The LIgurian Dispersion EXperiment 2010 (LIDEX10): drifter and glider preliminary results.

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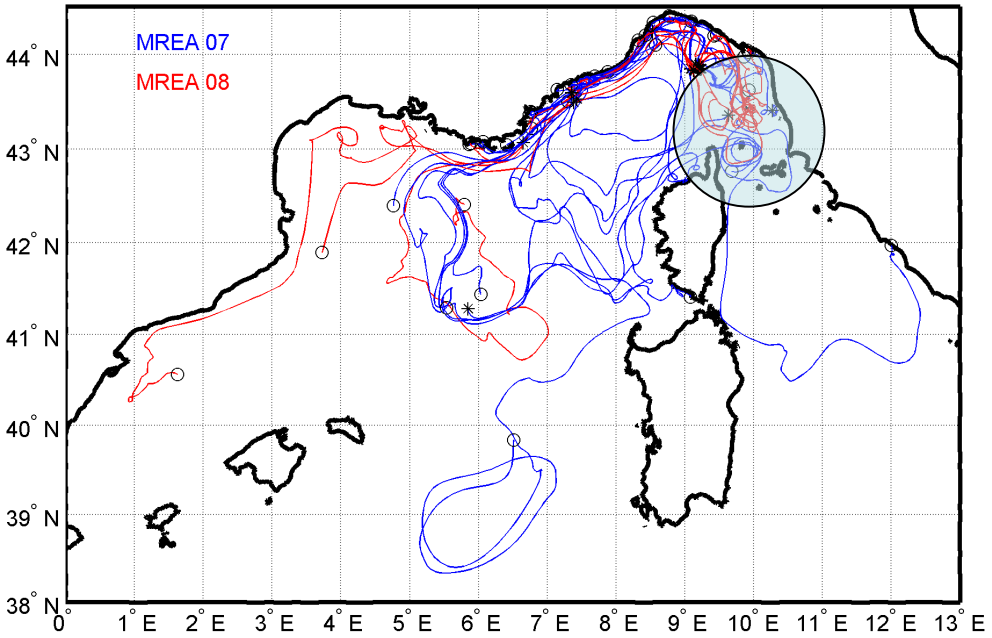
5th EGO Meeting and Glider School
2011 March 14th-18th
Gran Canaria /// SPAIN
ego2011.plocan.eu

The LIDEX10 experiment

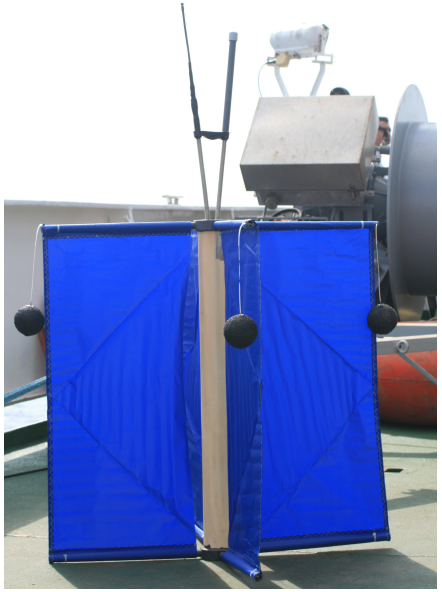
•The experiment plan was based on the results from the previous MREA07-MREA08 experiments in the Ligurian Sea (Schröeder K. et al., 2011. Deep Sea Research I, 58(3), 209-228 & Poulain P.-M. et al. Scientia Marina, submitted)

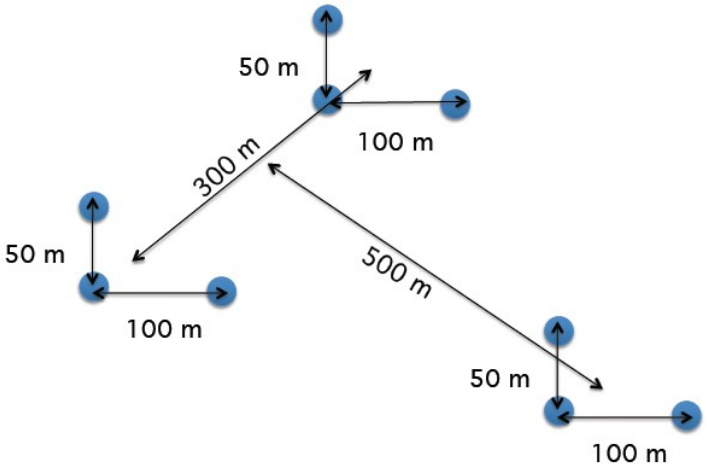
•The LIDEX10 experiment focused on the properties of sub-mesoscale to mesoscale relative dispersion in the eastern Ligurian Sea



The LIDEX10 experiment

•The drifter deployment strategy involved triplet launchings



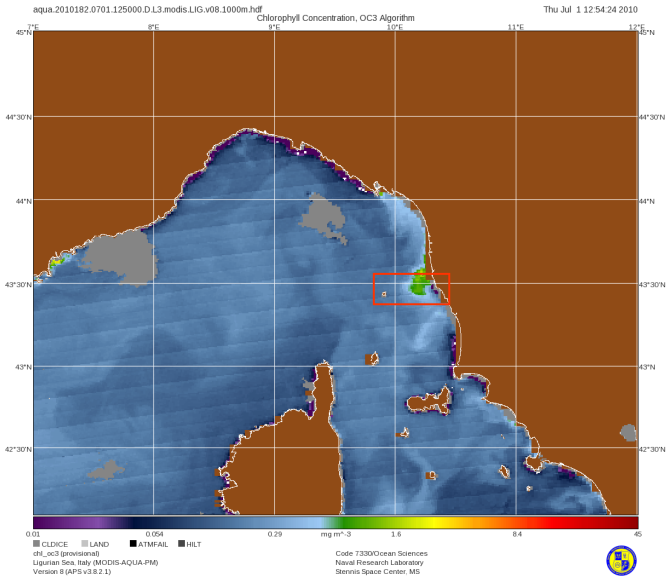


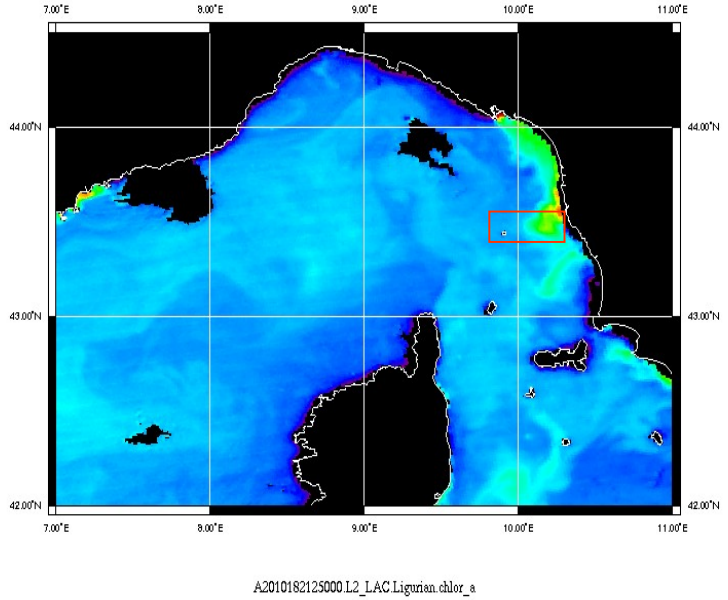
•The drifter measurements were complemented by glider (EGO Slocum - 200m) measurements in the same area, to provide subsurface information

•Timing: deployments: 3 July 2010 (21 drifters + 1 float + 1 glider)
glider recovery: 21 July 2010 (after 18 days)
drifters provided useful data till October 2010

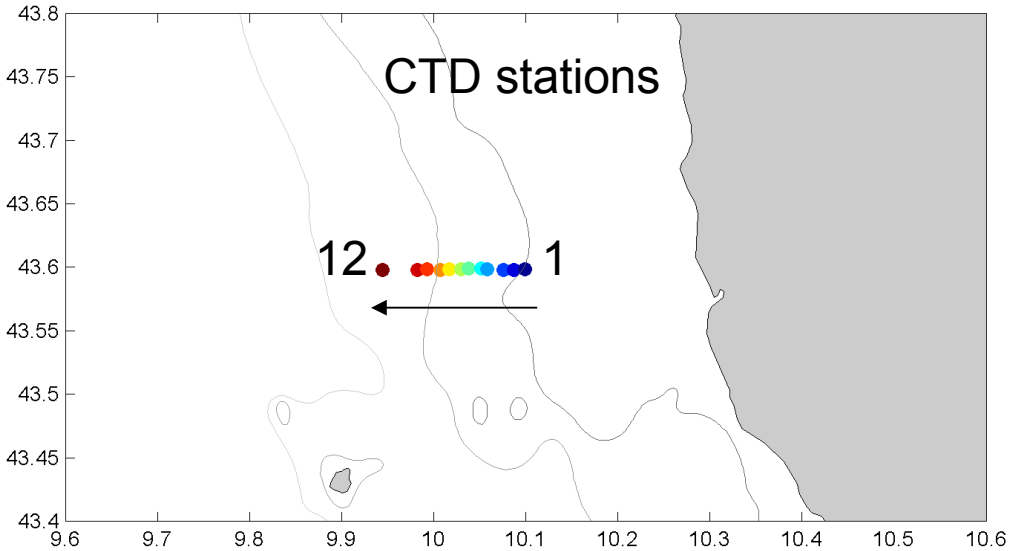
•The dispersion experiment was repeated in late August 2010 (REP10 experiment) in cooperation with the NATO Undersea Research Center (NURC)

Determination of the front associated with the Arno River Plume

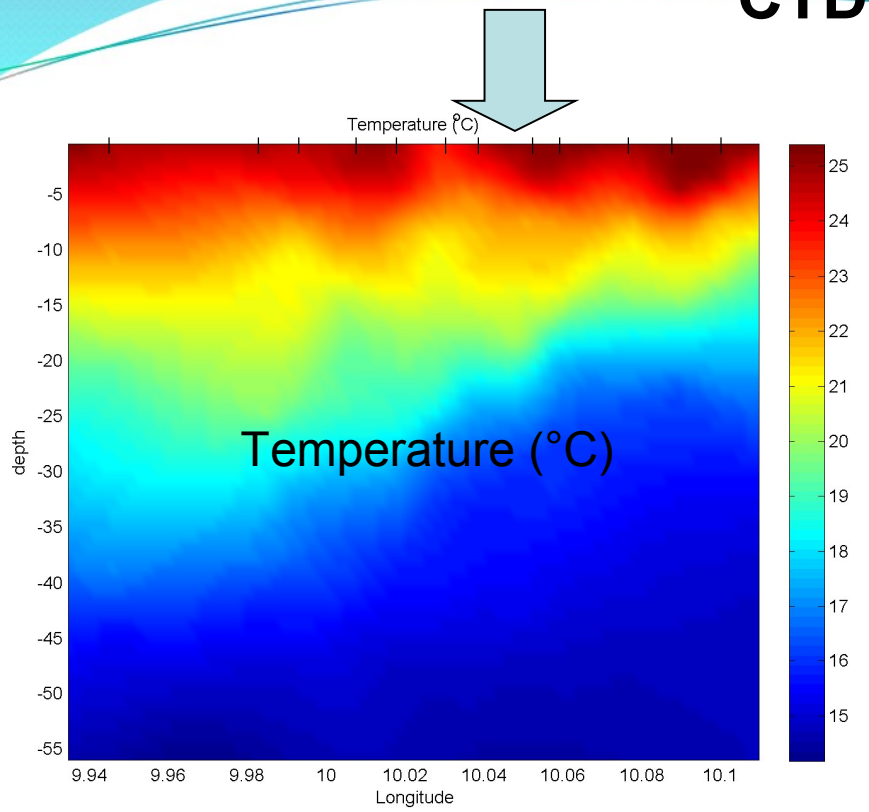


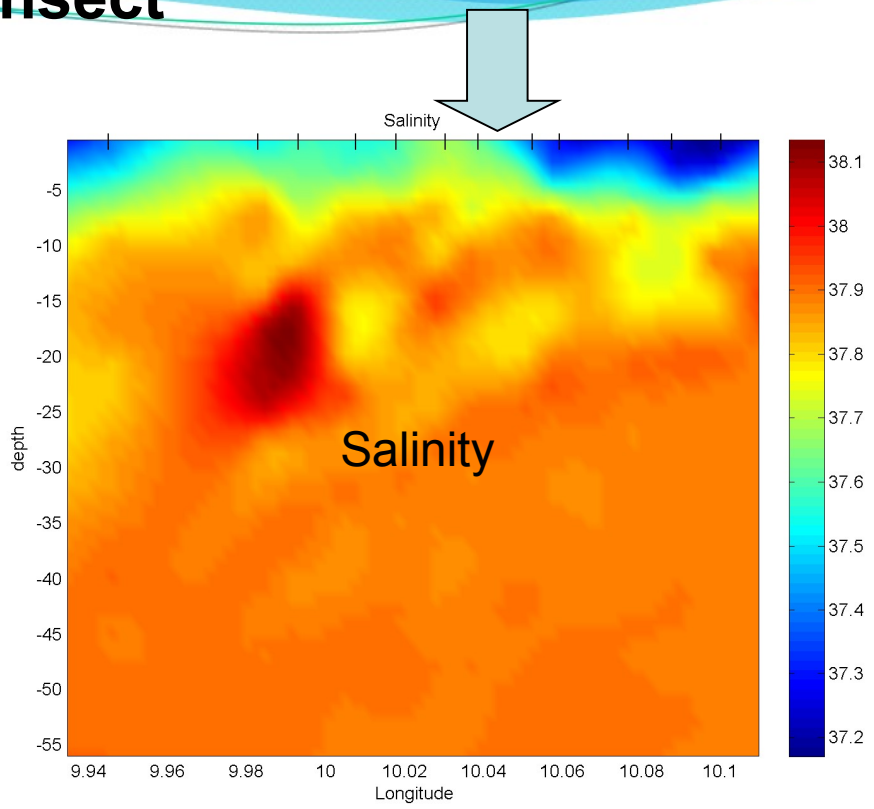


Satellite products and CTD casts were used to fine-tune the drifter deployment positions



