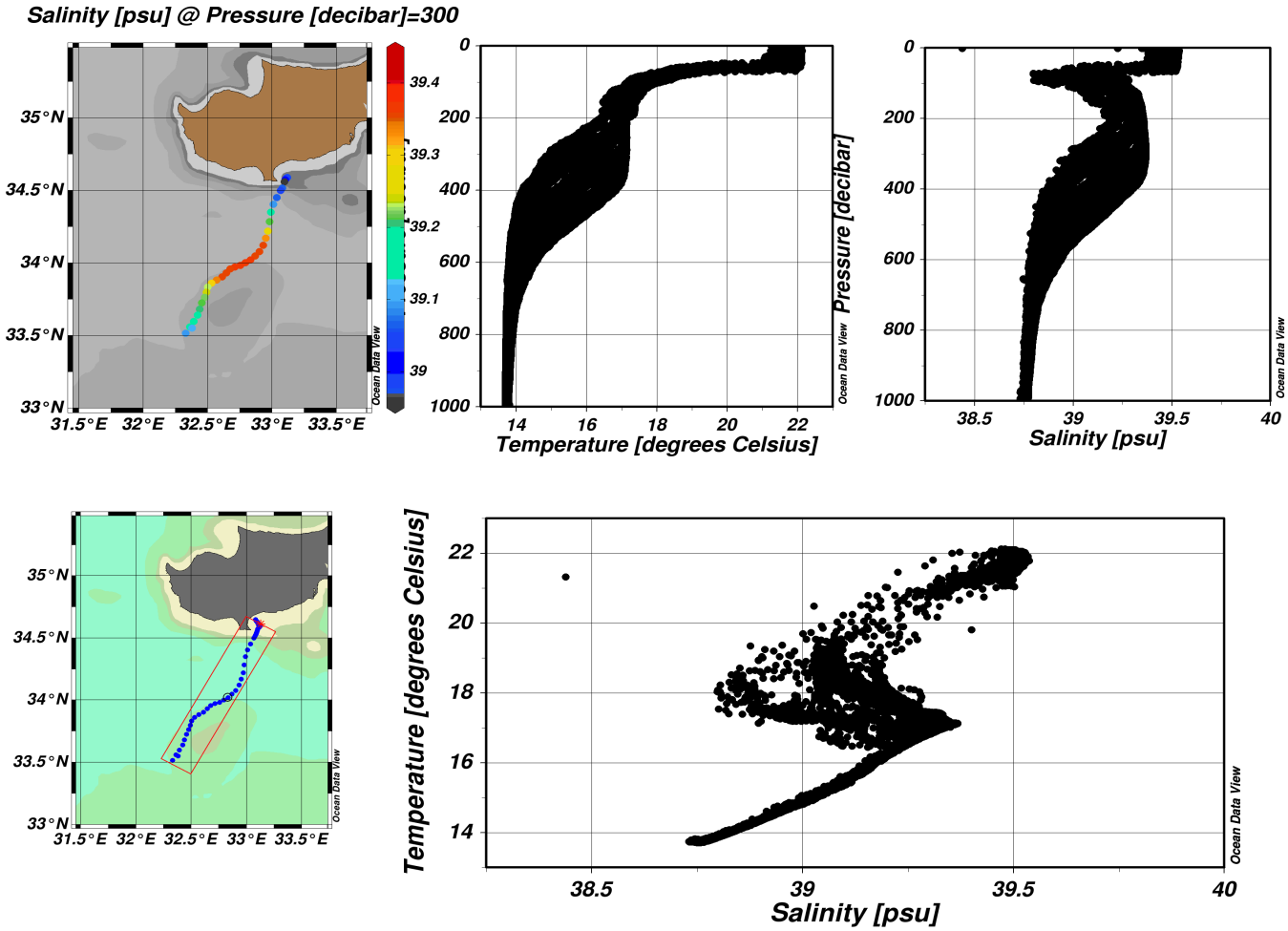
Hydrography and the Cyprus Eddy

EYE project

Glider comparisons

EYE of the Levantine
TS properties

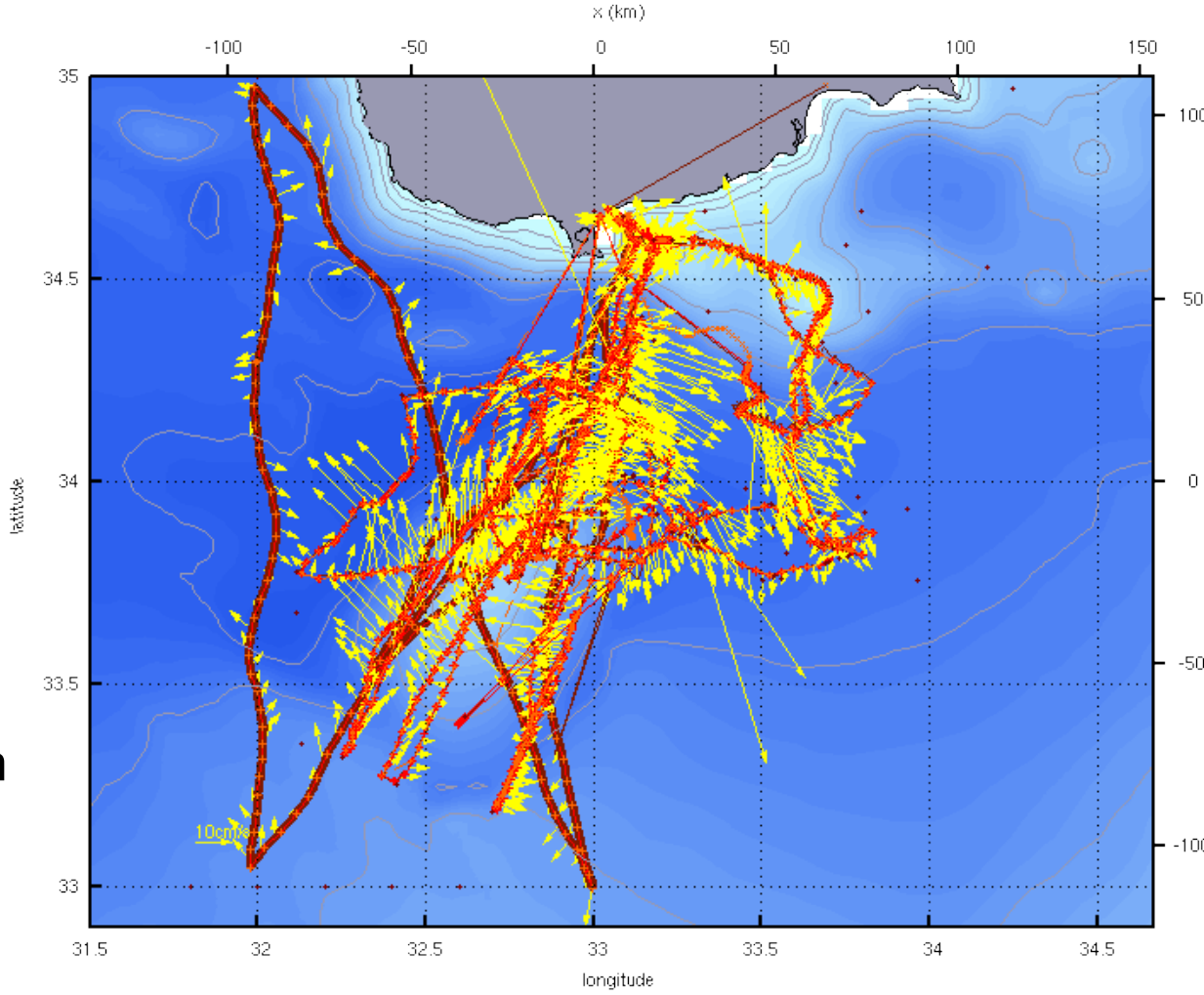
- Depth-ave velocity, Max 30 cm/s
- Anti-cyclonic
- Radius ~40km
- November 2009 to January 2010
- Near Eratosthenes Seamount



EYE of the Levantine (12/2009)

- **Sampling the warm core Cyprus Eddy**
- **Labs**: LOCEAN, LOV (fr), OGS (it), ULB (be), UCY-OC (cy)
- **Gliders**: physical and biogeochemical context for shipborne measurements

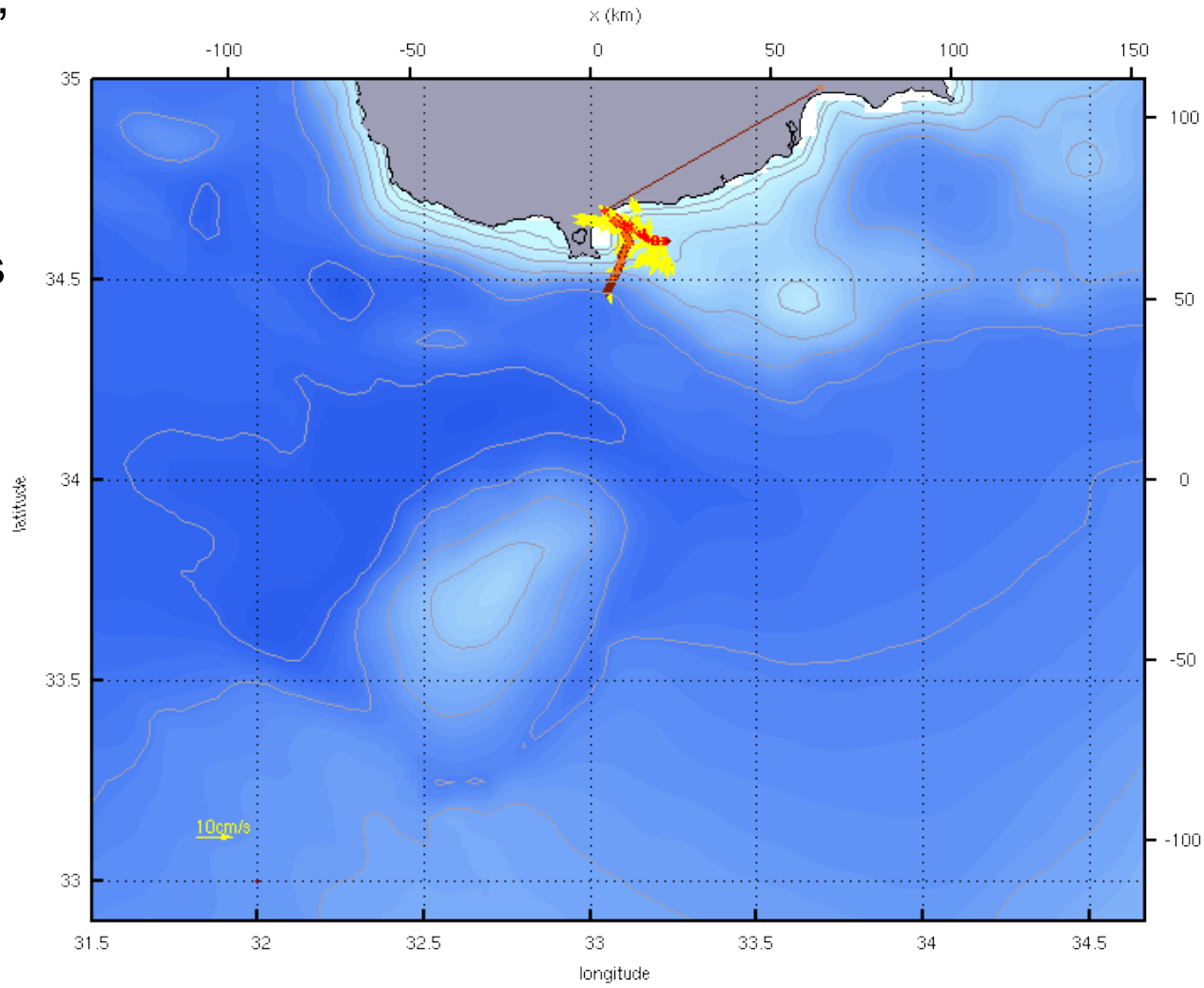
  - 6 gliders deployed from Limassol
  - 2 profiling floats
  - 4 surface drifters
  - shipborne measurements by CYBO (Cyprus), TARA (French), Merian (German)



