Measuring surface salinity in the N. Atlantic subtropical gyre. SPURS-MIDAS cruise, spring 2013

Jordi Font and the SPURS-MIDAS team

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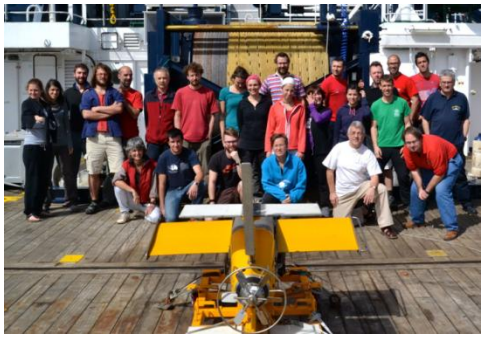
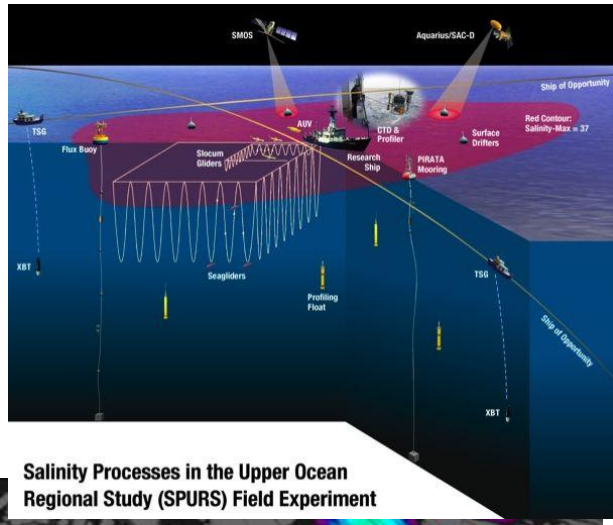
SPURS-MIDAS cruise, March-April 2013

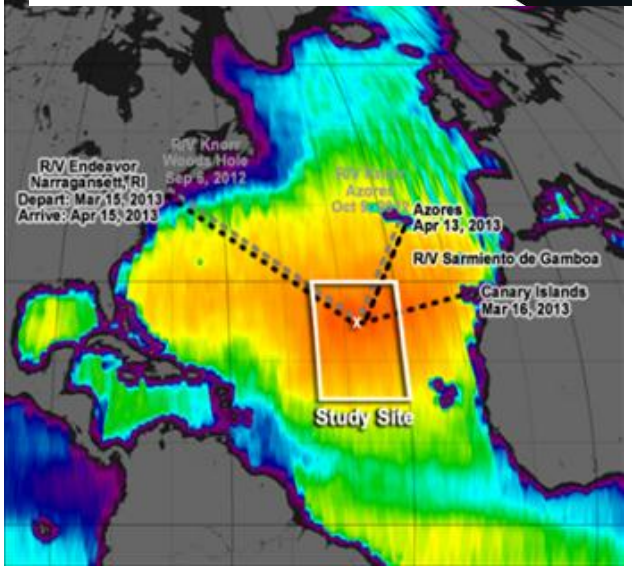
Contribution to SPURS international experiment lead by NASA and WHOI

RV Sarmiento de Gamboa (Spain), in joint sampling program with RV Endeavor (USA)