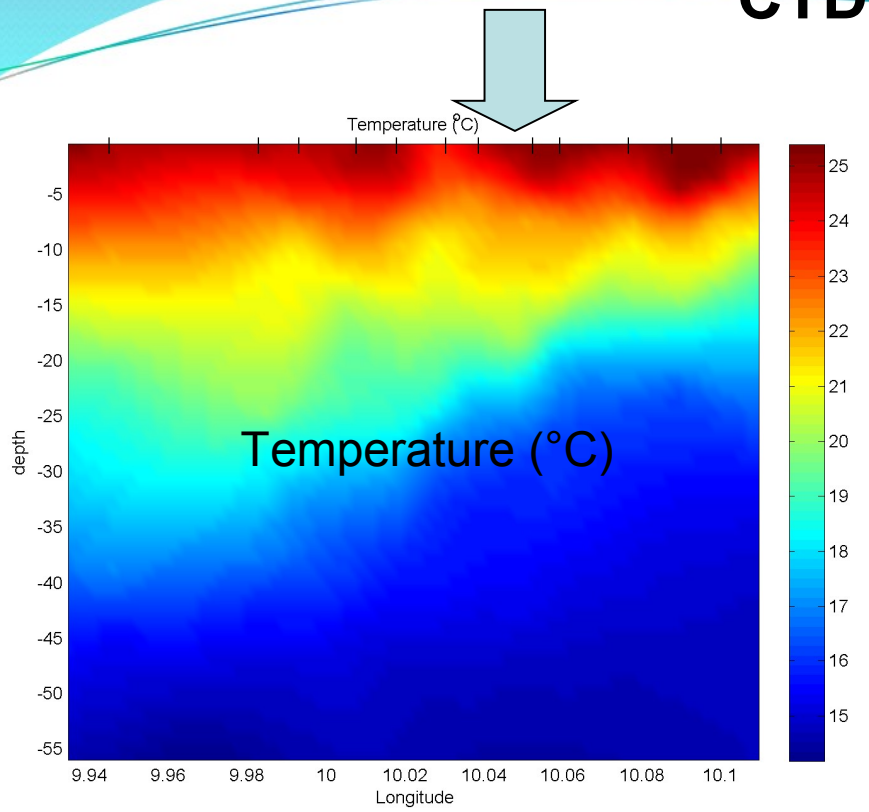
CTD transect

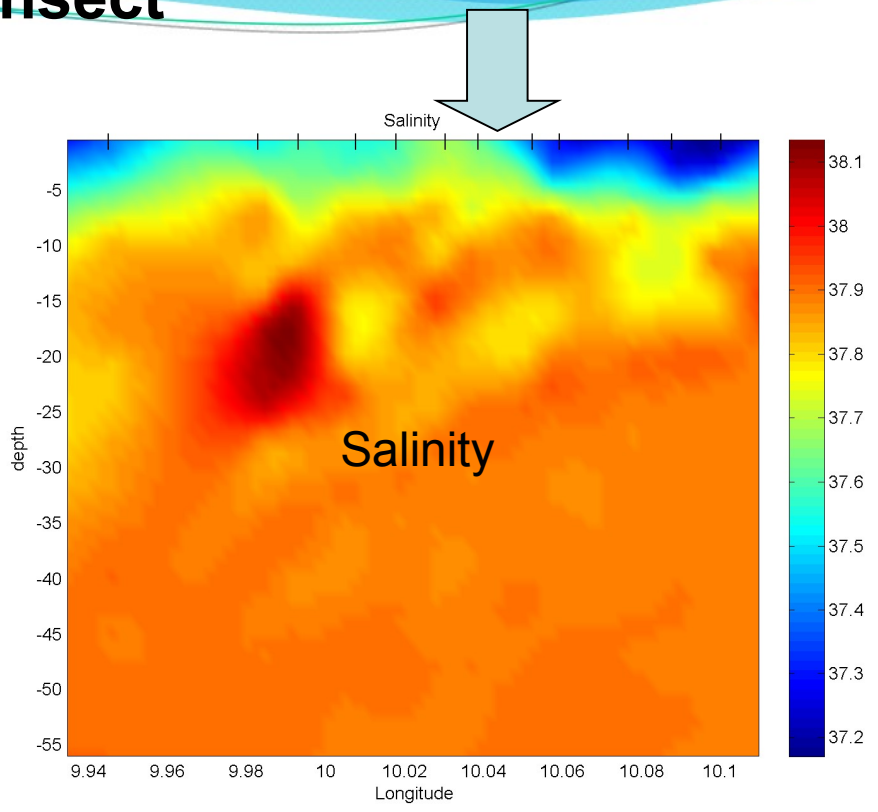


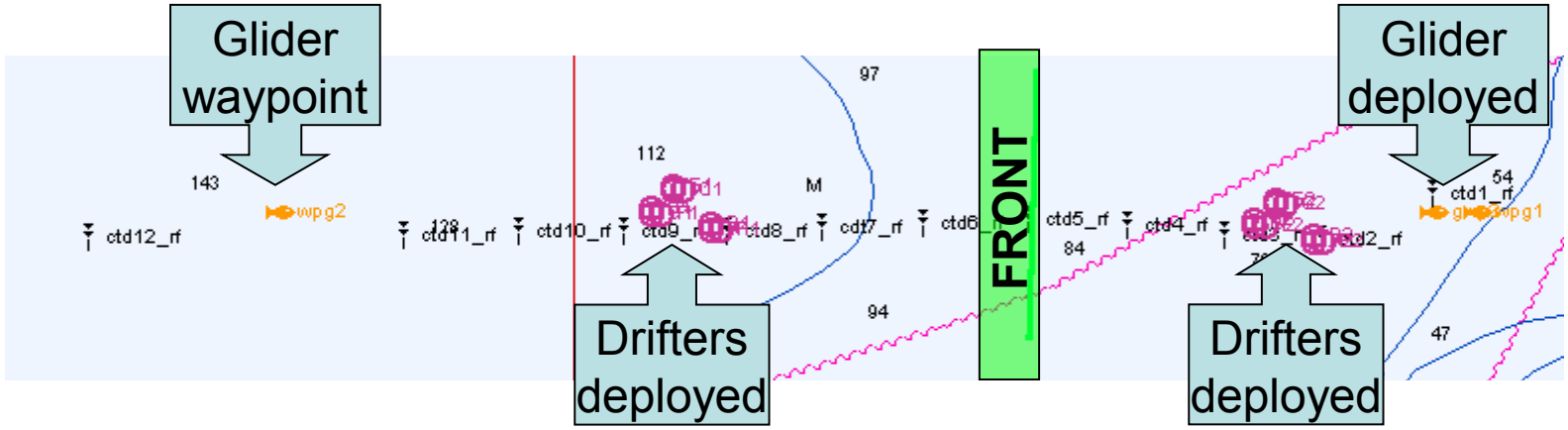


The front is located between stations 5 and 6

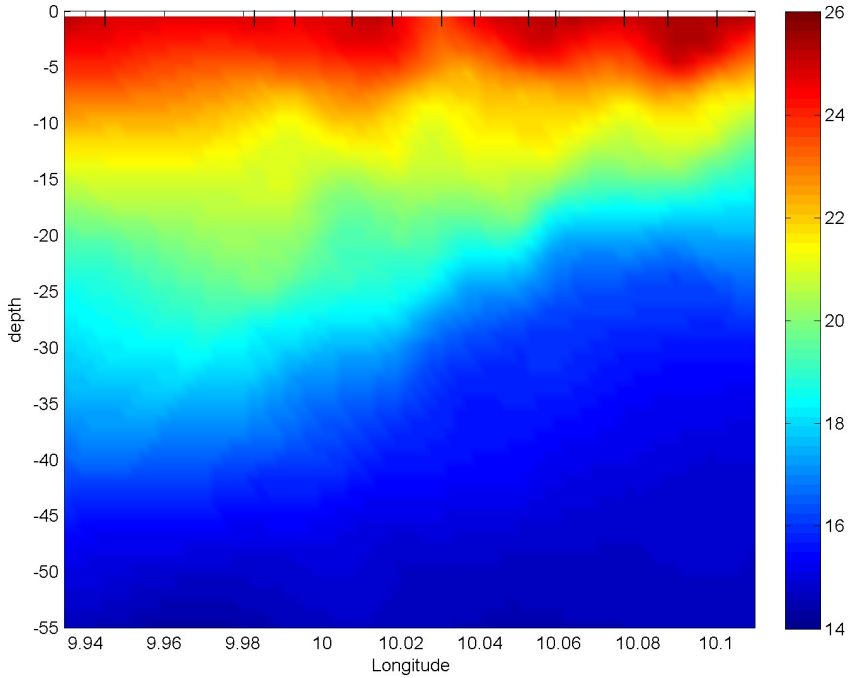
CTD transect

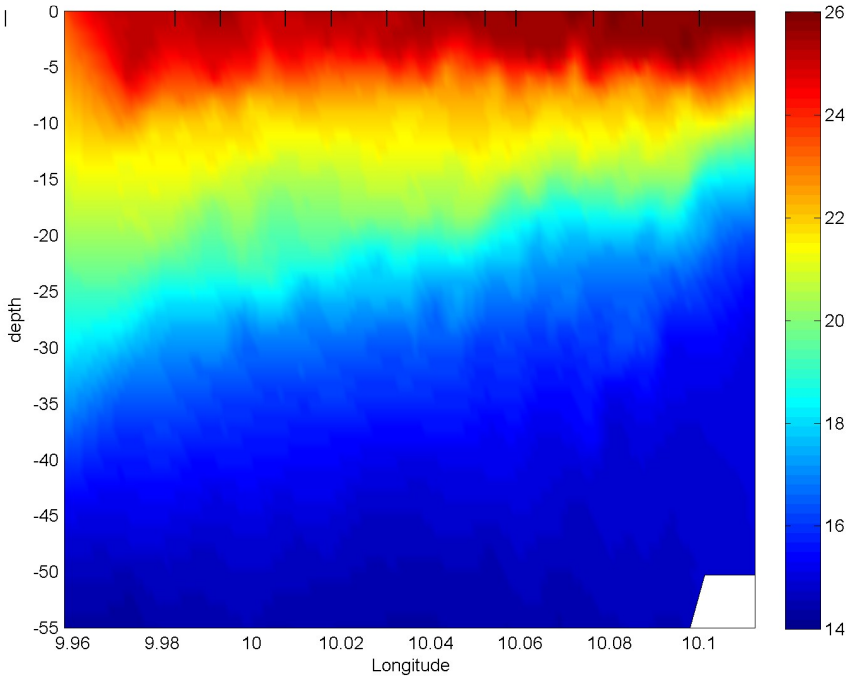






CTD vs glider: Temperature (°C)