EYE of the Levantine

Glider fleet

- Depth-ave velocity, Max 30 cm/s
- Anti-cyclonic
- Radius ~40km
- Near Eratosthenes Seamount



EYE of the Levantine

Glider fleet

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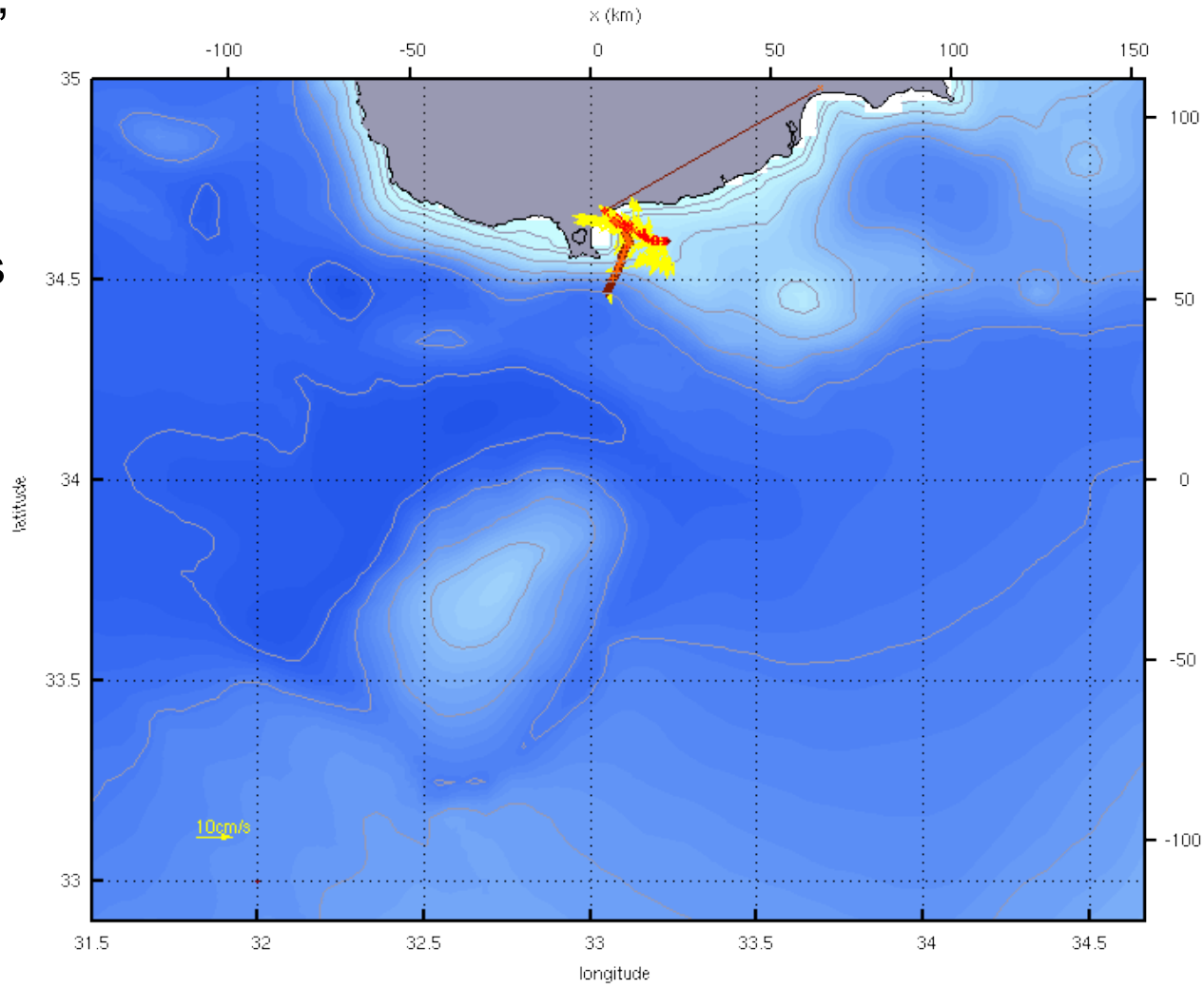
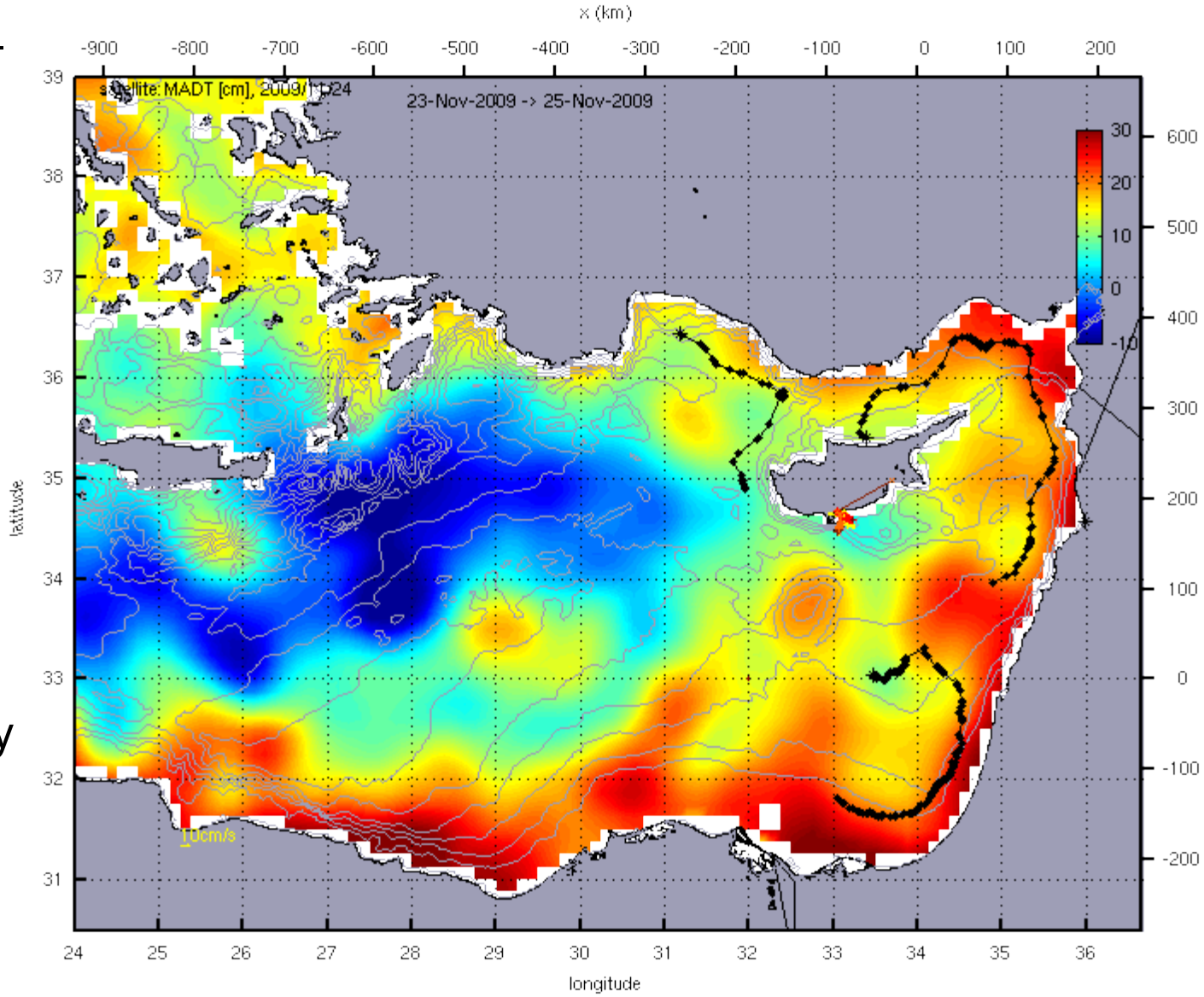


EYE of the Levantine

Drifter and Dynamic Topography

- 23 Nov ‘09 – 13 Jan ‘10
- Surface drifters and MADT
- General AC circulation in seamount region
- Stagnation near eddy center
- Second eddy to East (Shikmona Eddy)