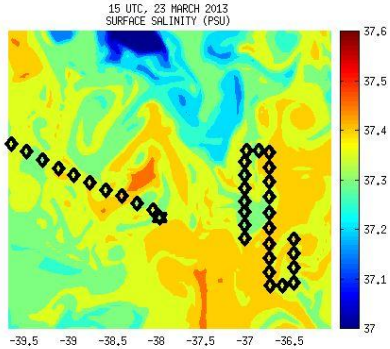




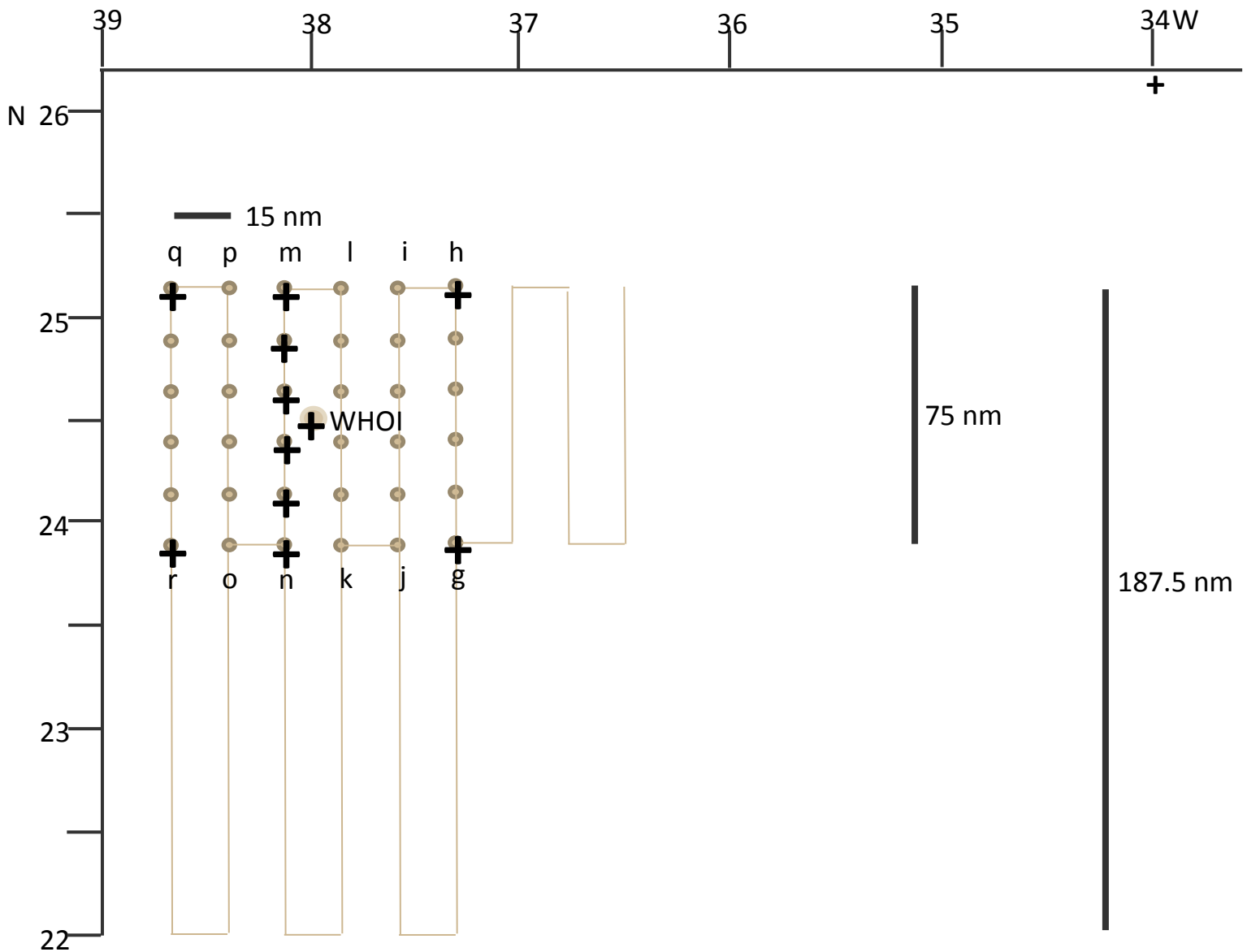
Salinity Processes in the Upper Ocean Regional Study (SPURS) Field Experiment



- Scientists from Spain, Ireland, France and USA
- Structure of the salinity maximum in N Atlantic
- Instruments deployment for long term studies
- Testing capability of SMOS products + validation