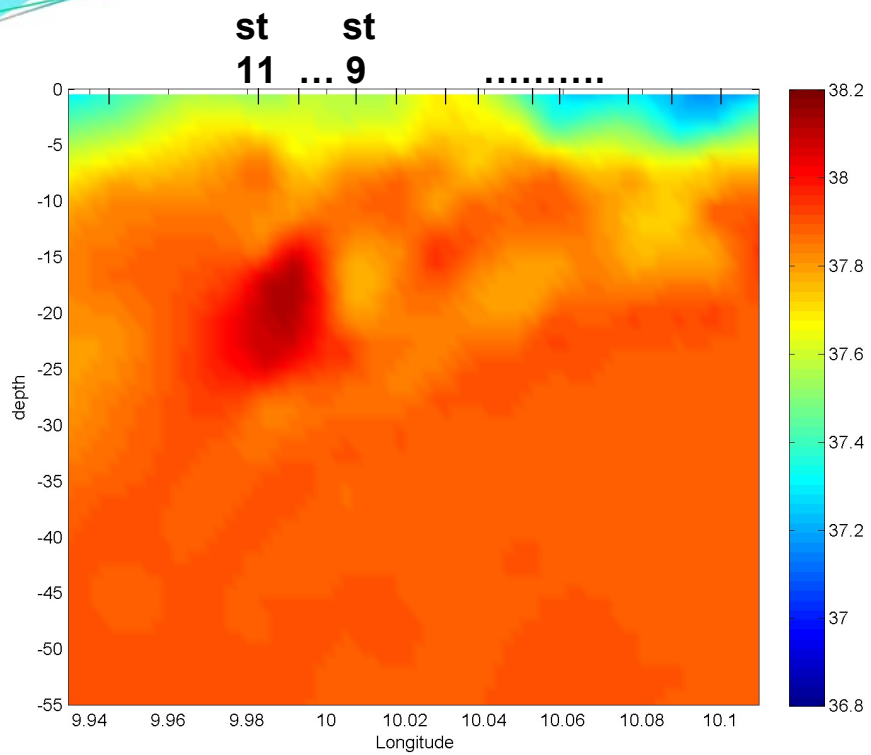


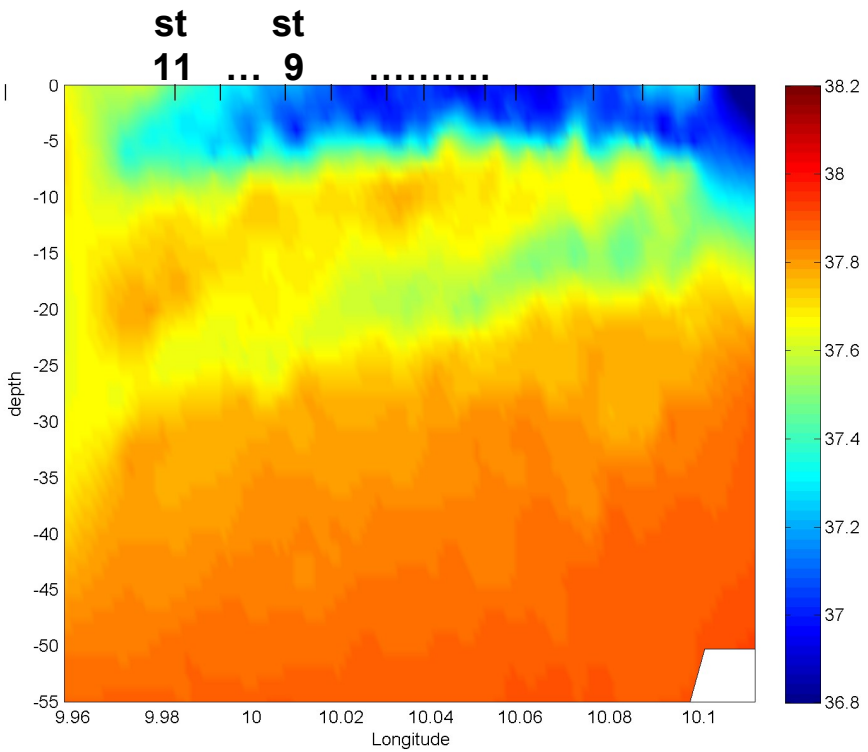


Glider transect: a bit shorter
CTD transect: 8:00-10:00
Glider transect: 19:30-5:30
Not concurrent: difference of about 15 h

Quite similar temperature field

CTD vs glider: Salinity

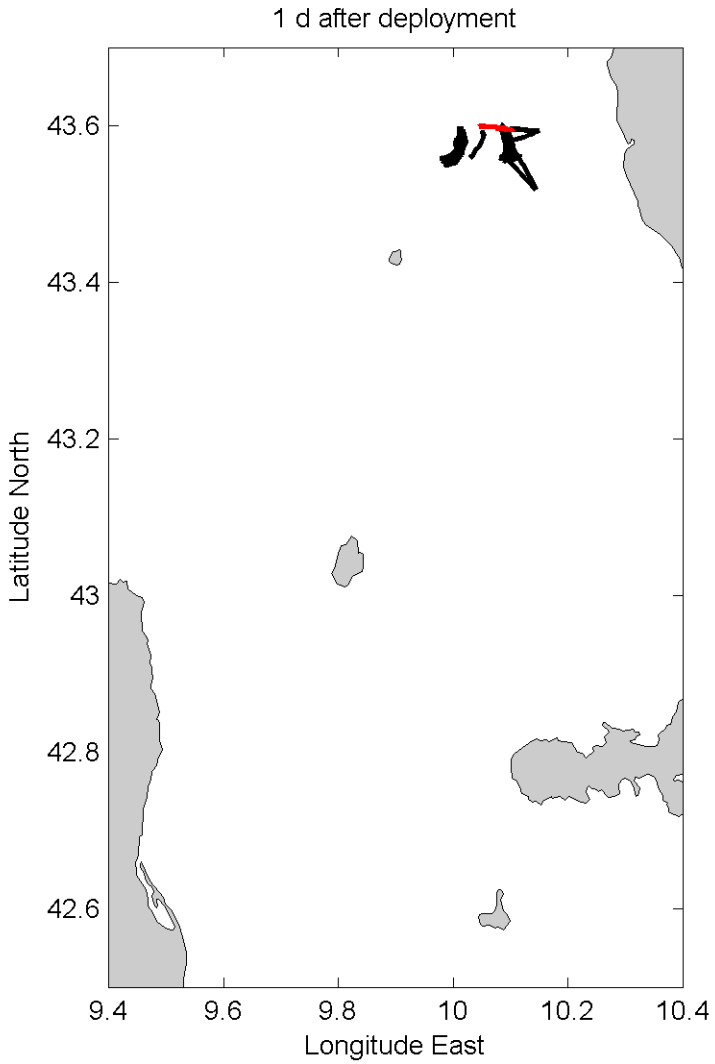




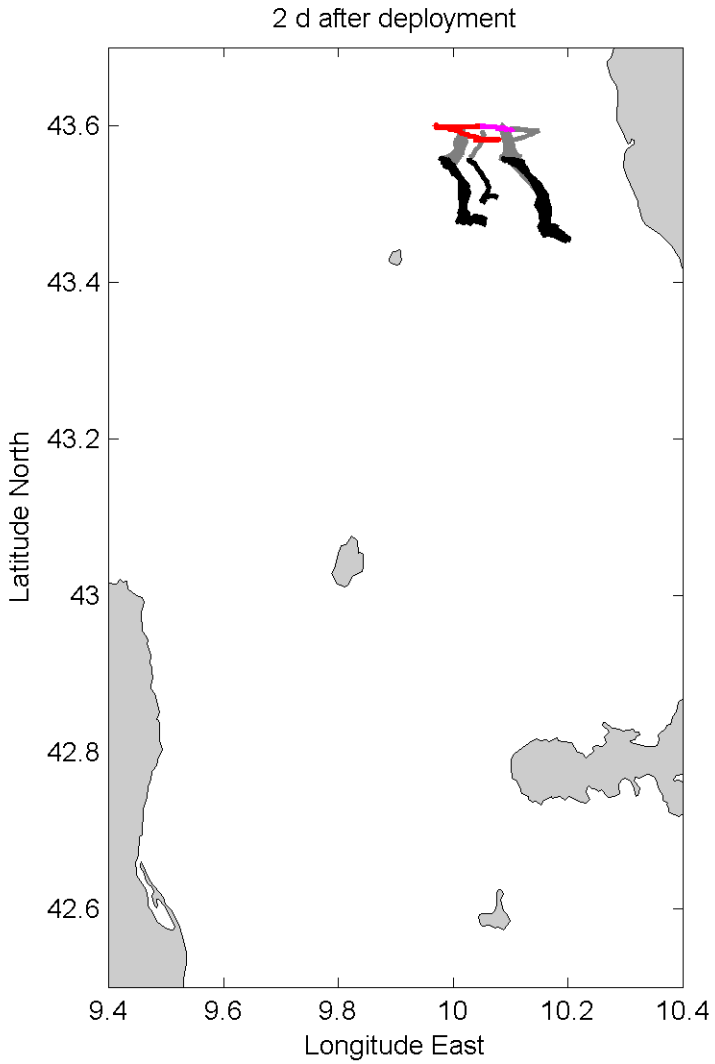
Glider transect: a bit shorter
CTD transect: 8:00-10:00
Glider transect: 19:30-5:30
Not concurrent: difference of about 15 h

Front moved westward (close to stations 9-11)
Clear fresh water intrusion (~20-25m, ΔS ~0.15) in the glider data
High salinity core shown by CTD data barely visible in the glider data

Drifter and Glider paths



Drifter and Glider paths



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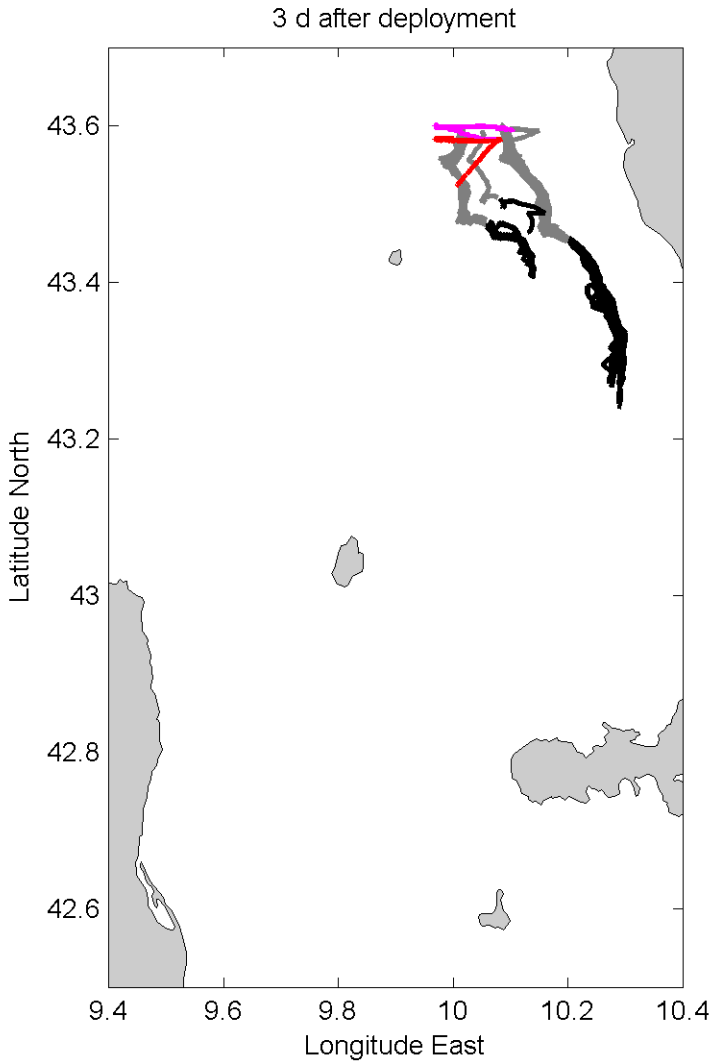

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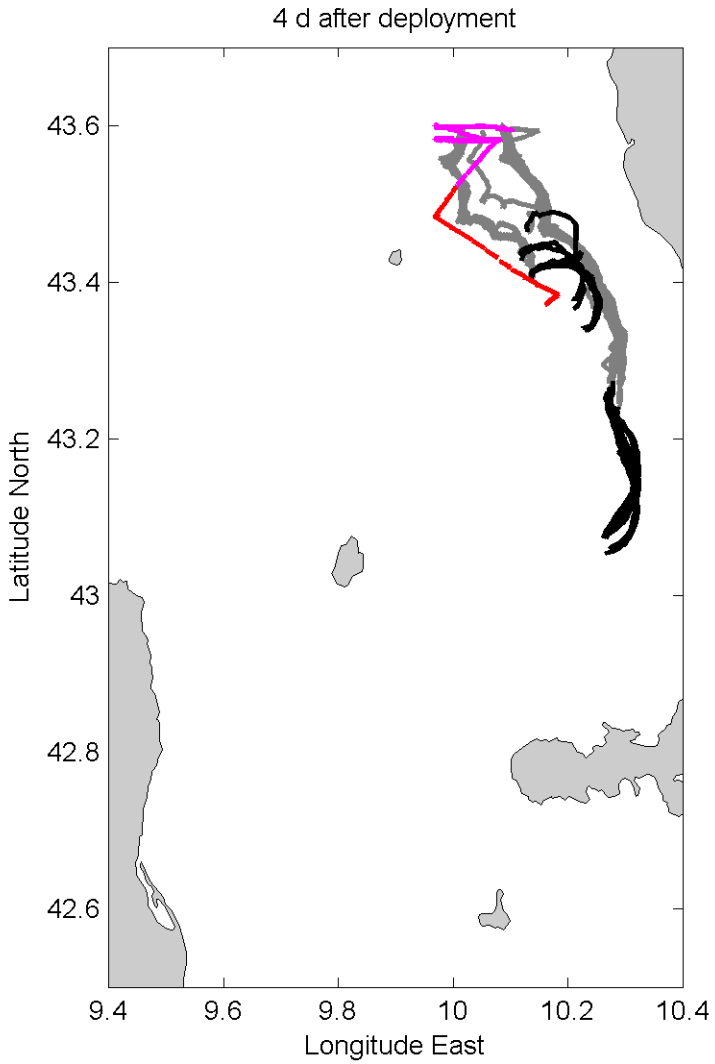