EYE of the Levantine

Drifter and Dynamic Topography

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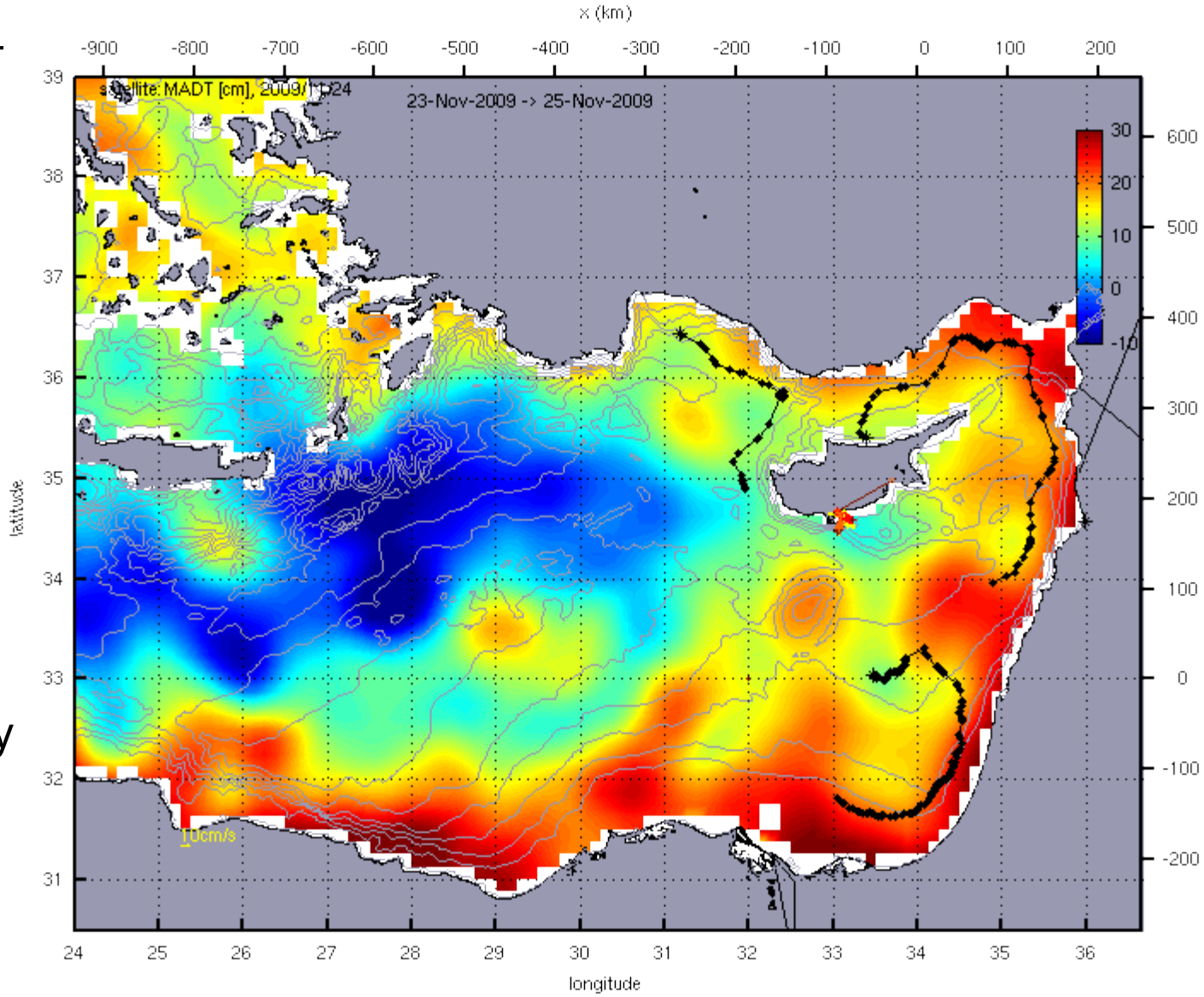
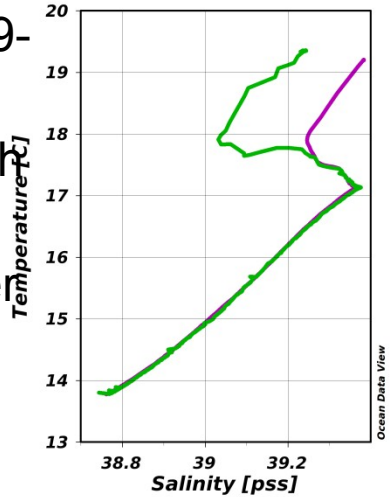
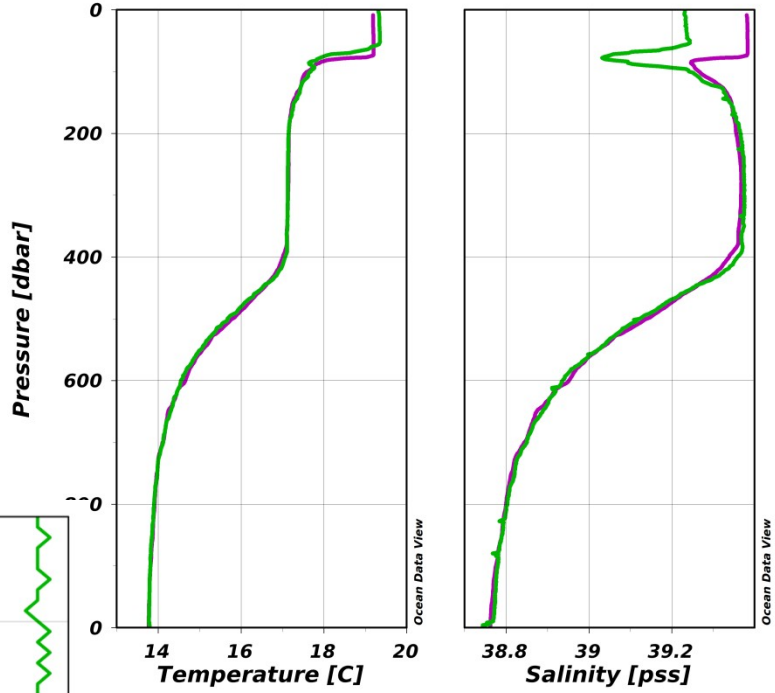


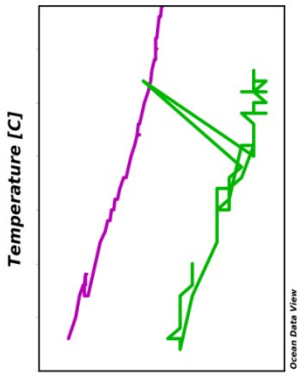
EYE of the Levantine

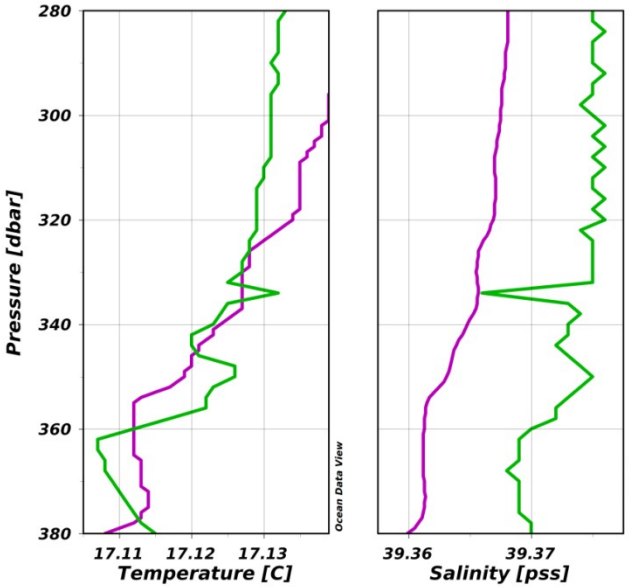
Glider Comparisons with MS Merian

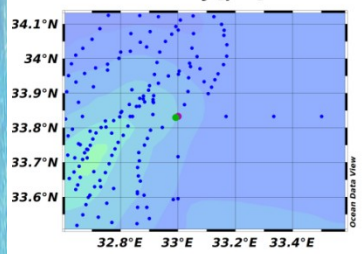
- 20 stations 24 Dec 2009-7 Jan 2010
- Visited same station with glider on 17 Jan
- Glider salinity 0.01 lower in eddy core

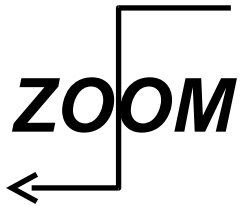






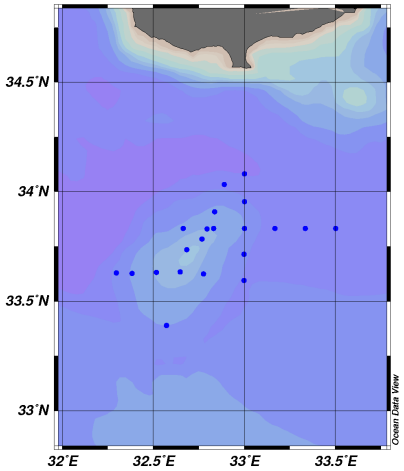


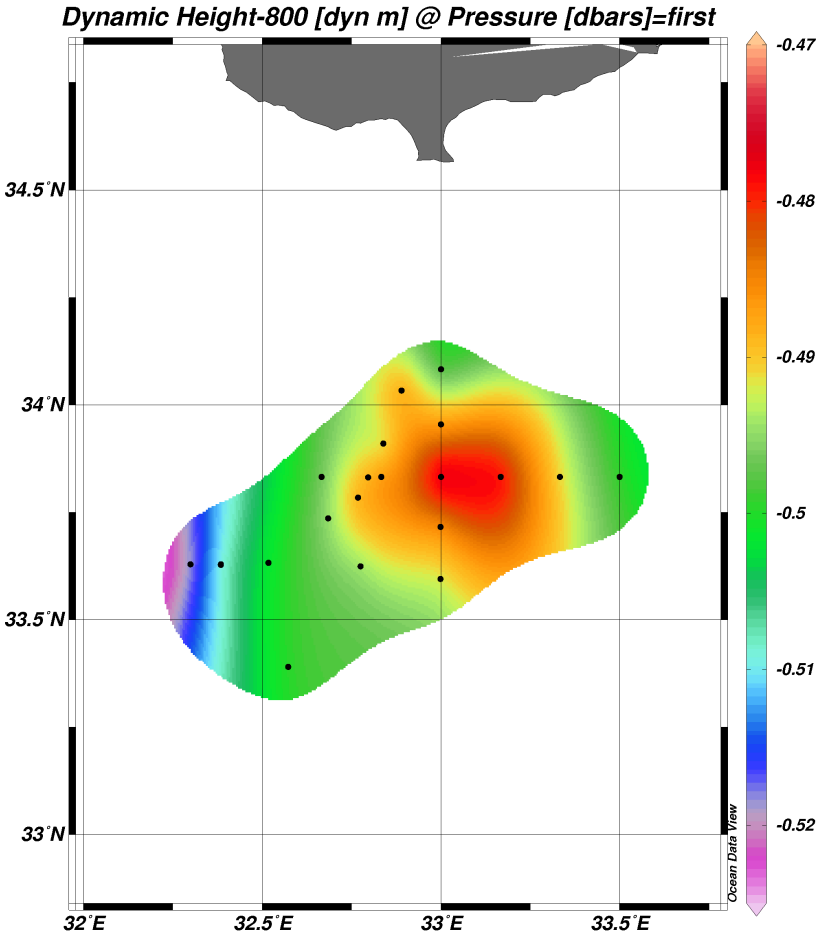




EYE of the Levantine
Glider Comparisons with MS Merian

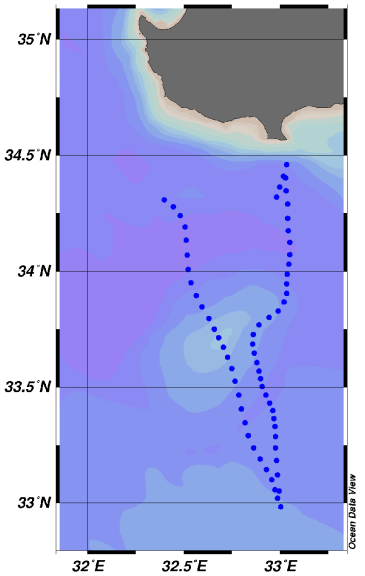
- 20 stations 24 Dec 2009-7 Jan 2010
- Dynamic Height at surface relative to 800 dbar