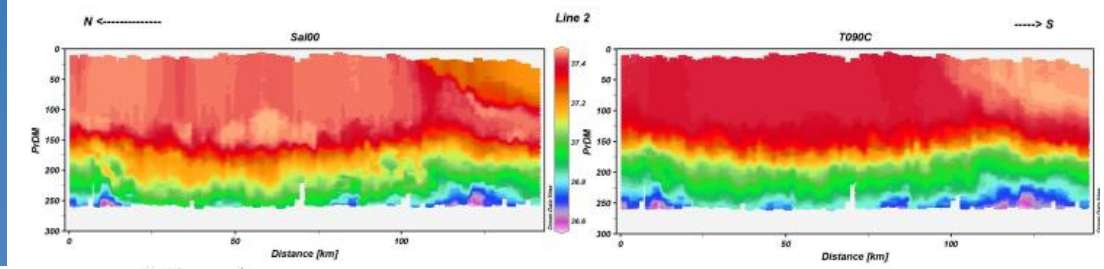
Planned cruise track

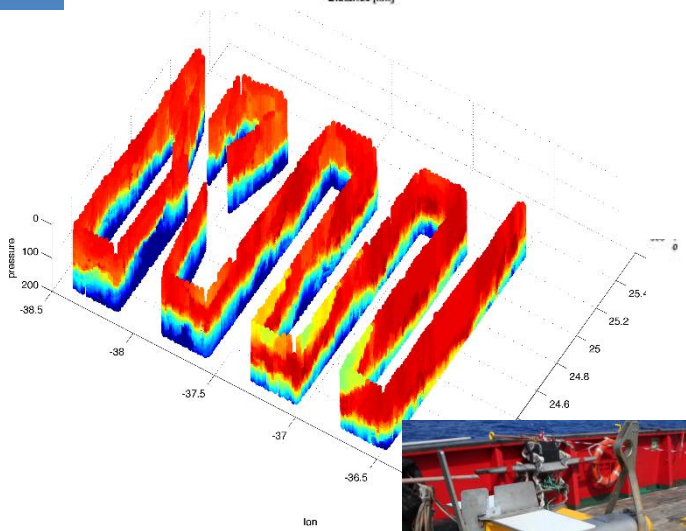


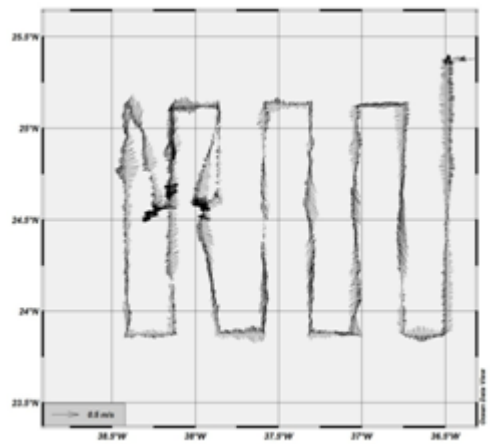
Surface layer underway sampling

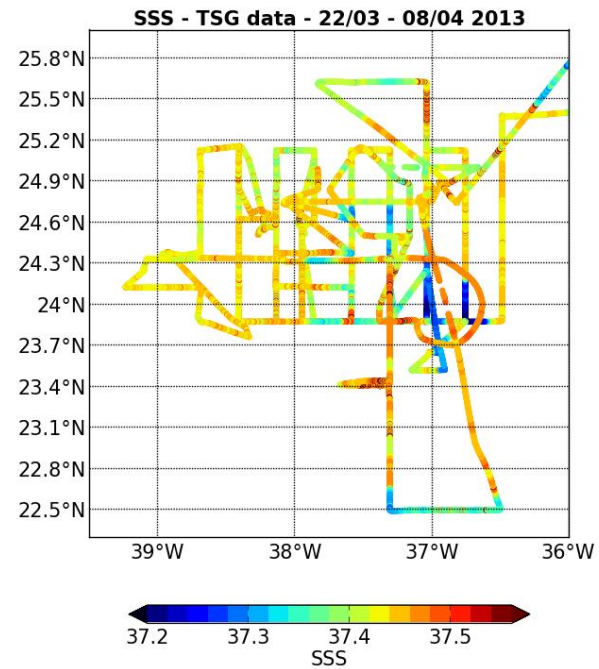
What processes determine and maintain the SSS maximum?

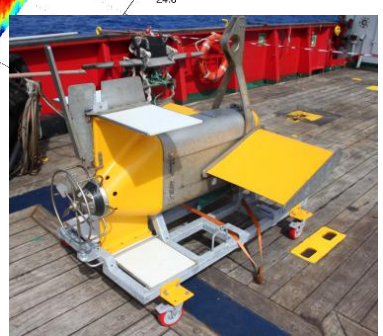
Underway sampling with undulating CTD (SeaSoar), ADCP and surface thermosalinograph