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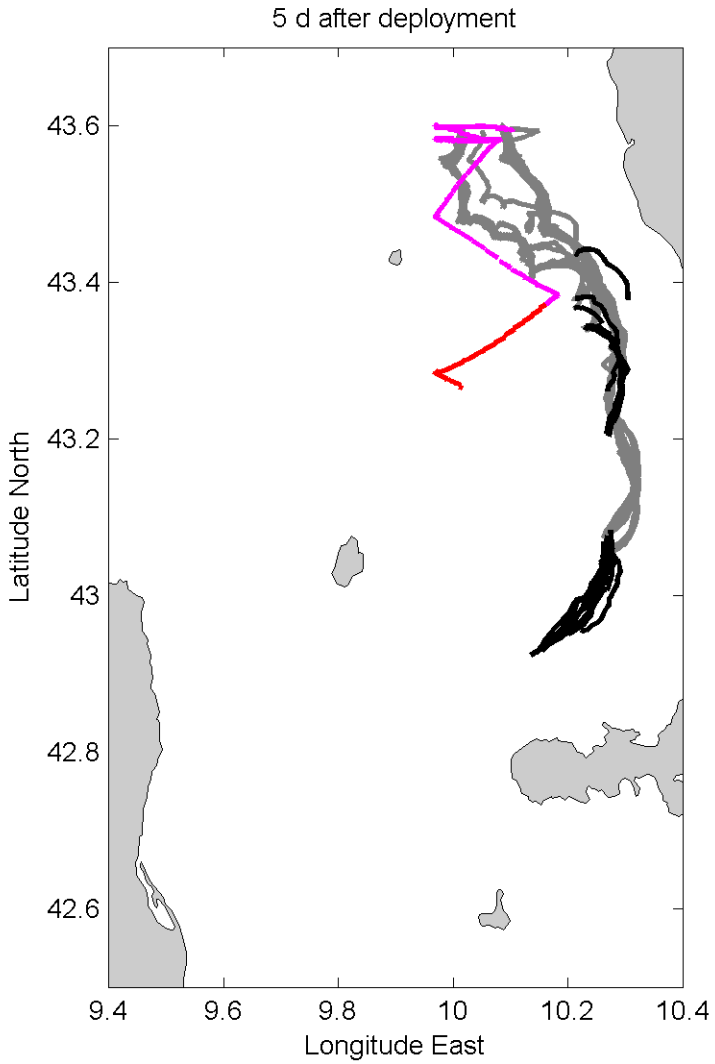

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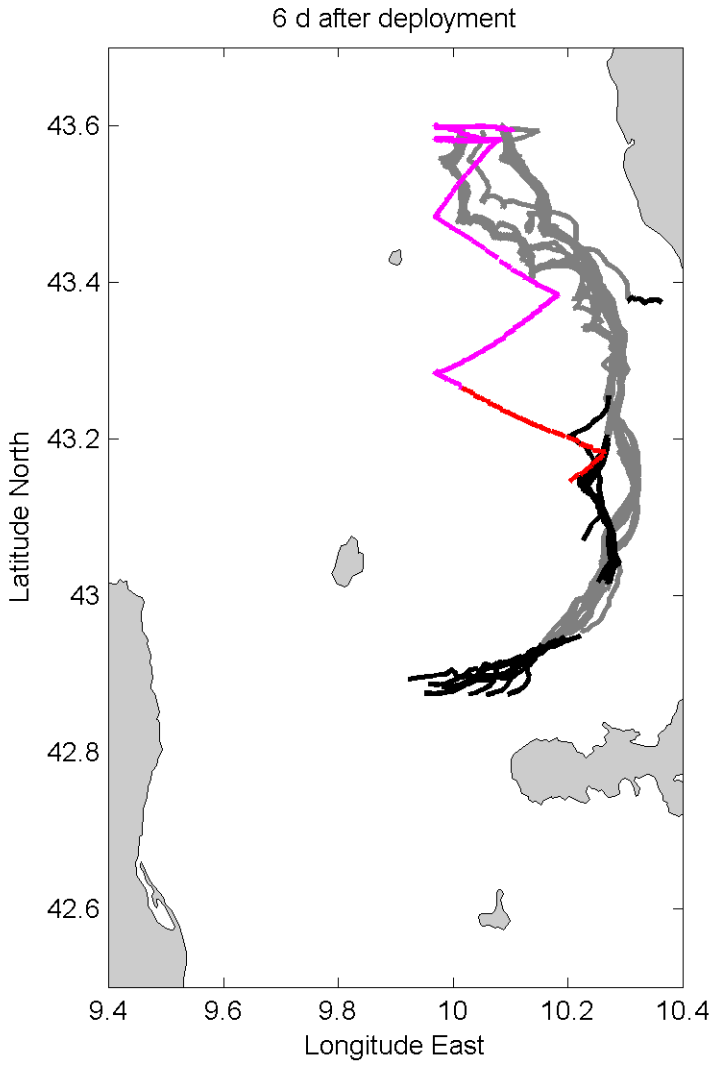

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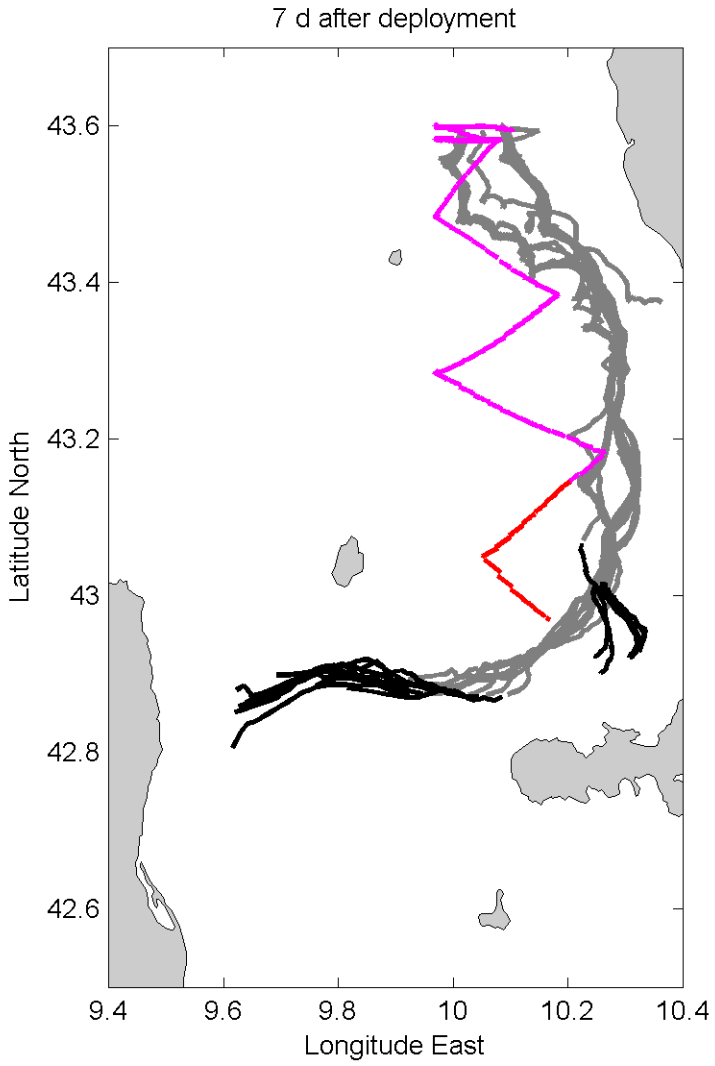

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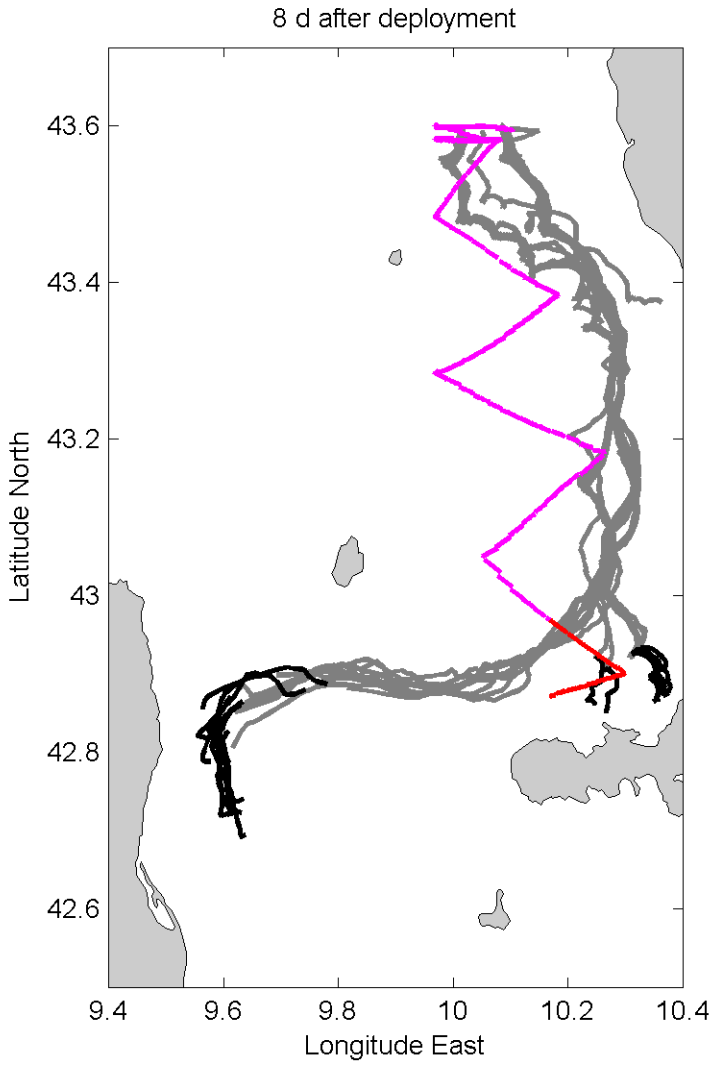

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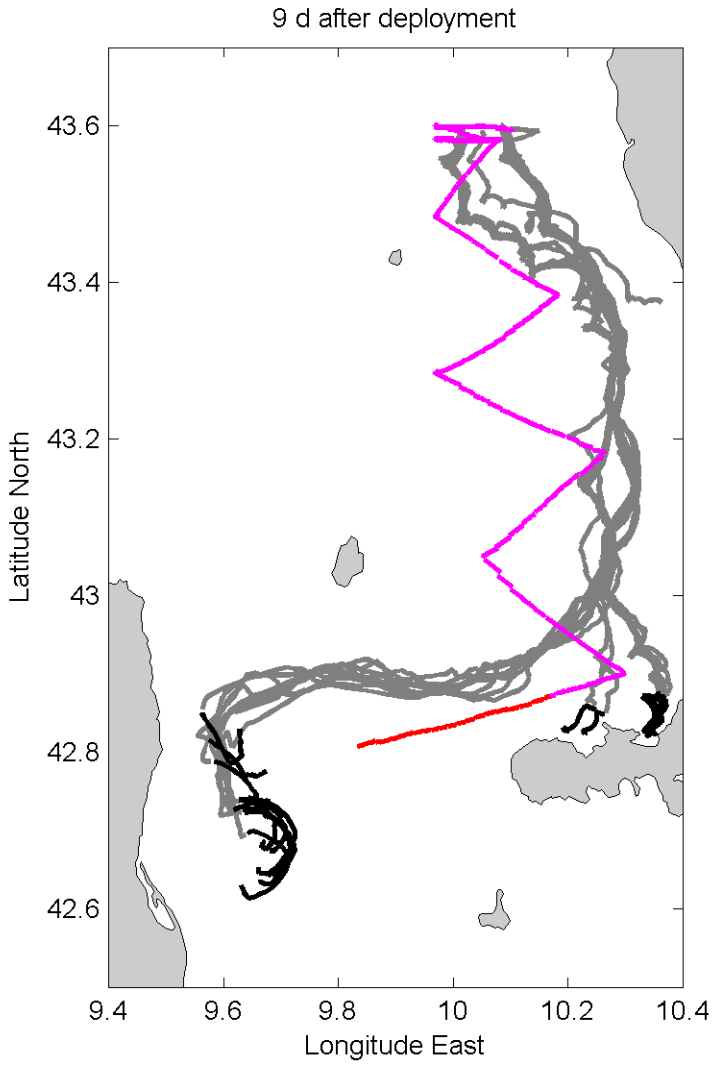