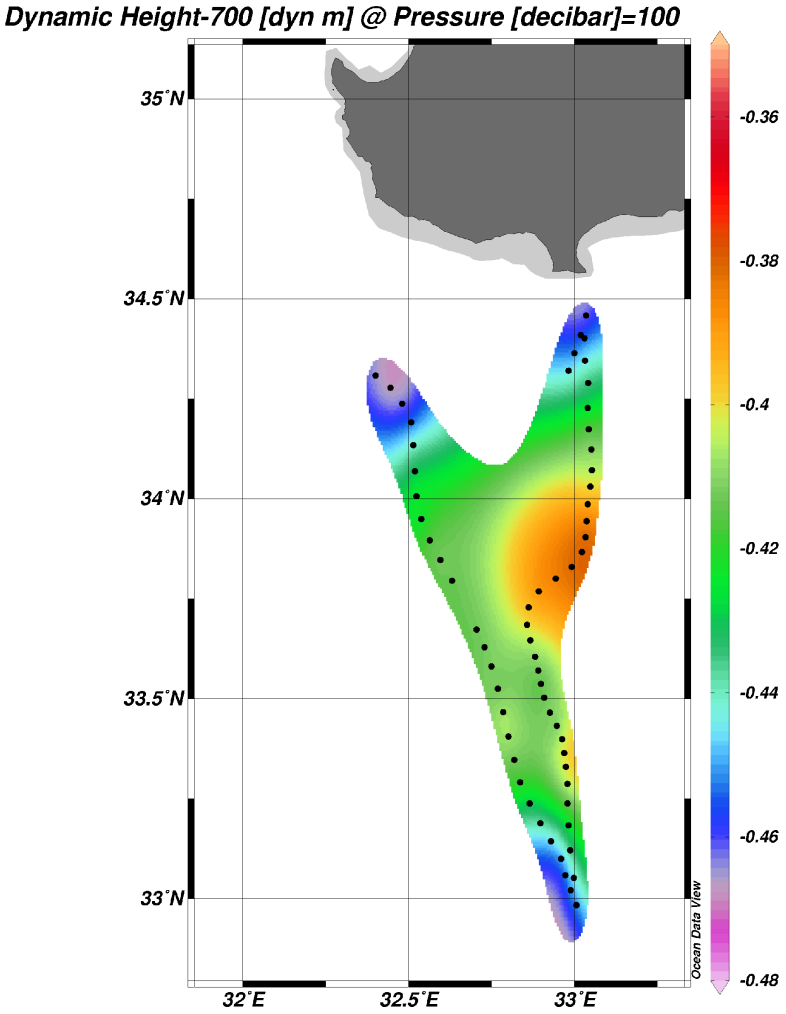




EYE of the Levantine
Glider Comparisons with MS Merian

- 13-25 Jan 2010
- Dynamic Height at 100 dbar relative to 700dbar

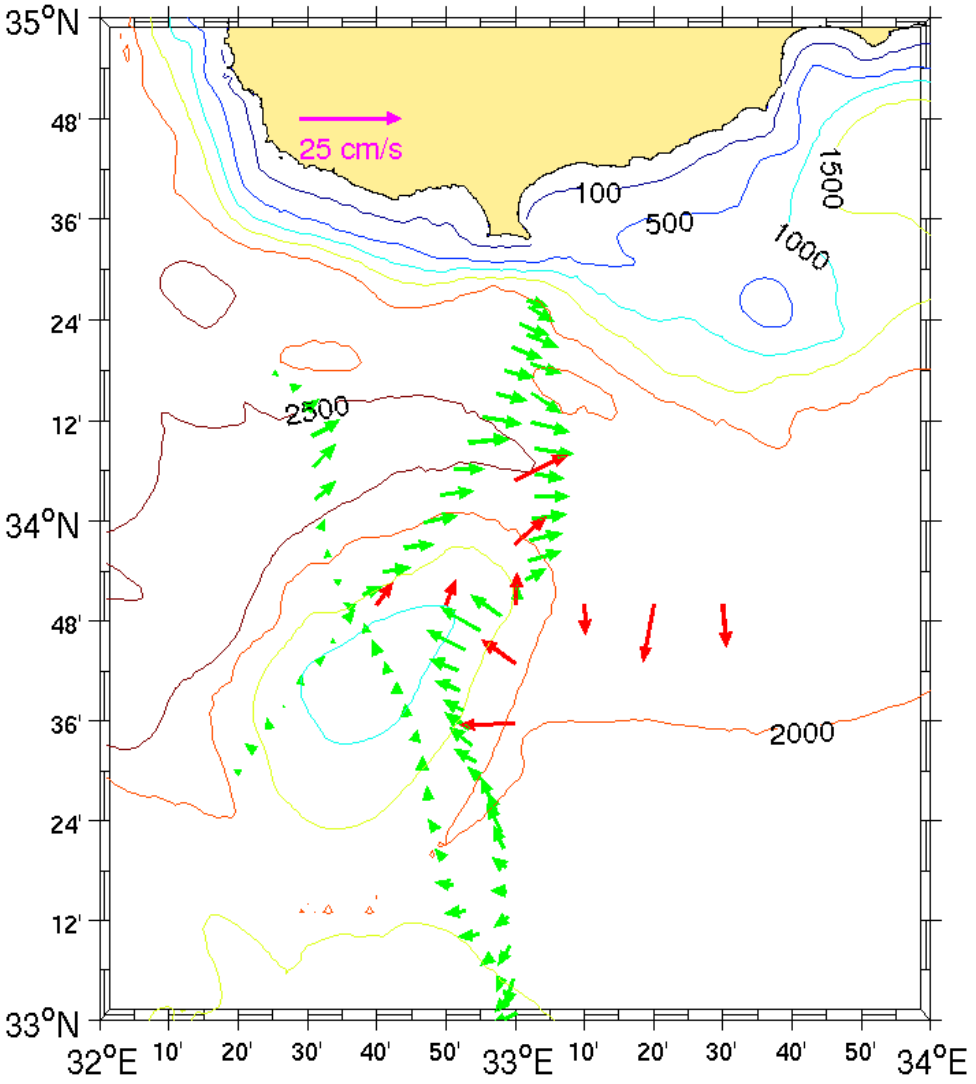




EYE of the Levantine

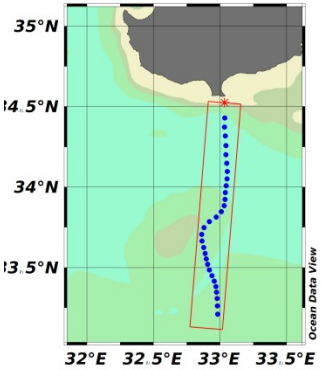
Glider Comparisons with MS Merian

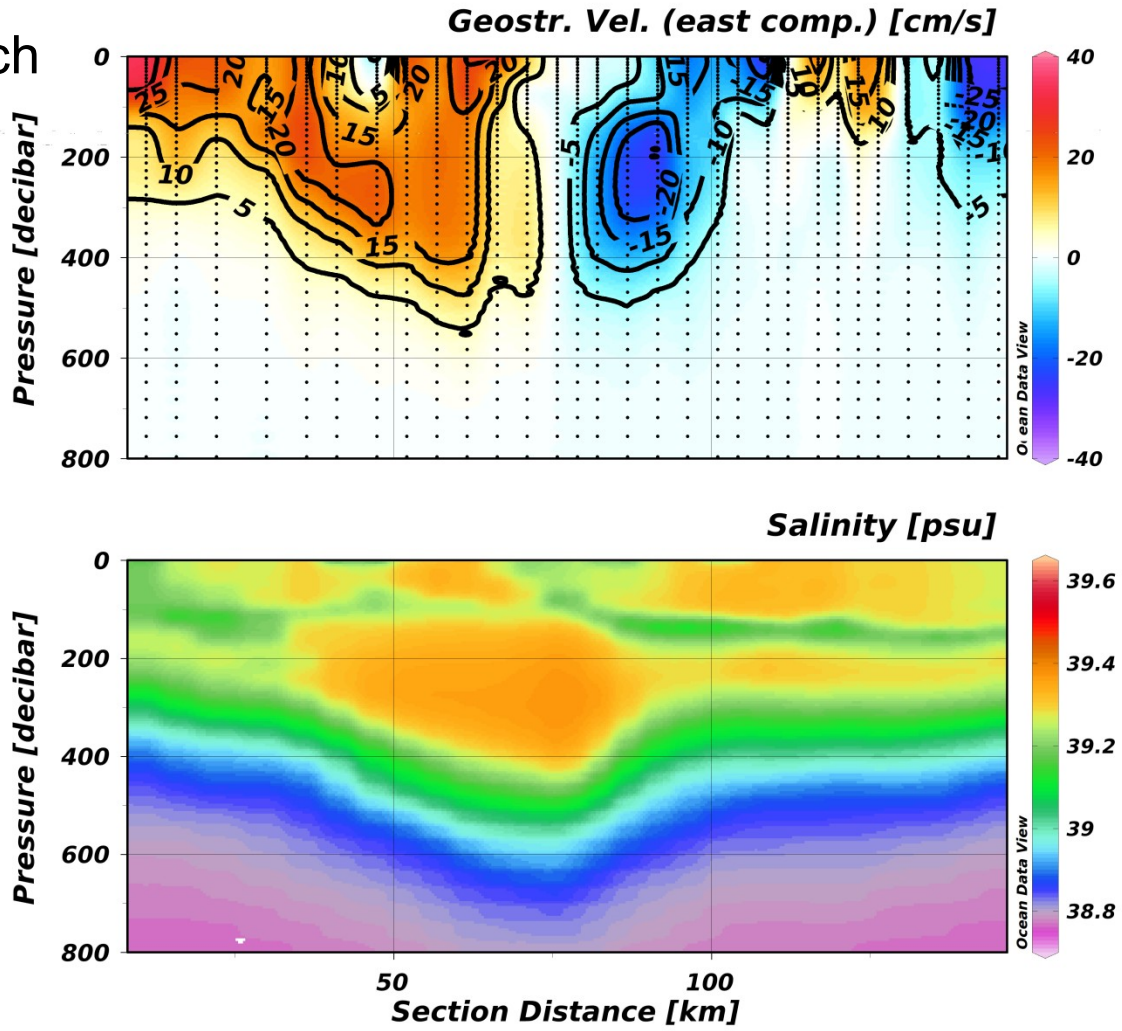
- 10 stations 4-5 Jan 2010
- Dives 170-250 7-31 Jan 2010
- Dive-averaged currents from glider (to 1000m usually) and from ADCP (800m range)



EYE of the Levantine
Glider (Atalanta)

- 14-22 Jan 2010
- Geostrophic Velocity (top)
- Salinity (bot)
- Asymmetric: south branch of core more focused