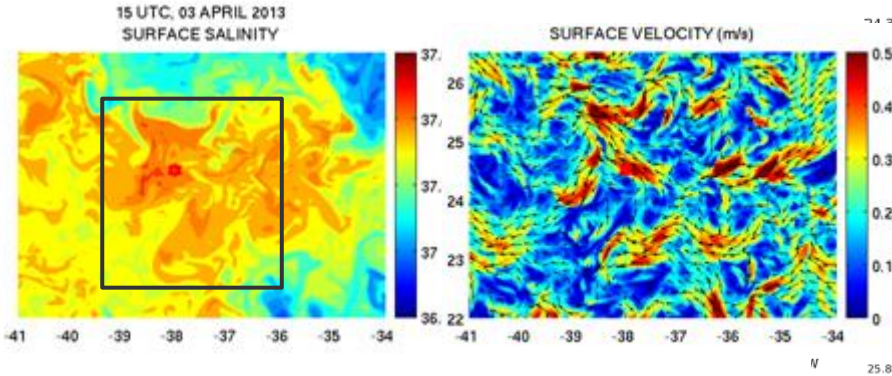


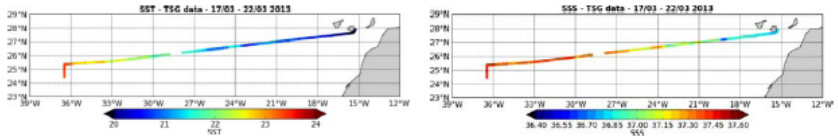


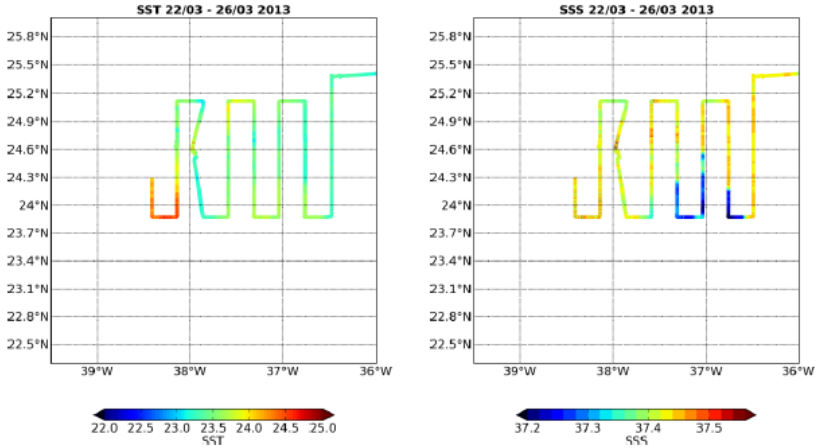
figures: M. Emelianov, J. Busecke, O. Hernández

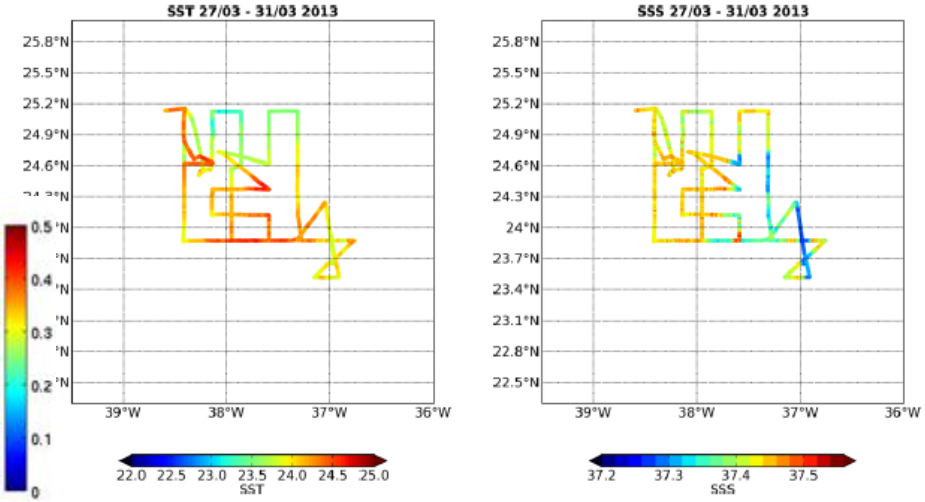
High spatio-temporal variability

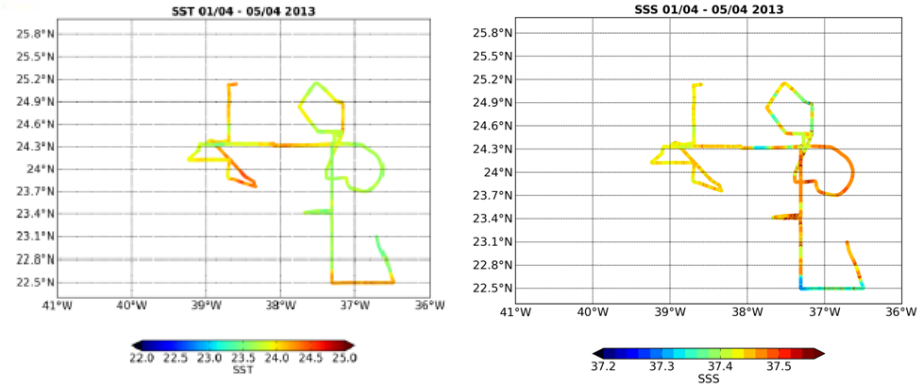
- TSG at 5 days intervals + ROMS model (Z. Li, JPL)