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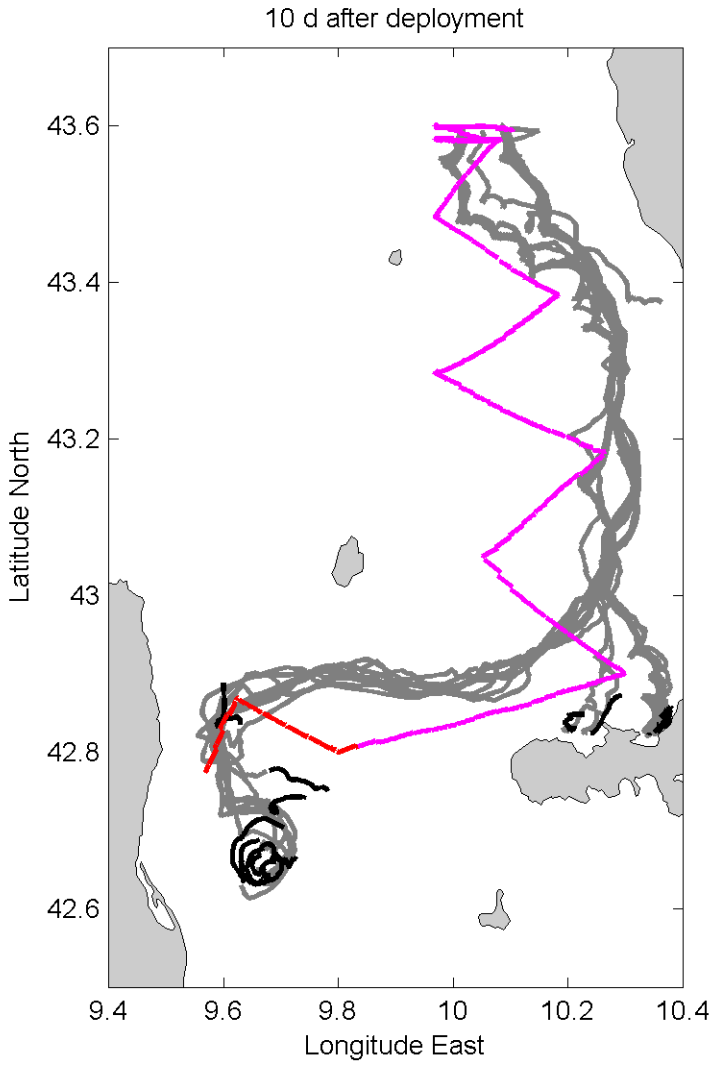

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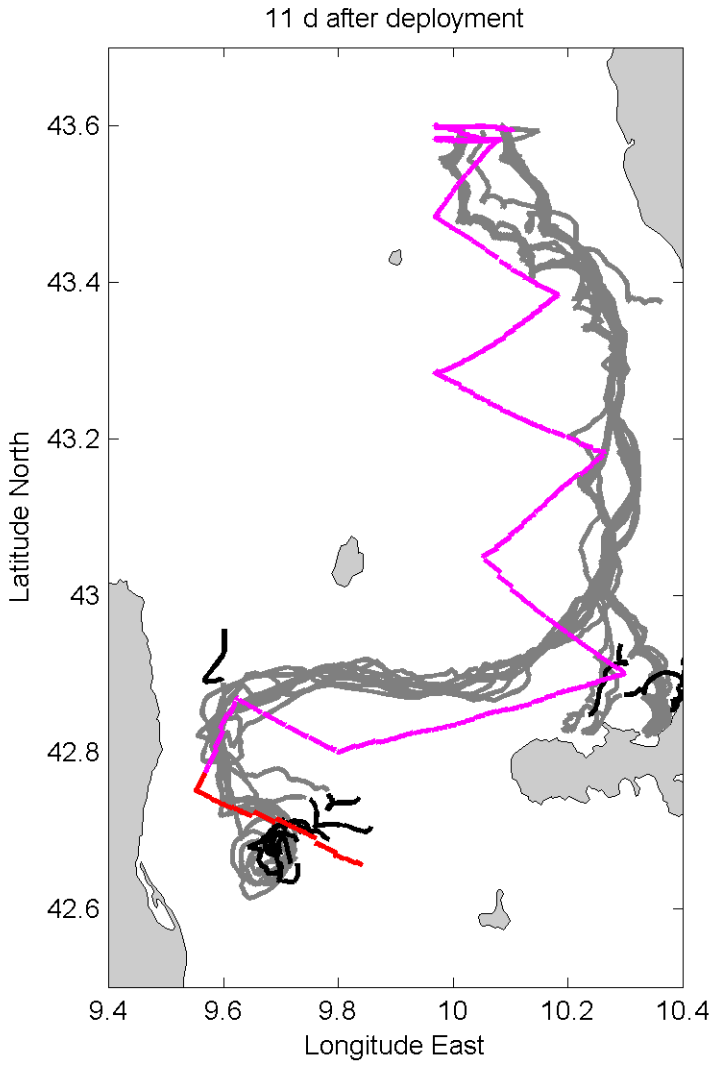

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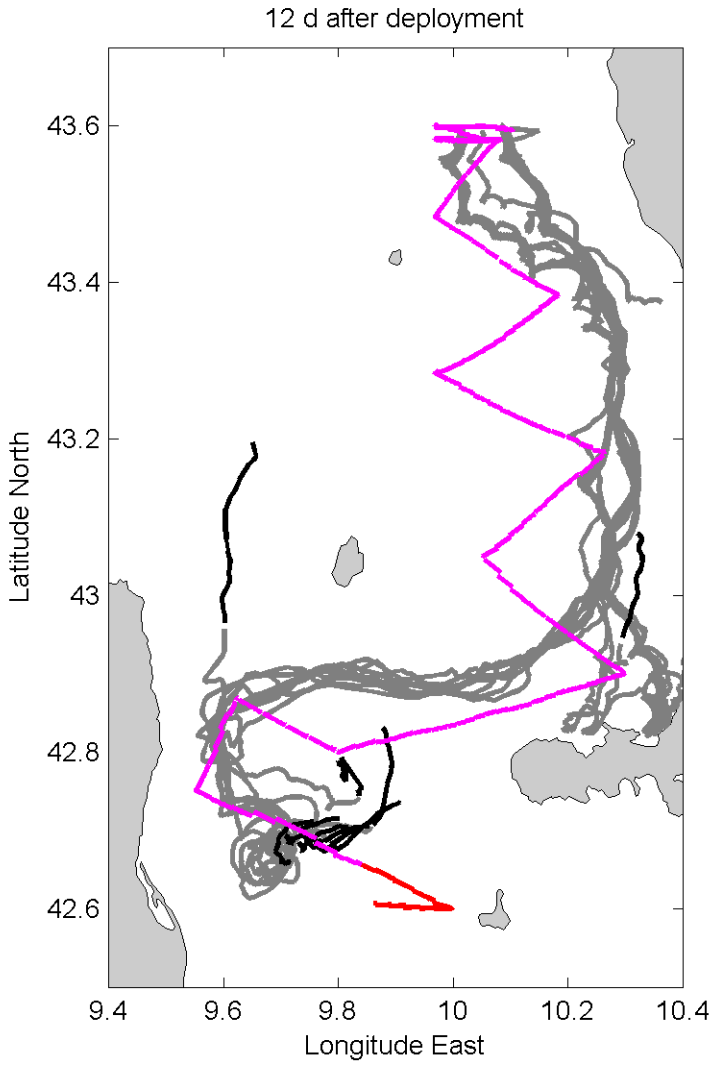

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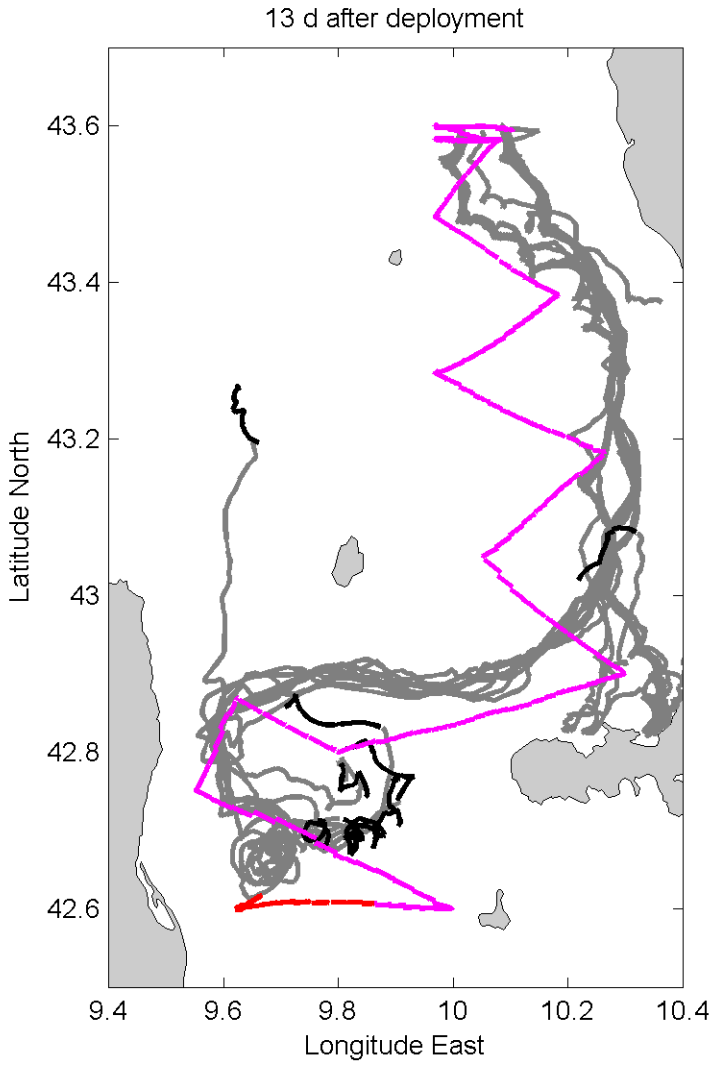

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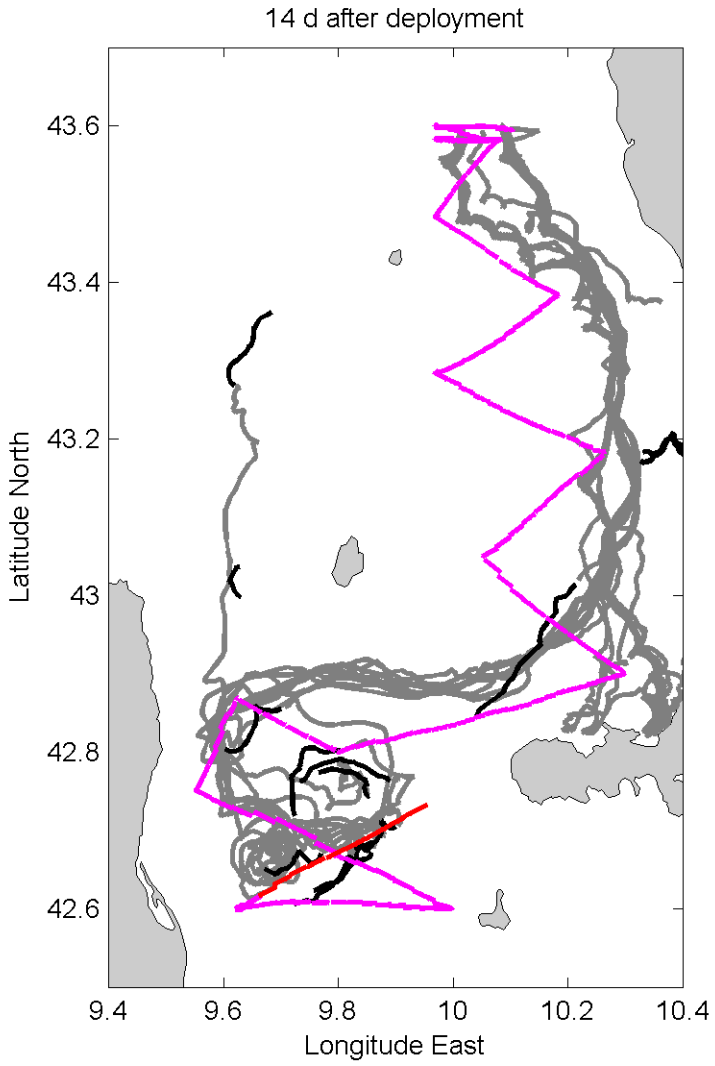