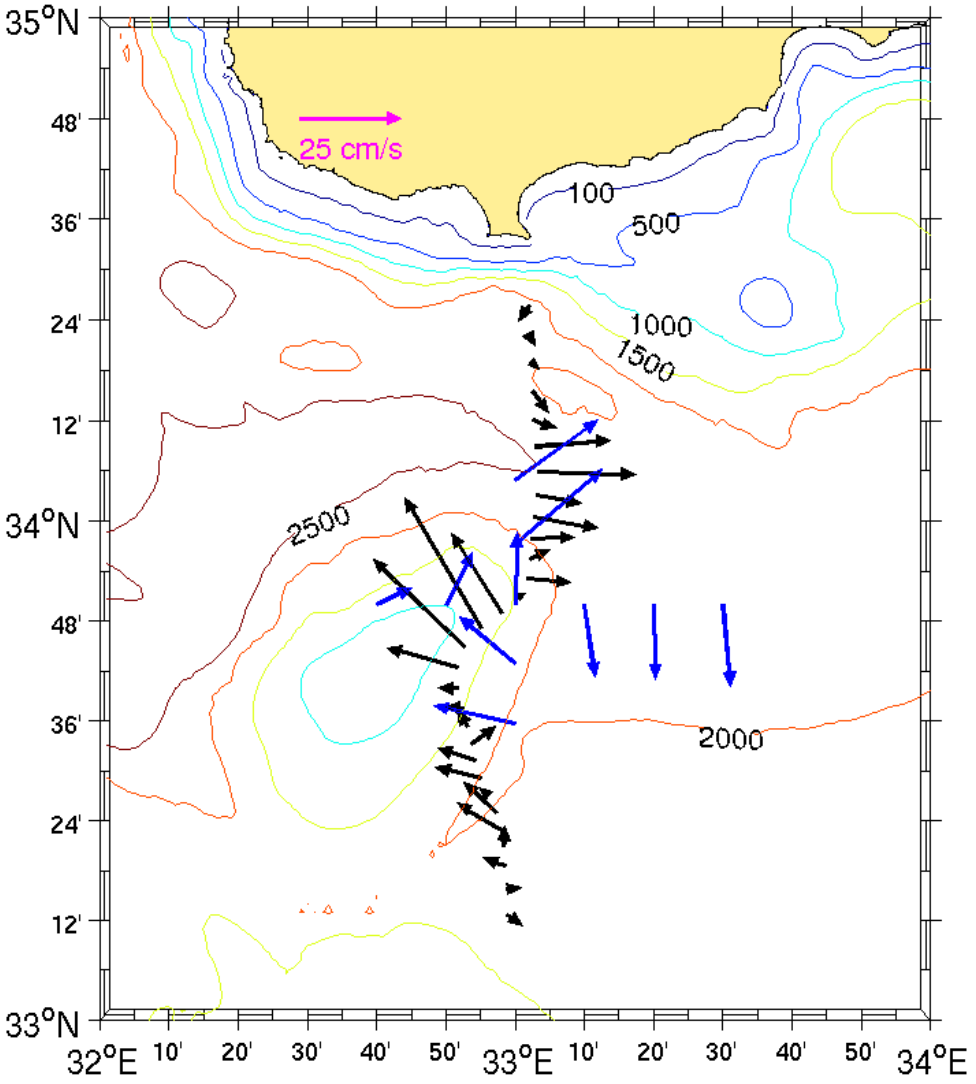




EYE of the Levantine

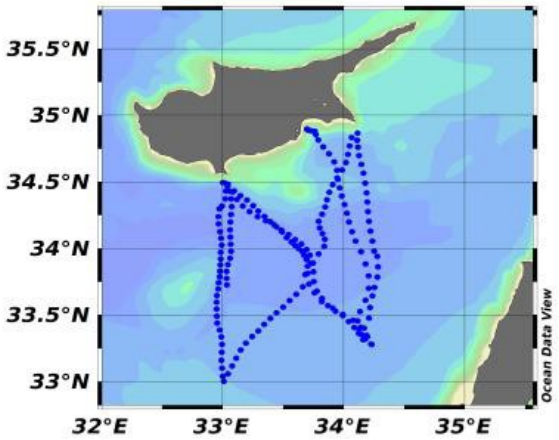
Glider Comparisons with MS Merian

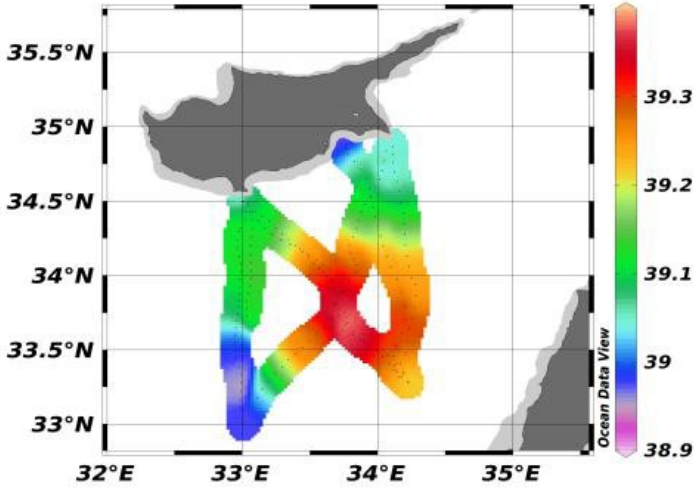
- 10 stations 4-5 Jan 2010
- Dives 190-220 14-22 Jan 2010
- 310 m currents from glider (geostrophic + DAC) and from ADCP

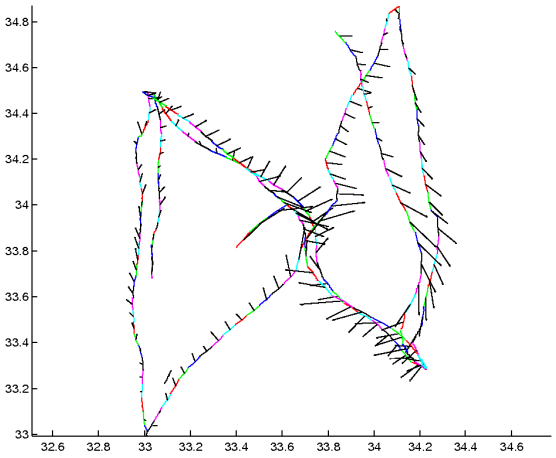


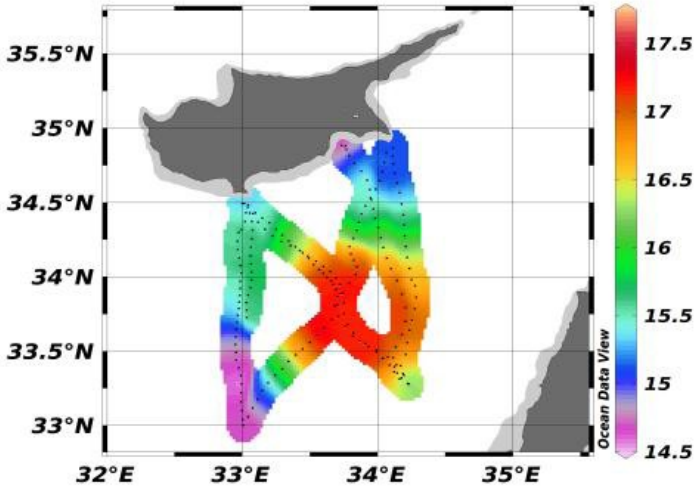
The Sequel
2010-11 glider mission

- 12 Oct-10 Dec 2010 S and T at 300 dbar
- Eddy has moved eastward—eddy is evolving!



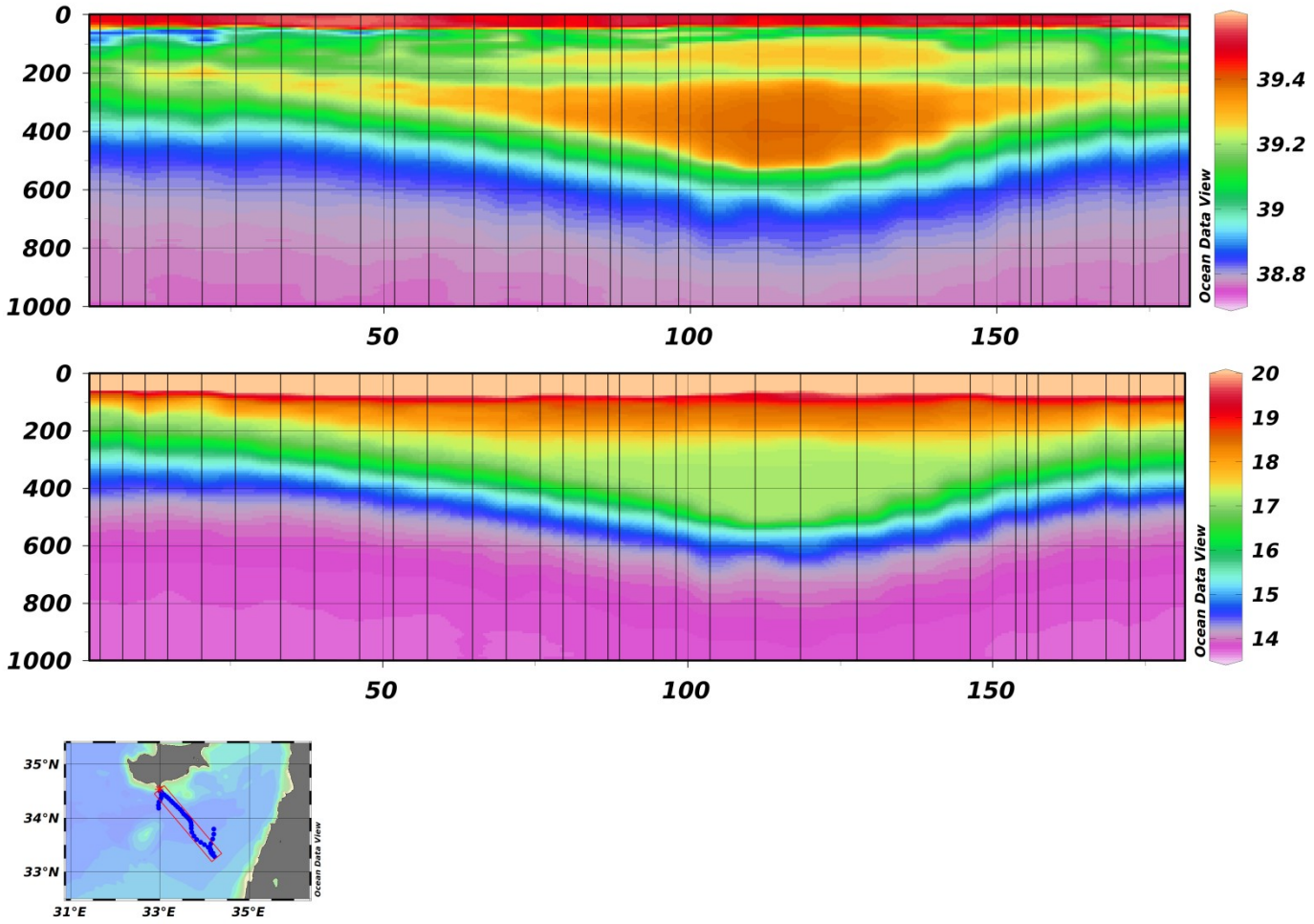






The Sequel
2010-2011 glider mission

- 18-31 October 2010 section from NW to SE
- Salinity intrusions—eddy is evolving!
- Must apply theory to calculate quasi-geostrophic currents



Conclusions

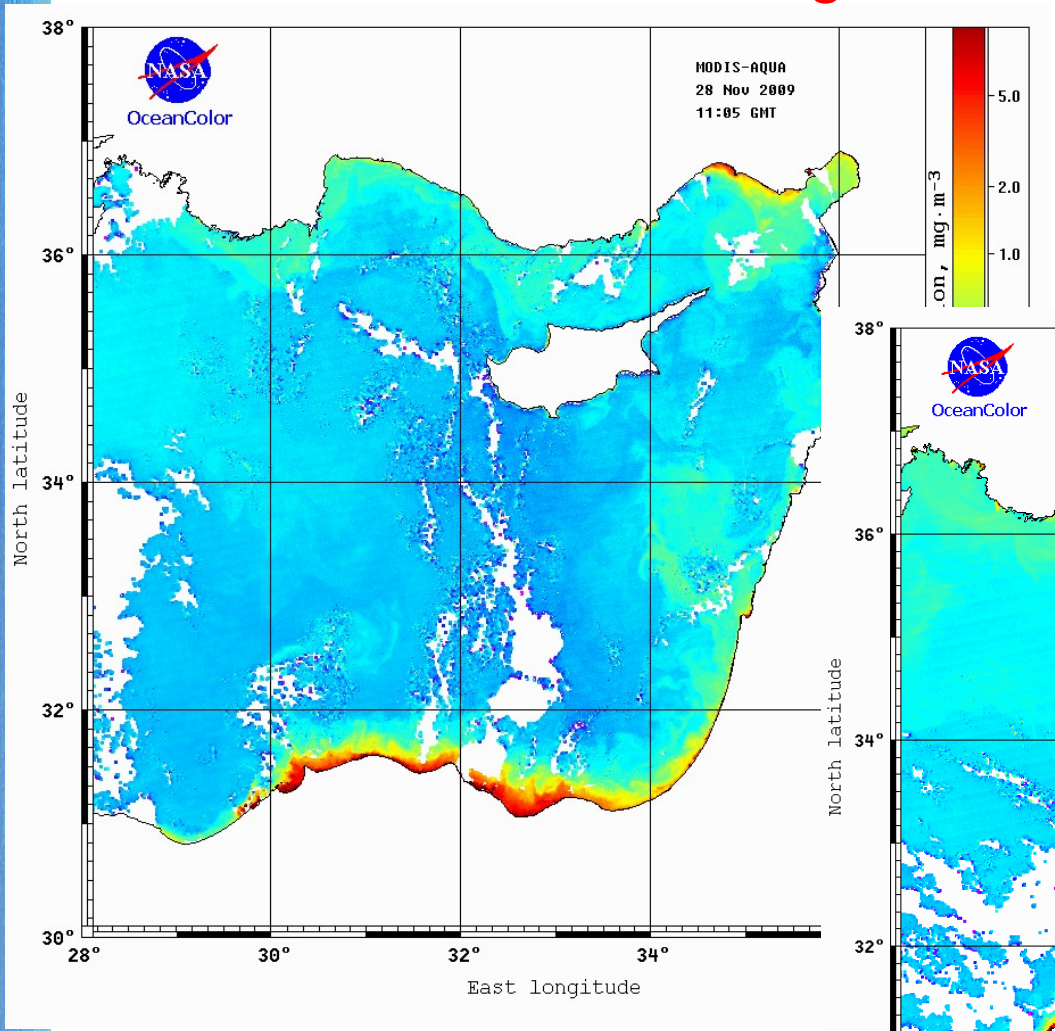
- Gliders and glider fleets are a vital component for near real time and long term observation networks but should still be **science-driven**.
- Support NRT forecasts and their application plus basic research: our **endurance lines should allow for adaptation**.
- We have a long way to go to describe and predict the ocean state with **known uncertainty**.