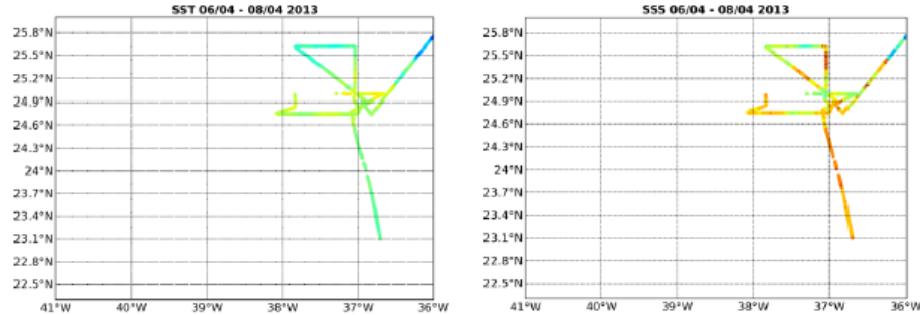








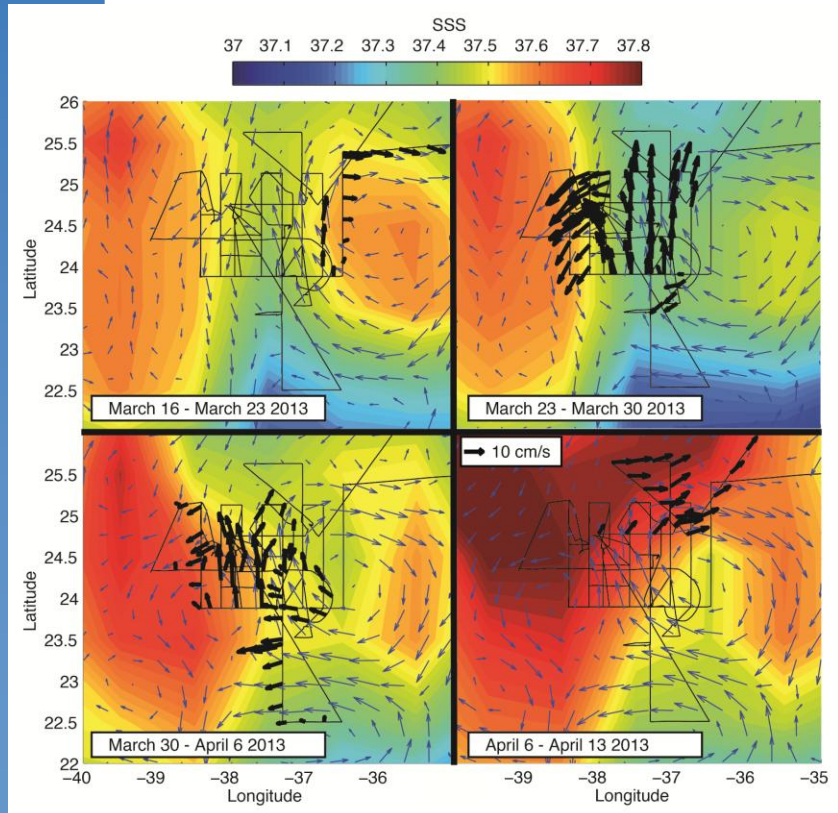


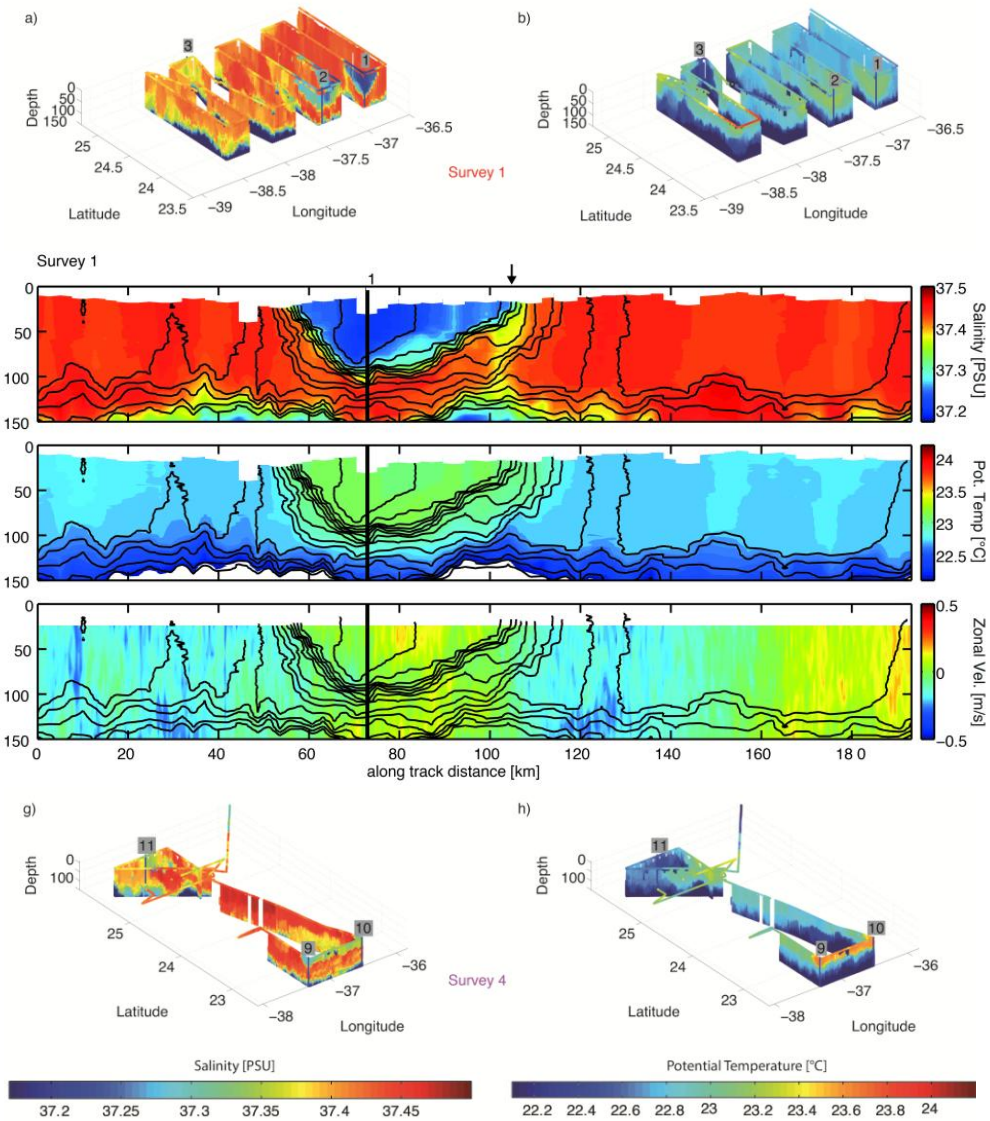


Data analysis: freshwater anomalies

J. Busecke, A.L. Gordon, Z. Li, F.M. Bingham, J. Font

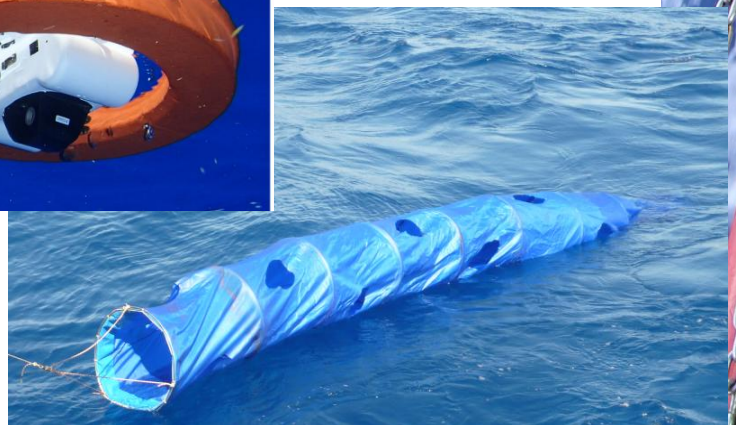
"Subtropical surface layer salinity budget and the role of mesoscale turbulence" JGR, submitted