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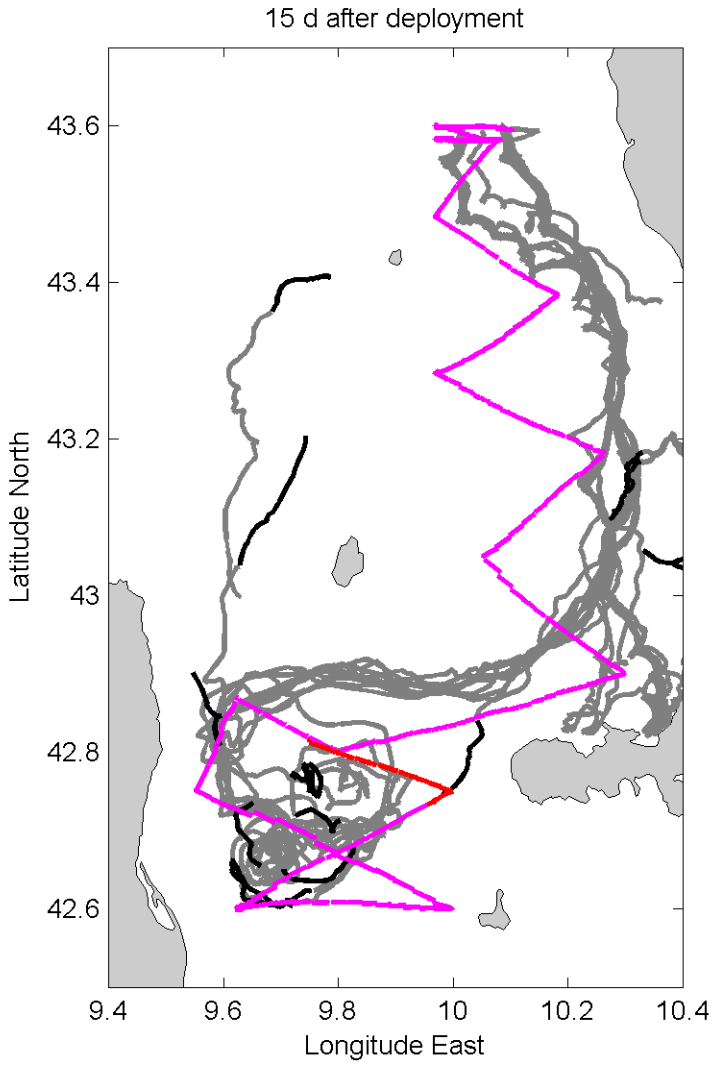

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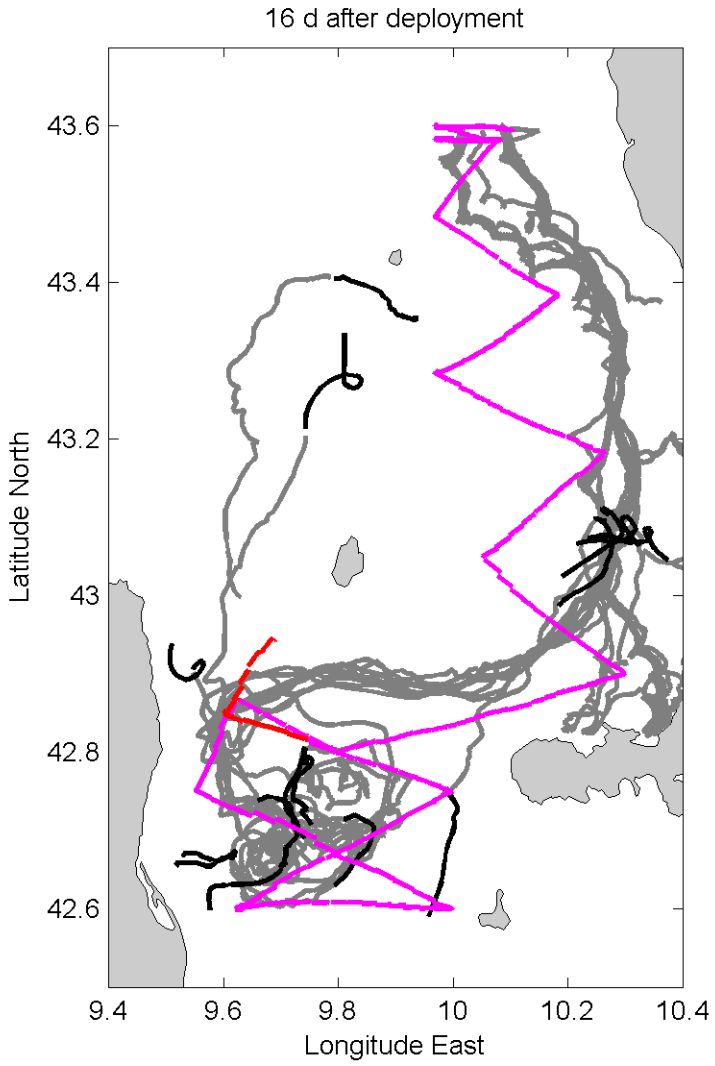

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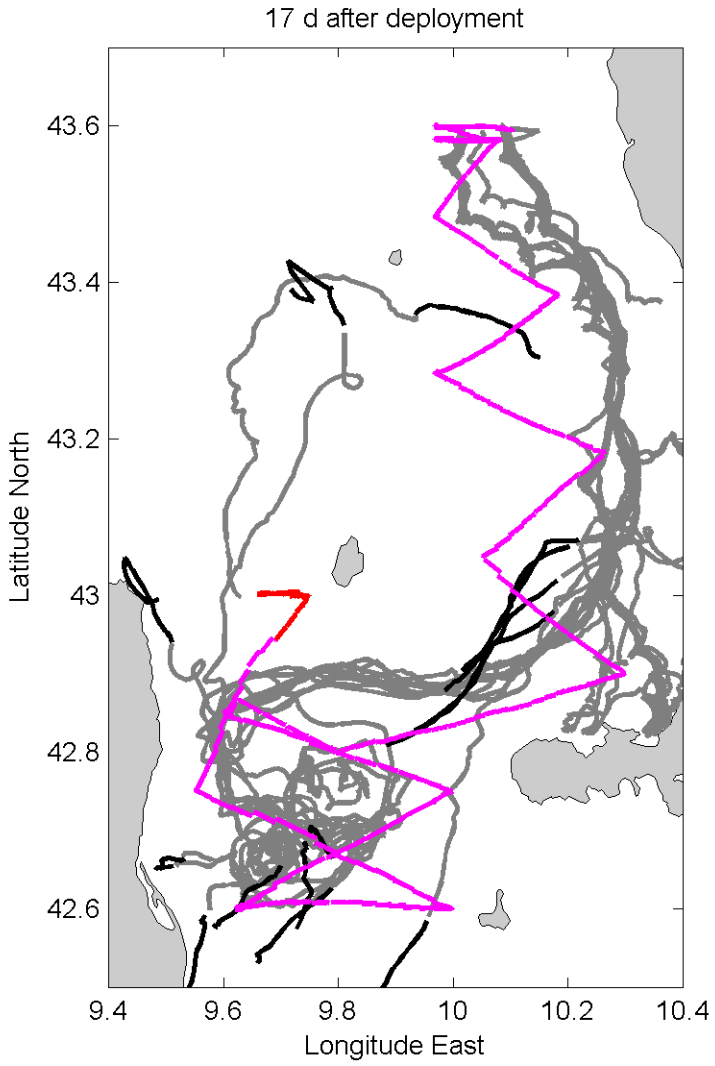
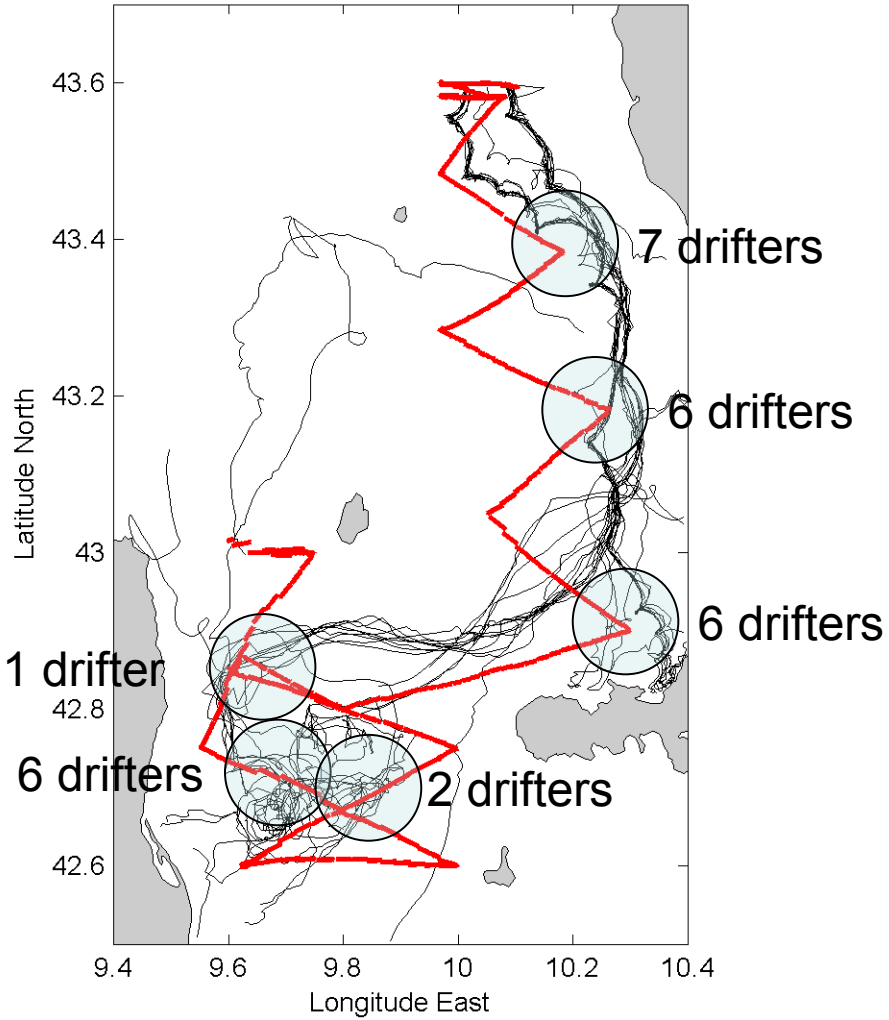
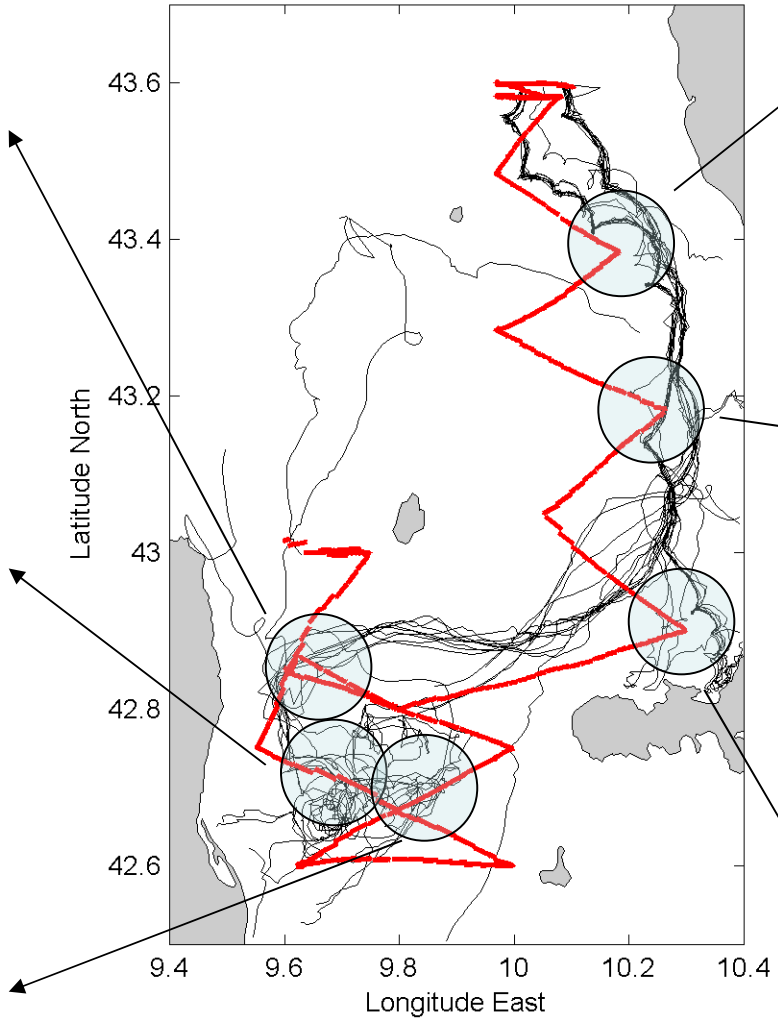