Acknowledgements

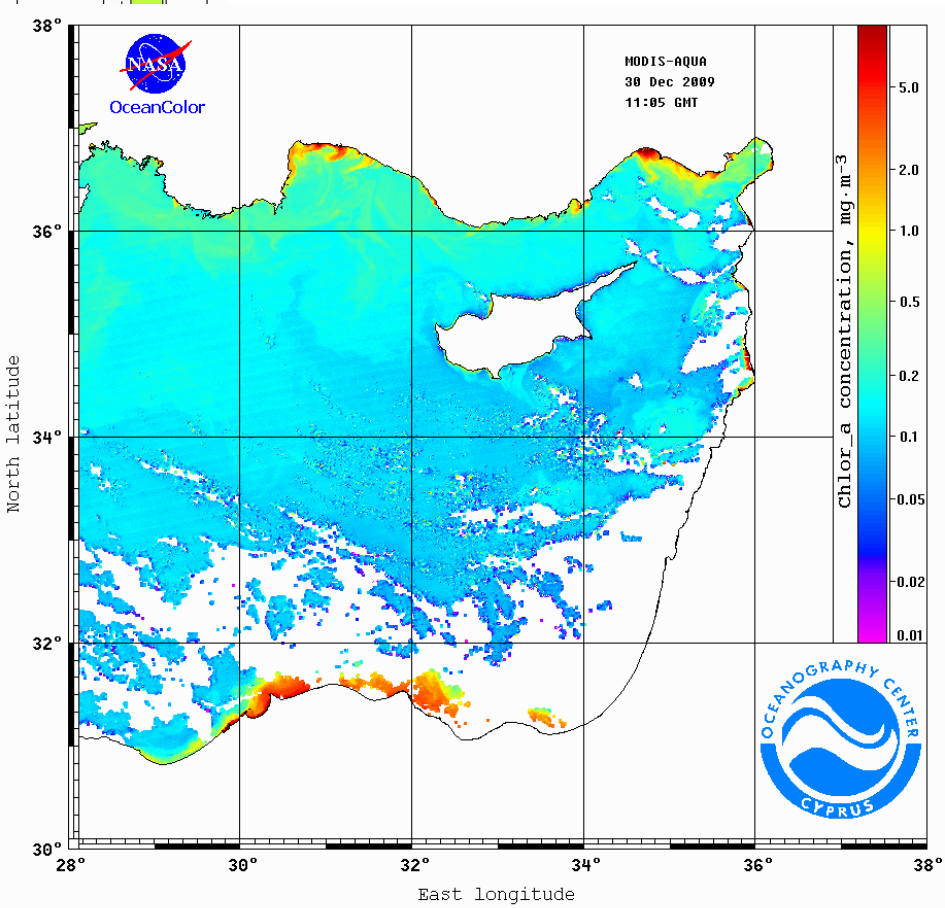
- Funding: Cyprus RPF and UCY, TARA/Oceans.
- Launch/recovery support: Department of Fisheries and Marine Research
- Colleagues—best is to come.

EYE of the Levantine

Remote Sensing - Chlorophyll

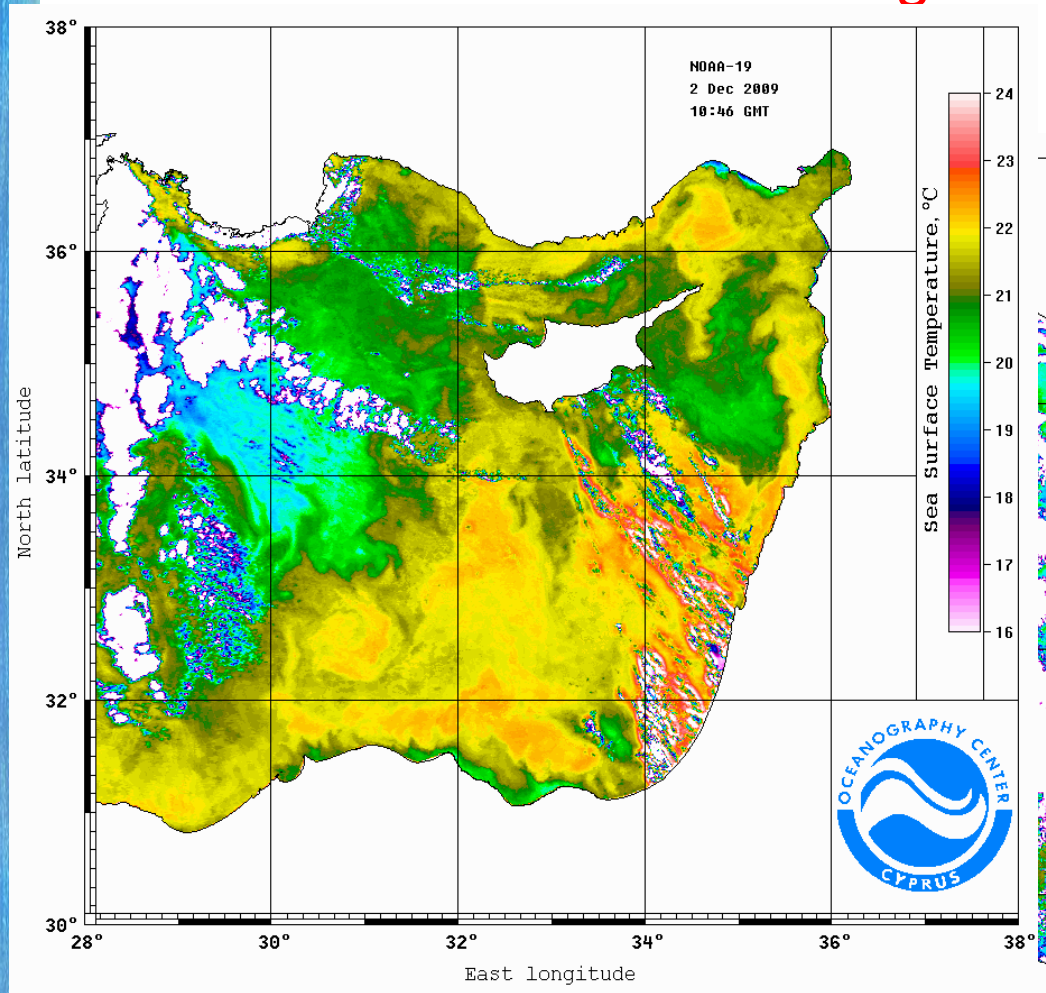


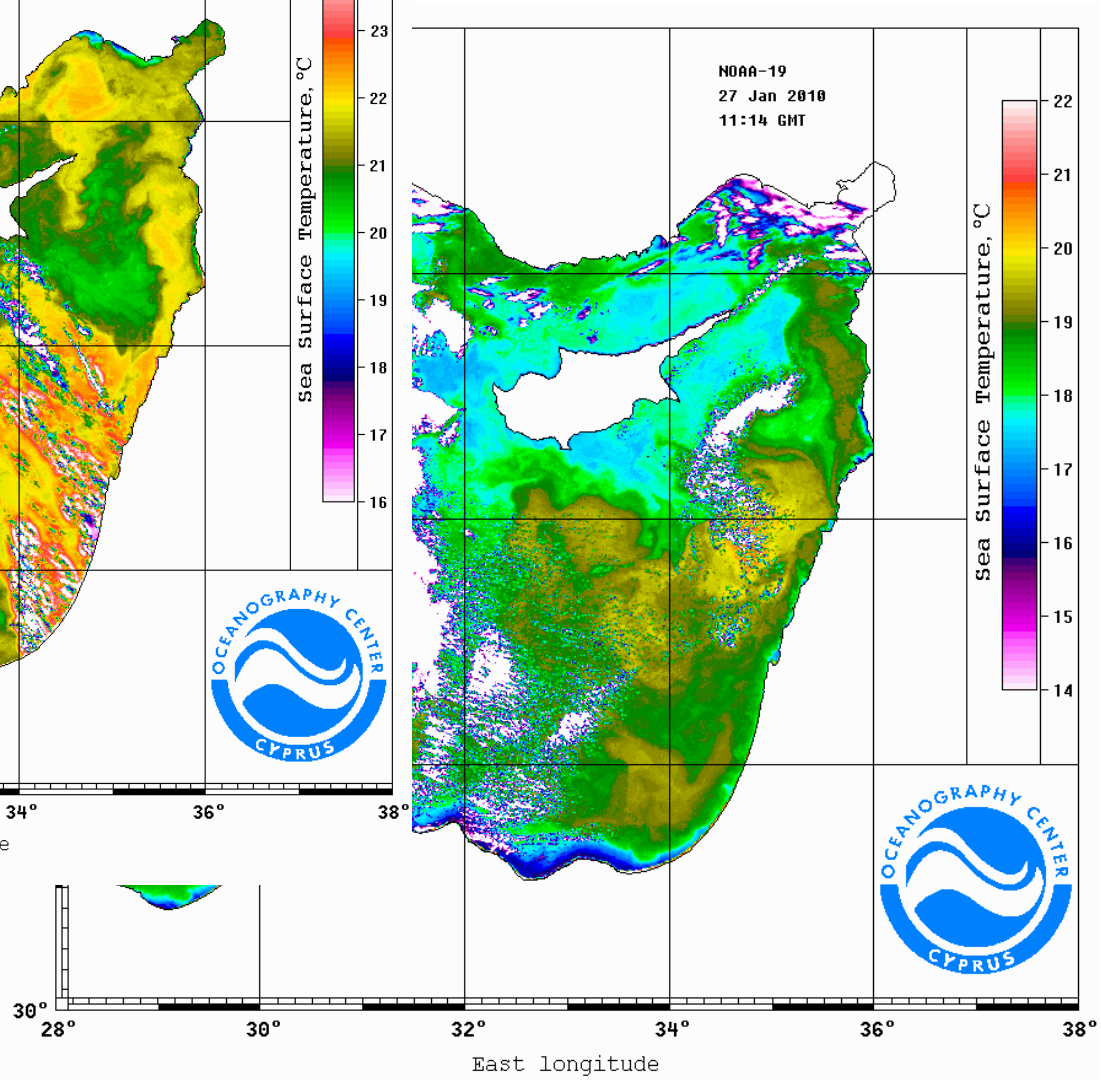
- Where is Cyprus Eddy?
- Shikmona Eddy is clear.