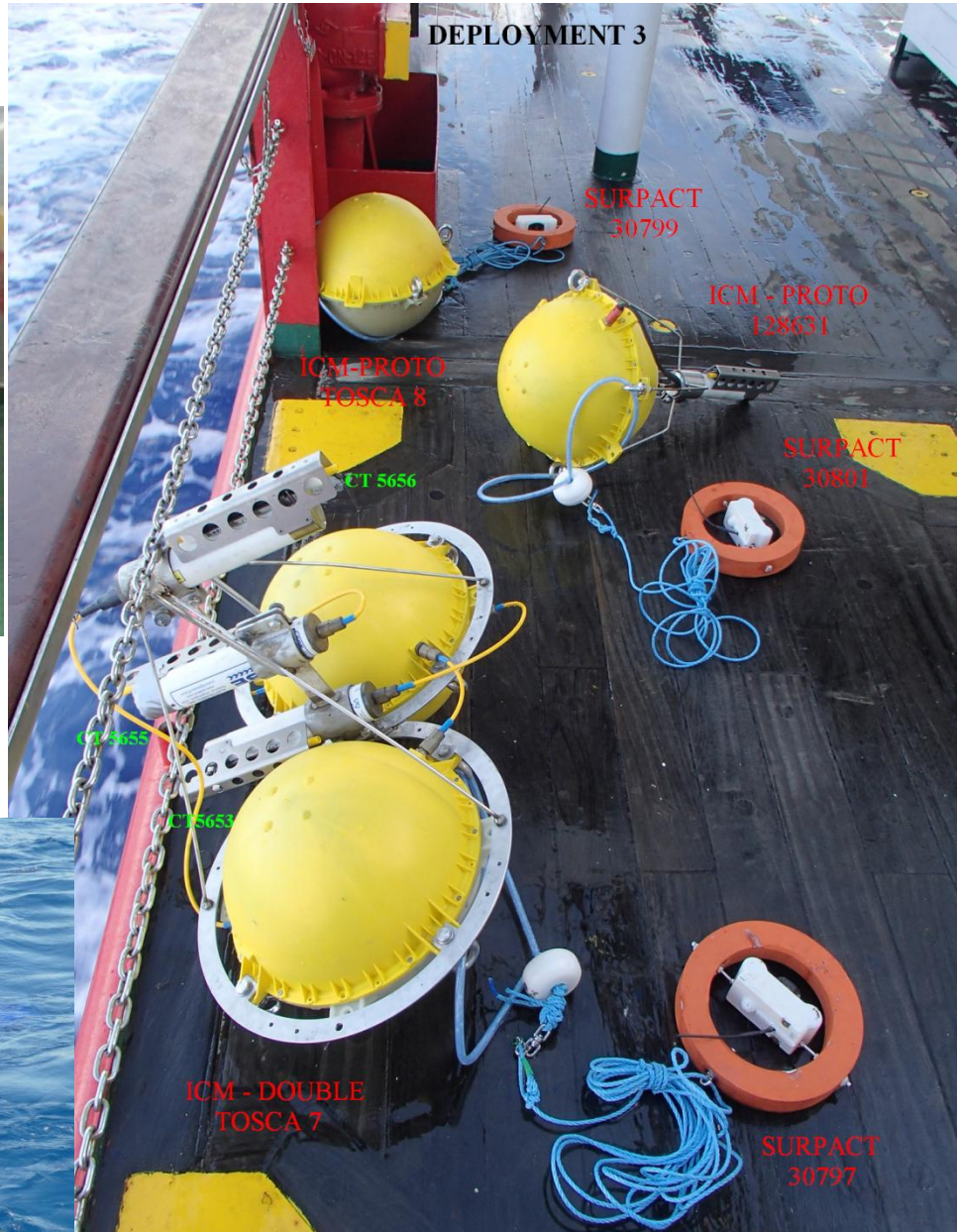




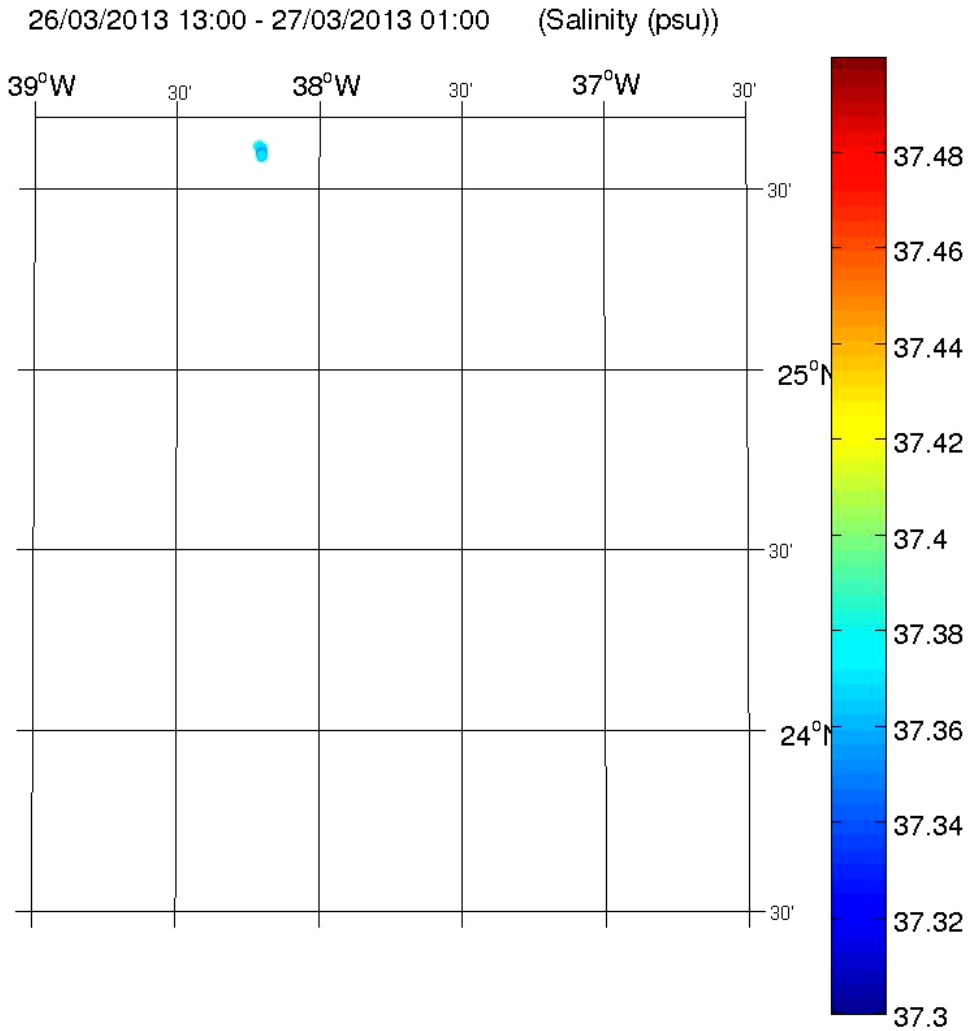
50 surface drifters (NOAA, ICM, LOCEAN)