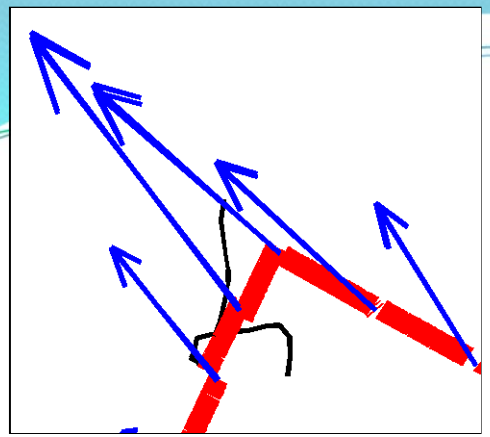
Concurrent drifter and glider measurements

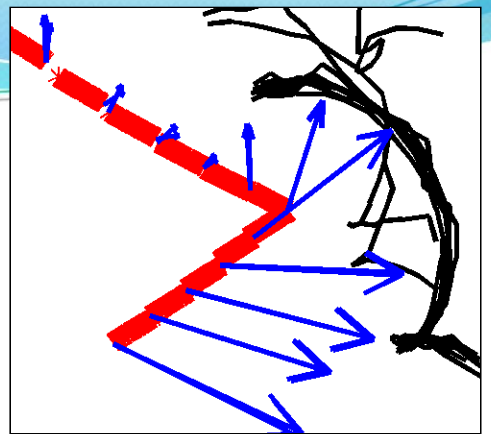


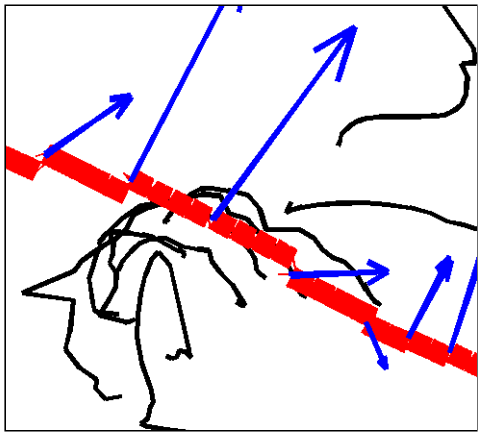
Radius: ½ nm
Time interval: 1d
Mean drifter speed: 3.3 cm/s
Mean Glider speed: 4.2 cm/s

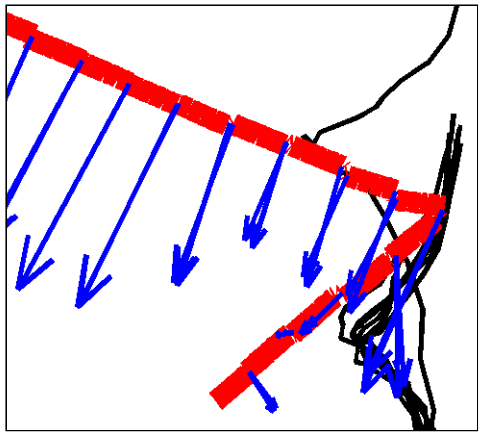
Mean water velocity as deduced by the Glider

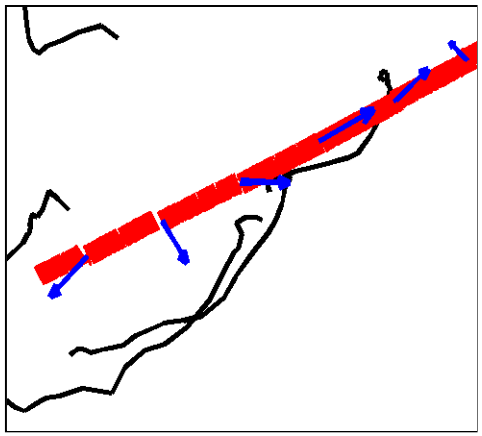


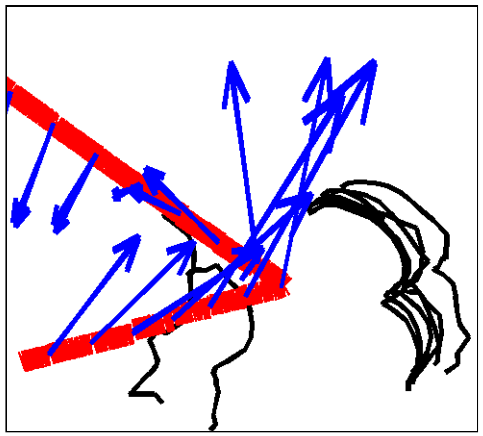




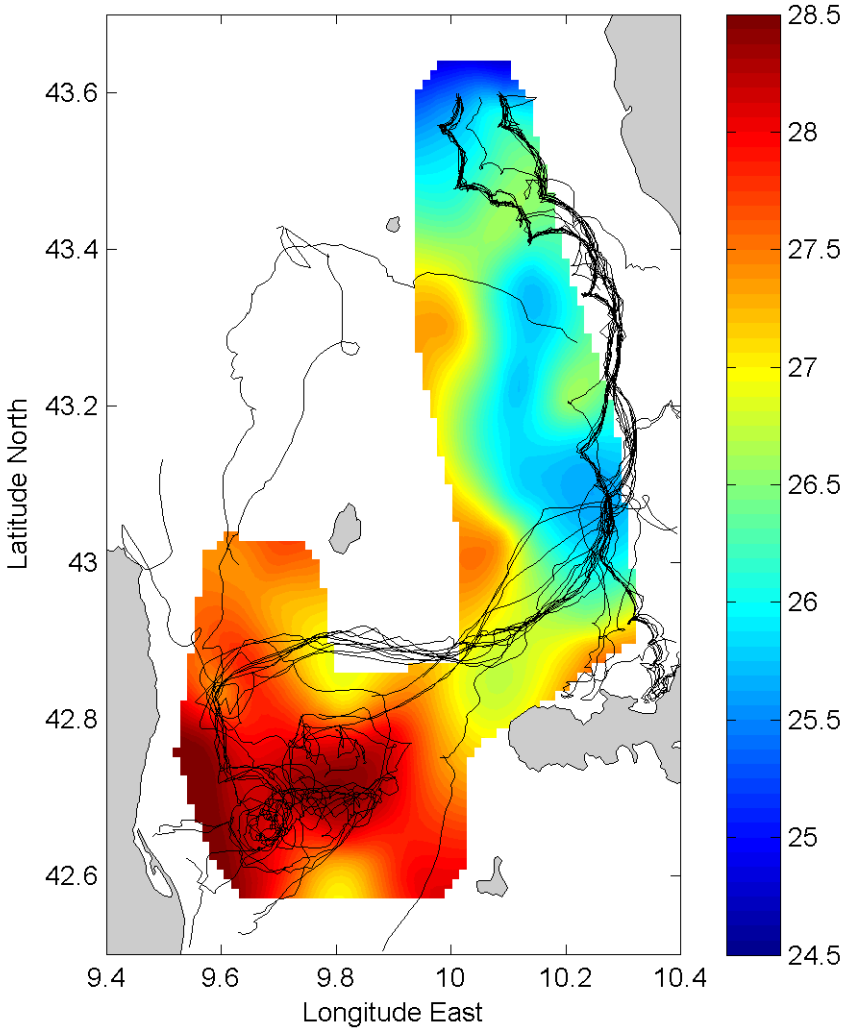




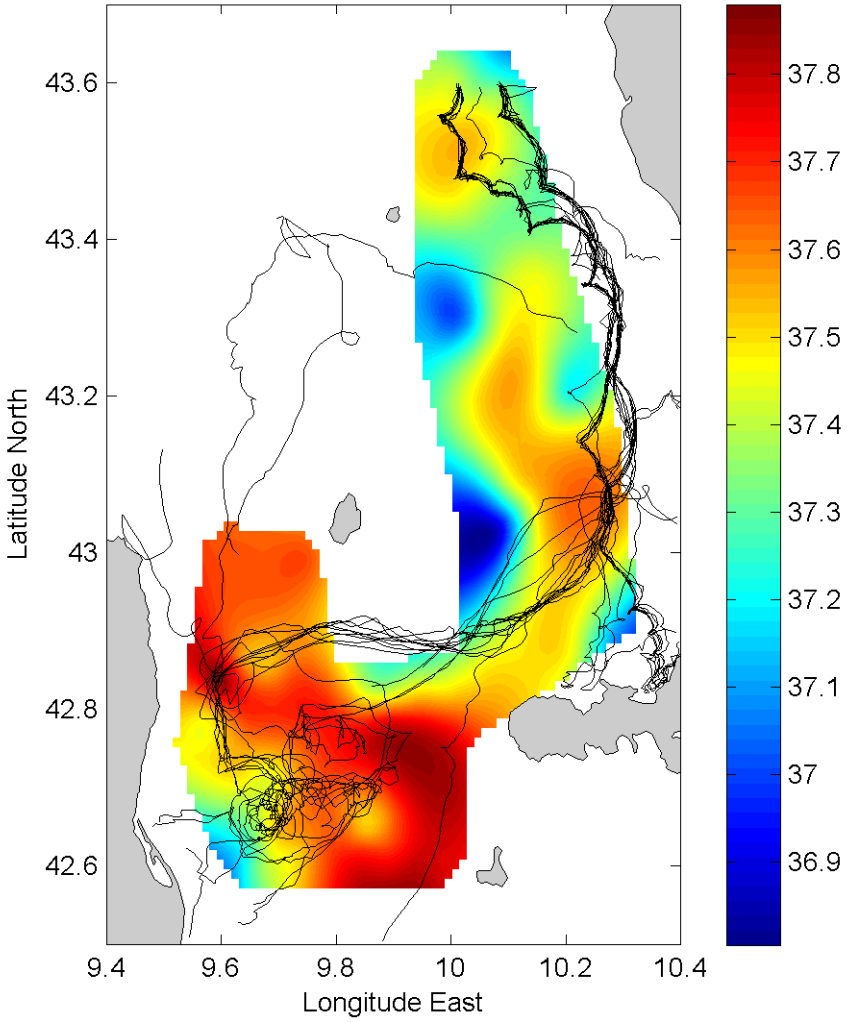




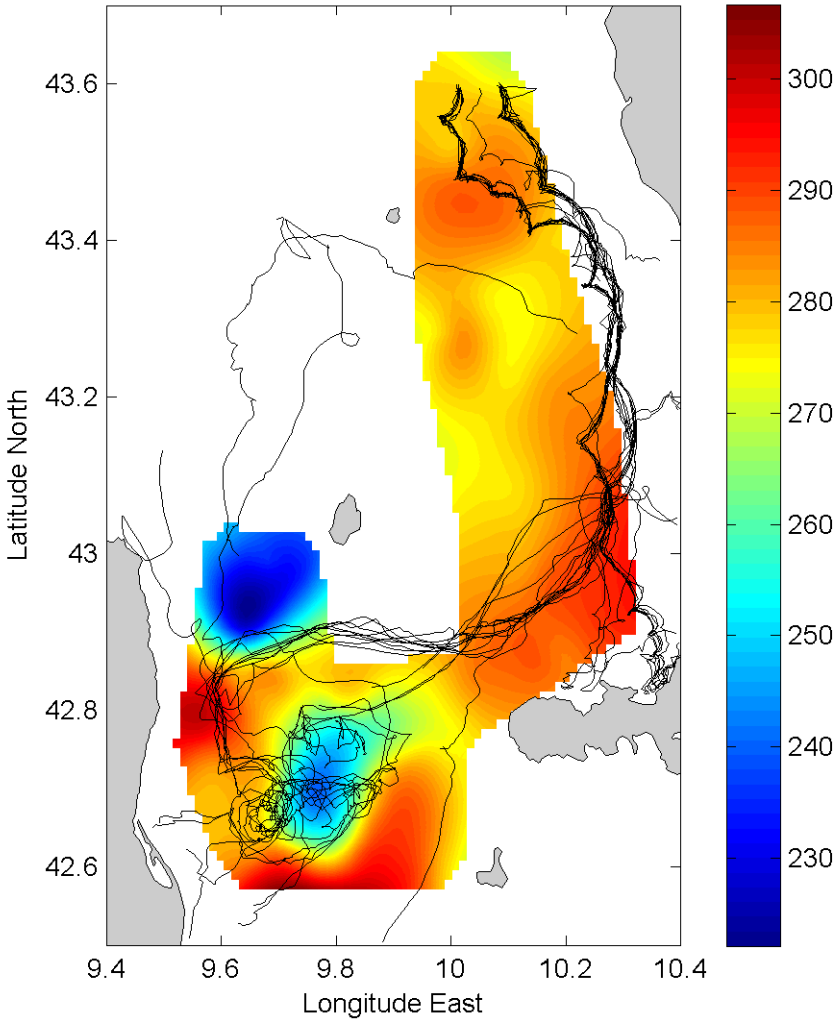
Surface glider temperature (°C) and drifter tracks