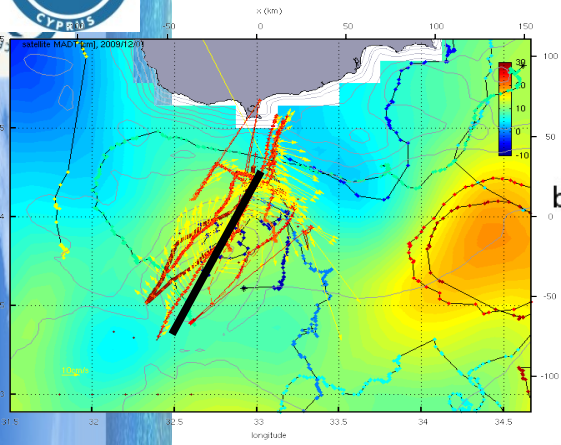


EYE of the Levantine

Remote Sensing - SST

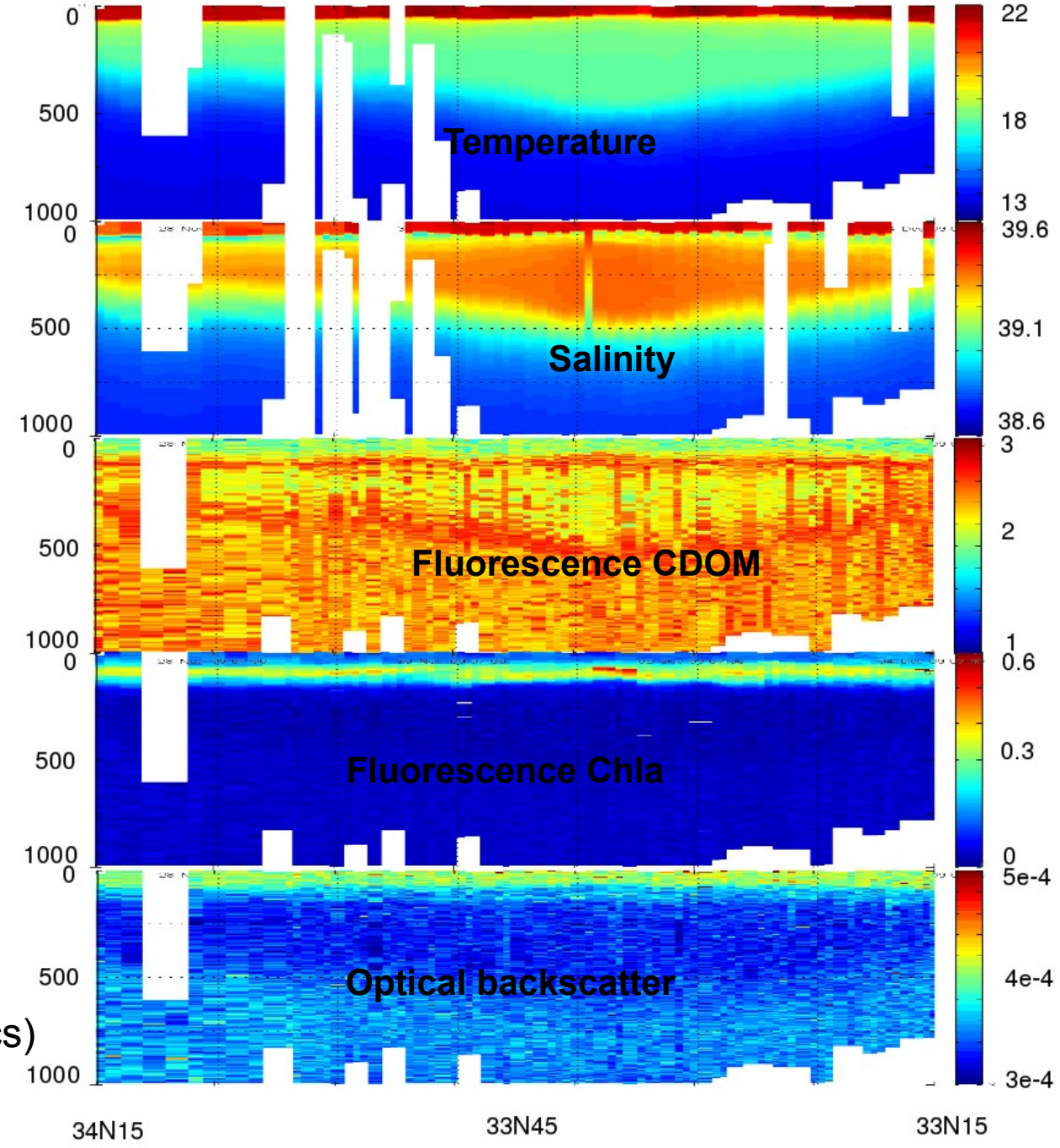






- Distribution of properties in eddy
- Location of center and edges
- Guide for measurements:

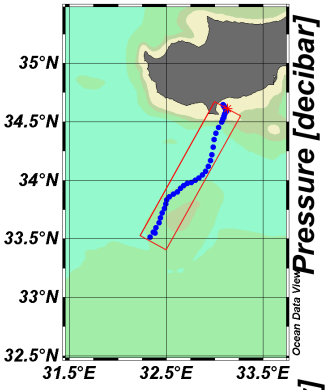
1. Biogeochemical (nutrients, pigments).
2. Biological (TARA: water samples for taxonomy, genetics)

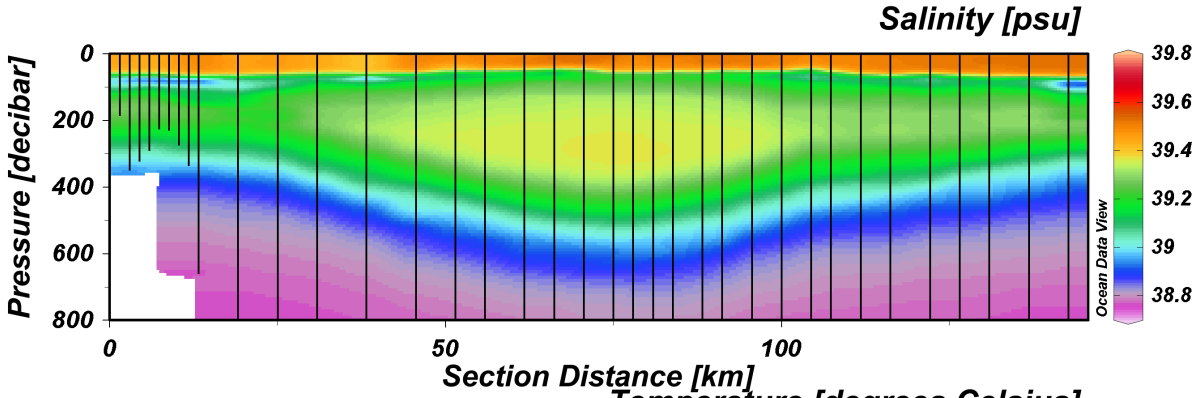


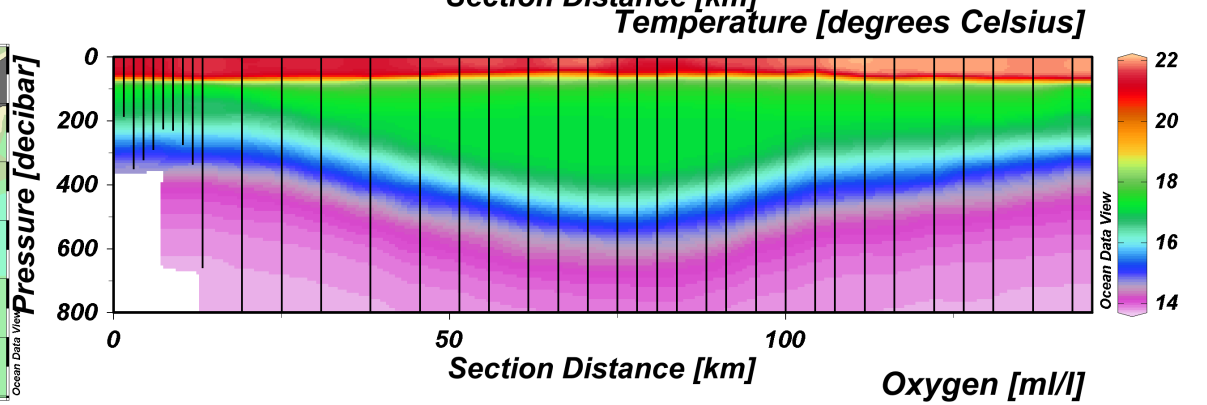
EYE of the Levantine

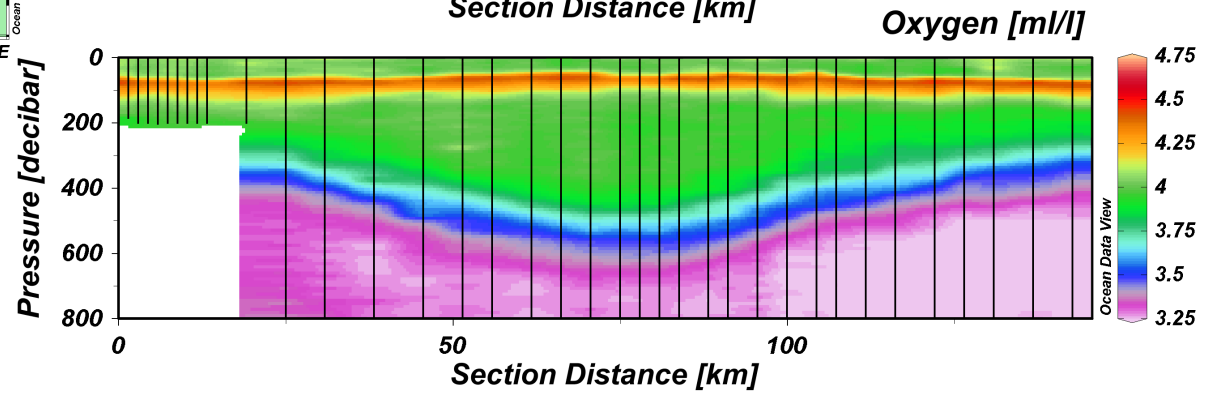
Glider (Atalanta)

- N-S Section (10d)
- LIW to 500 m.
- Asymmetric shape
- Nov 2009- April 2010
- Autonomy: 2,370 km, 143d.