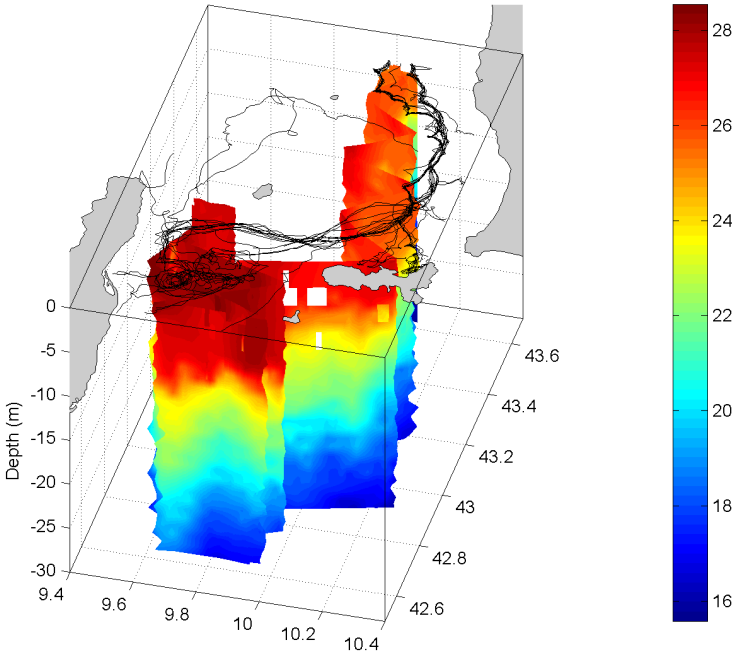
Surface glider salinity and drifter tracks



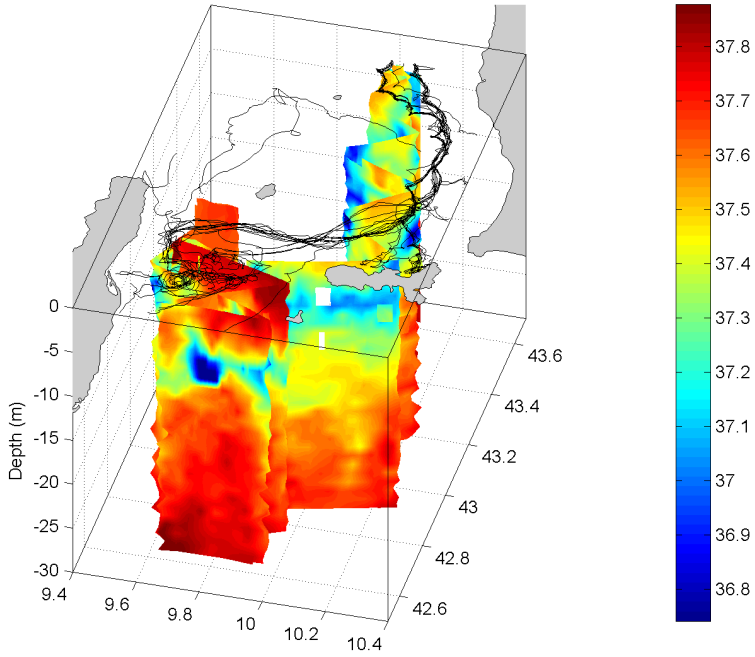
Surface glider dissolved oxygen (Mol/l) and drifter tracks



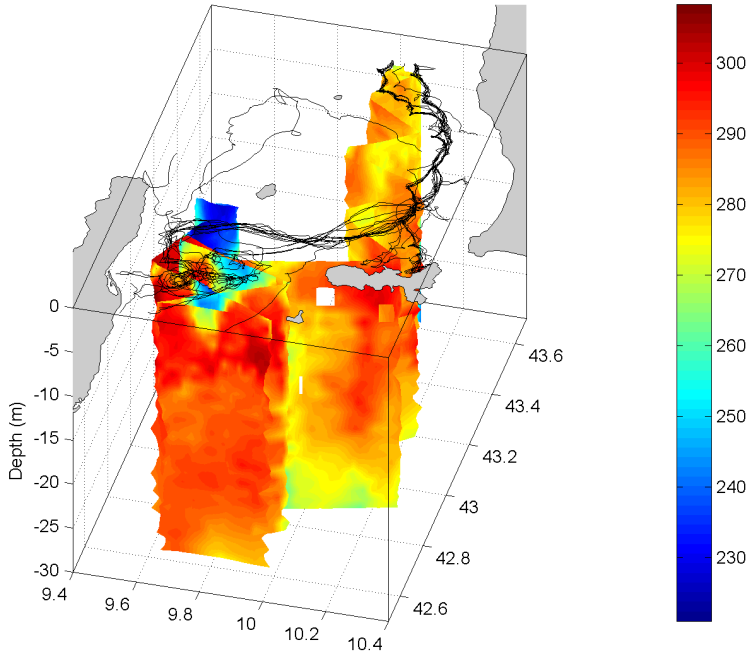
Temperature (°C) as recorded by the glider and drifter tracks during the glider mission



Salinity as recorded by the glider and drifter tracks during the glider mission



Oxygen (M/l) as recorded by the glider and drifter tracks during the glider mission

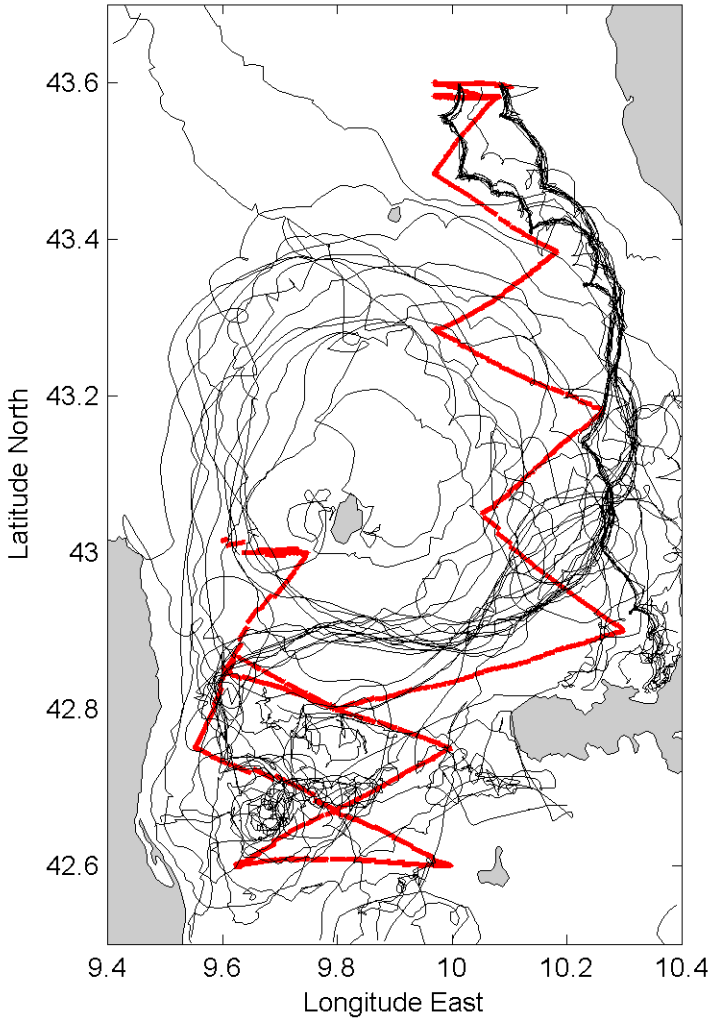


The anticyclonic feature between Corsica and Elba Islands does not extend underwater

AW is located at 10m

Low dissolved oxygen core at surface

Drifters provided useful data for another 2-3 months …



Unfortunately, the glider was recovered just before the drifters depicted a “permanent” anticyclonic feature around Capraia Island

Conclusions and future work

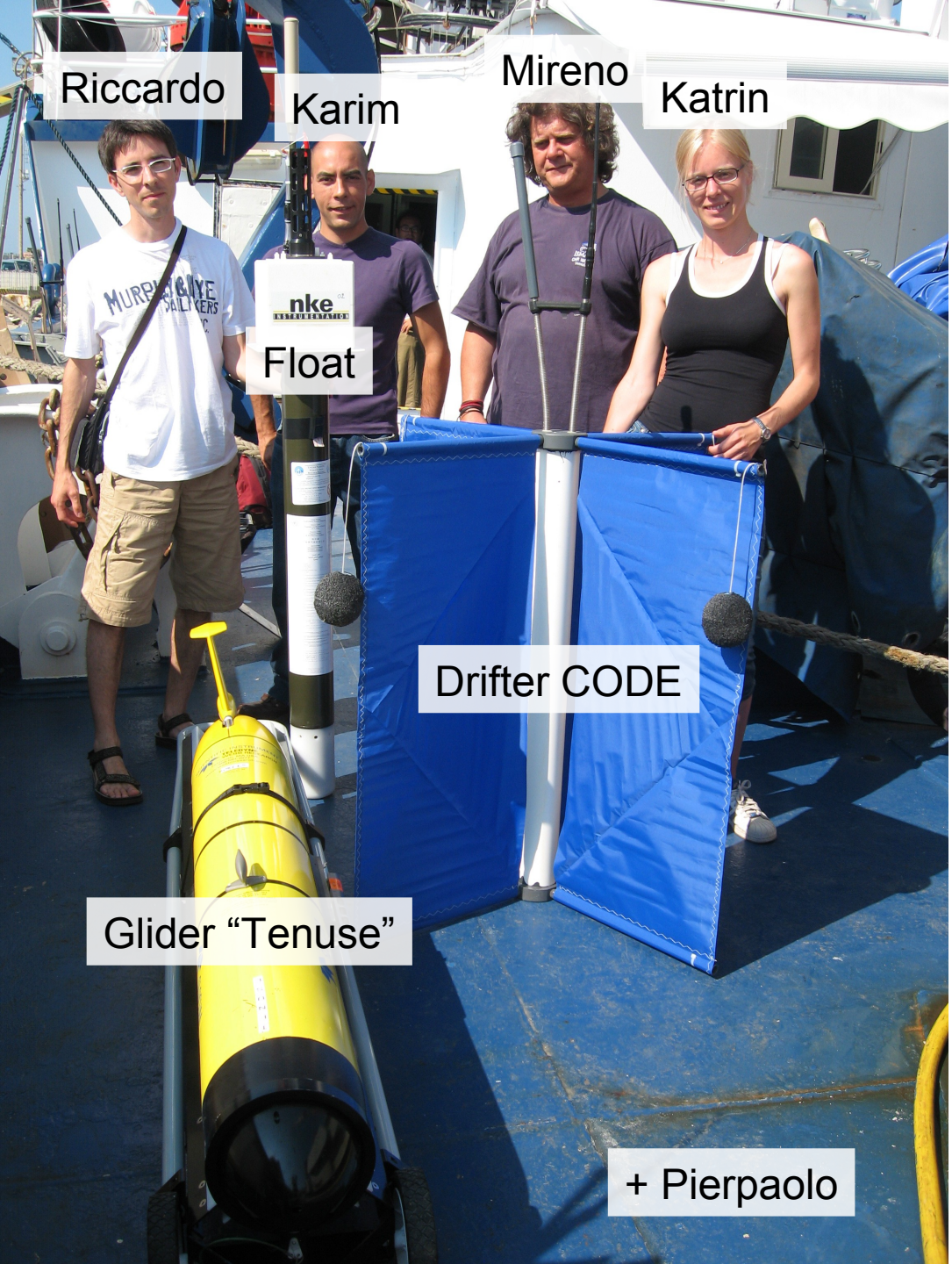
• The LIDEX10 experiment gave us the opportunity to use a glider to support a surface dispersion experiment

• High resolution glider data permit a representation of the water column that is much finer than that which can be obtained using CTD casts

• Glider data can help to explain drifter behaviours

• It is very difficult and challenging to pilot a glider below drifters (24-h watches, varying bathymetry, different speeds, unpredictability of drifter directions, …)

• We need to obtain wind products for the period of the experiment to better understand the observed drifter behaviours (the southward motion along the Italian coast, the anticyclonic feature between Corsica and Elba Islands, the large anticyclonoc eddy around Capraia Island, …)



Thank you for your attention!

We would like to thank all the people involved in the glider and drifter operations, and in particular the Captain and the Crew of the RV Maria Grazia and Laurent Beguery, Antonio Bussani, Karim Mahiouz, Nevio Medeot and Rajesh Nair.