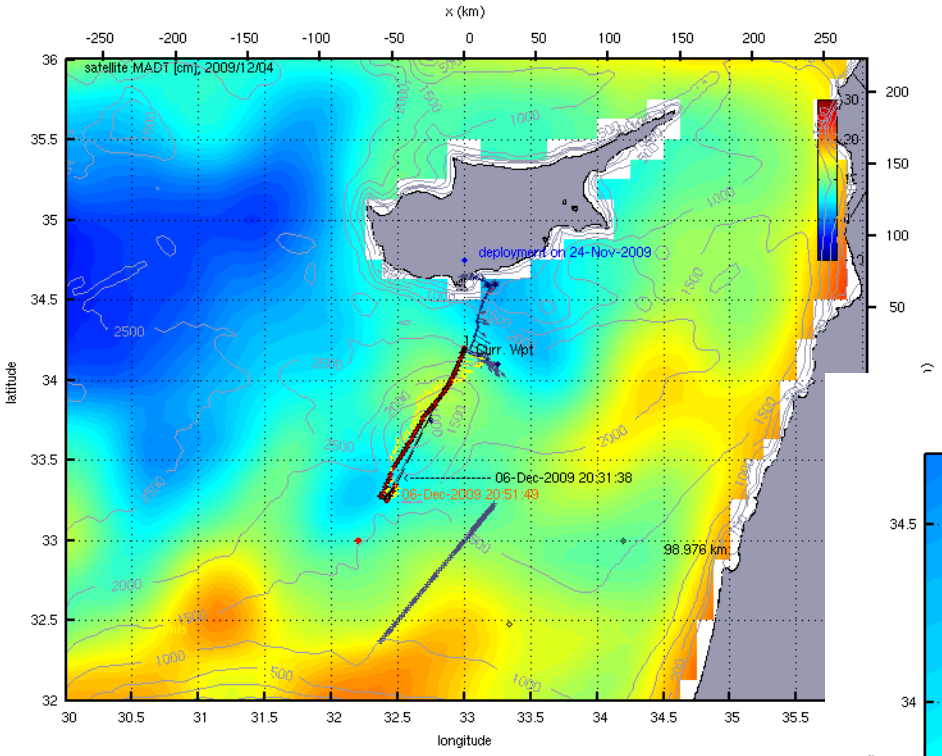




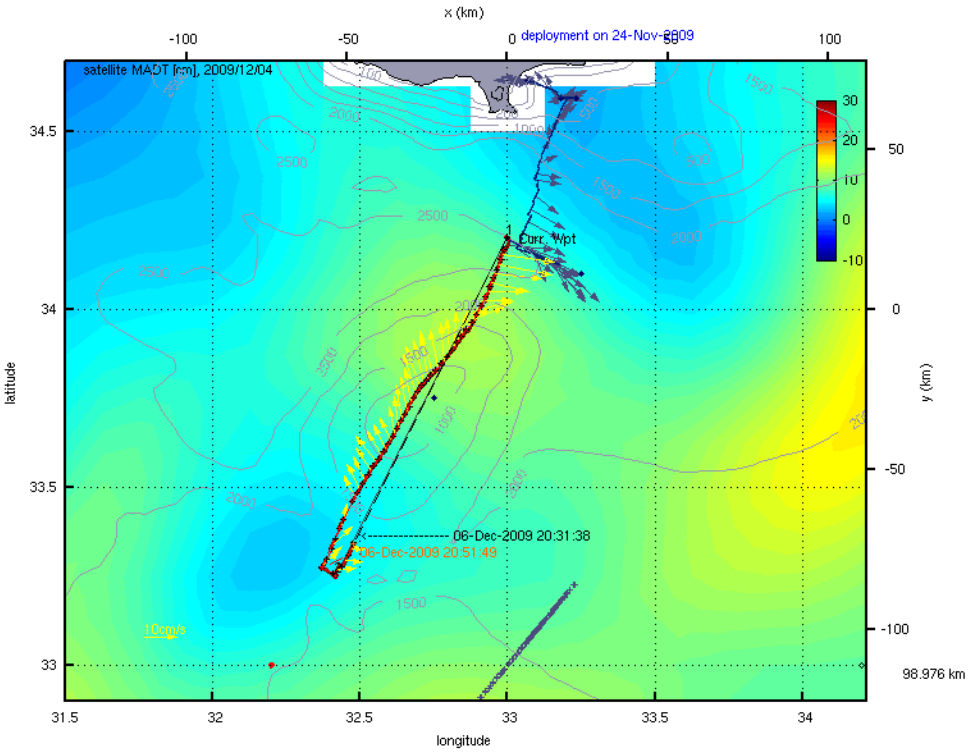


EYE of the Levantine

Remote Sensing - SLA



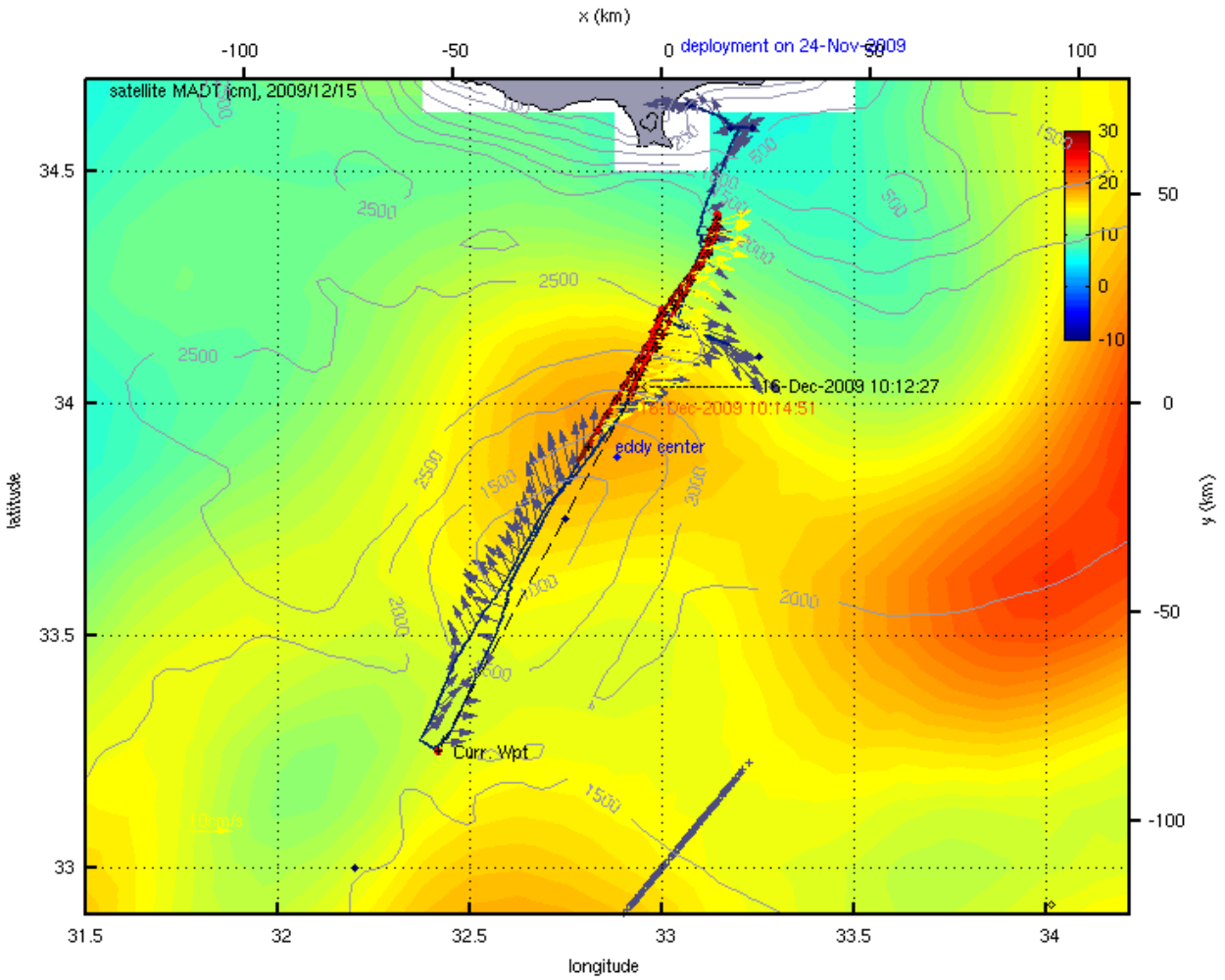
- Four gliders sampling the eddy
- Currents and sea level image show eddy position



EYE of the Levantine

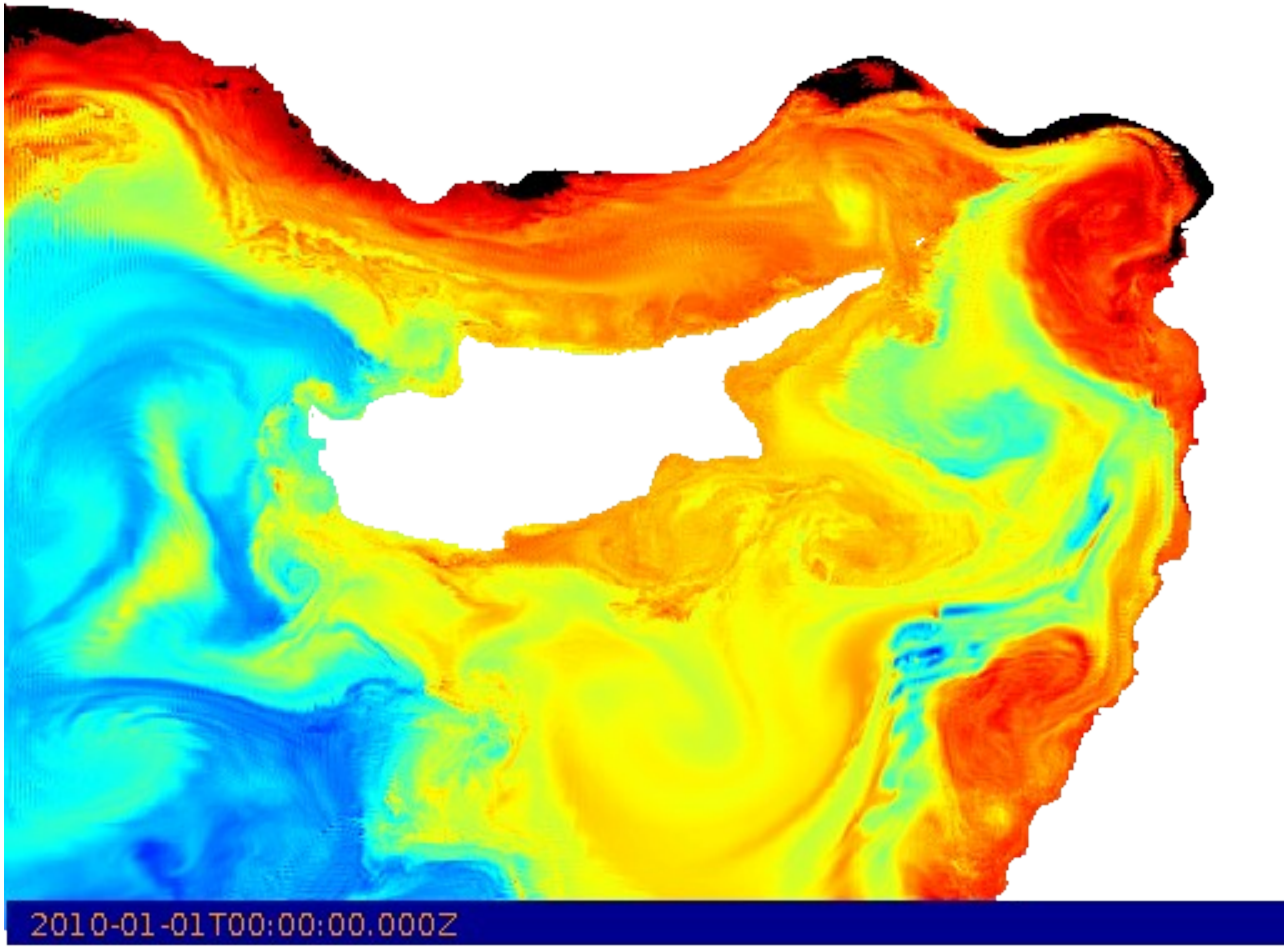
Remote Sensing - SLA

- Sea Level Anomaly
- December 2009 – Feb 2010
- Glider velocities co-located



EYE of the Levantine
Operational Forecasts

- 1-30 Jan 2010, Salinity 120 m from Cyprus 1 km POM



The Sequel
2010-2011 glider mission

- 18-31 October 2010, Salinity 120 m from Cyprus 1 km POM