L. Centurioni, J. Salvador, S. Morisset



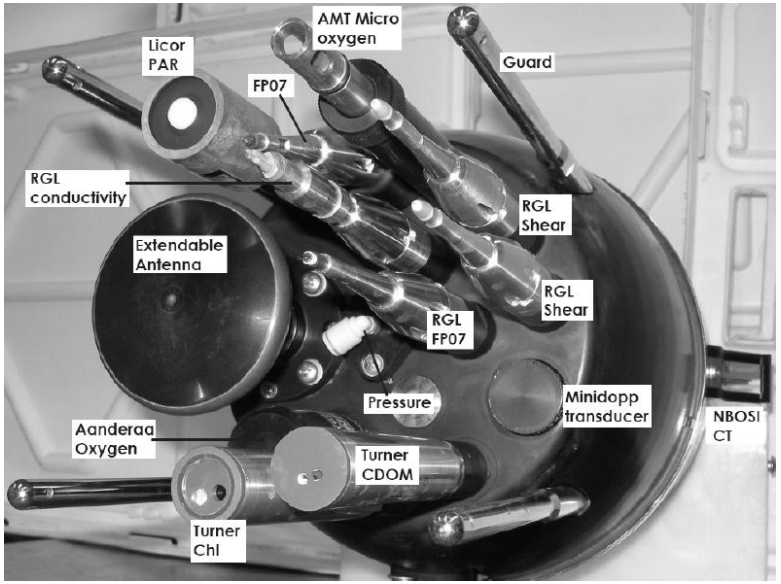


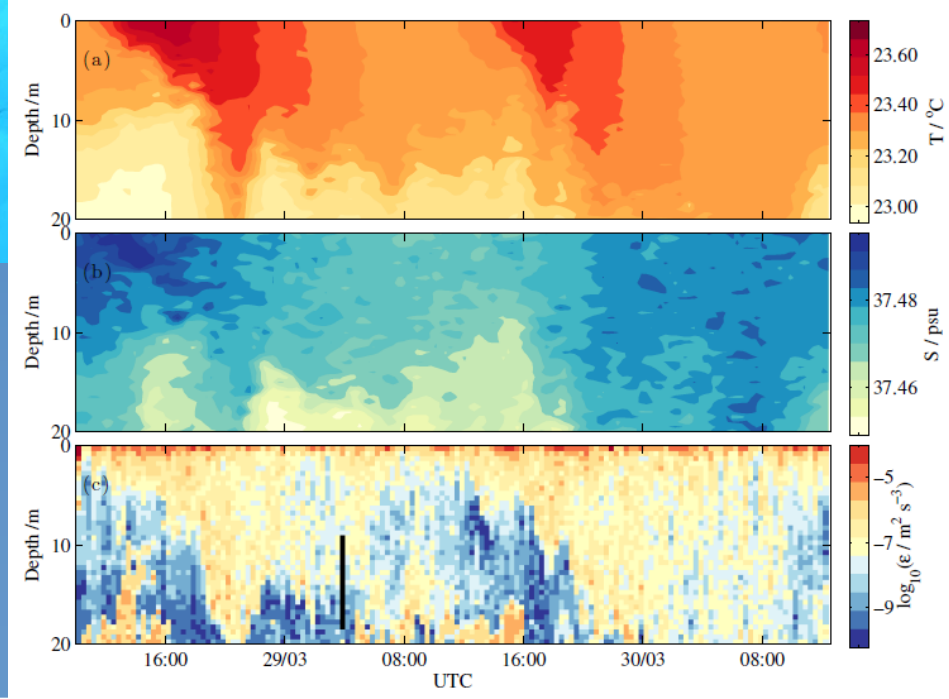
Operational drifters 26 March – 14 April



Vertical profilers (ASIP, Apex)

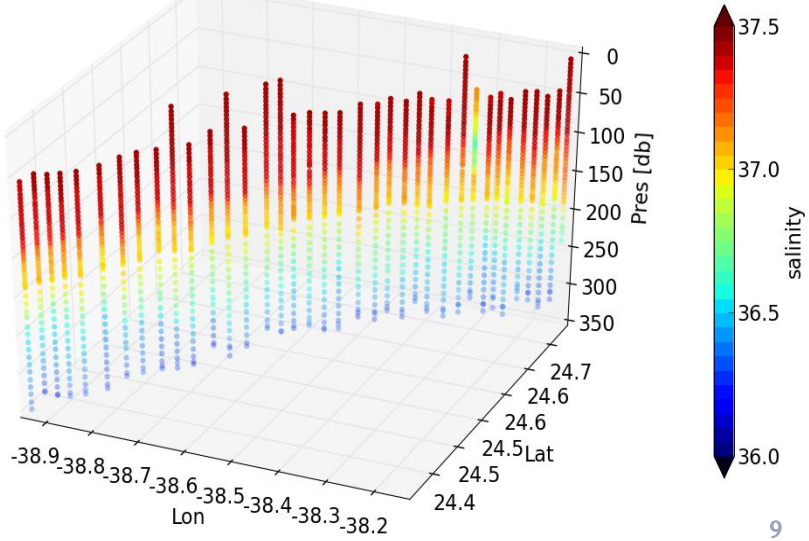
B. Ward, NUI Galway team



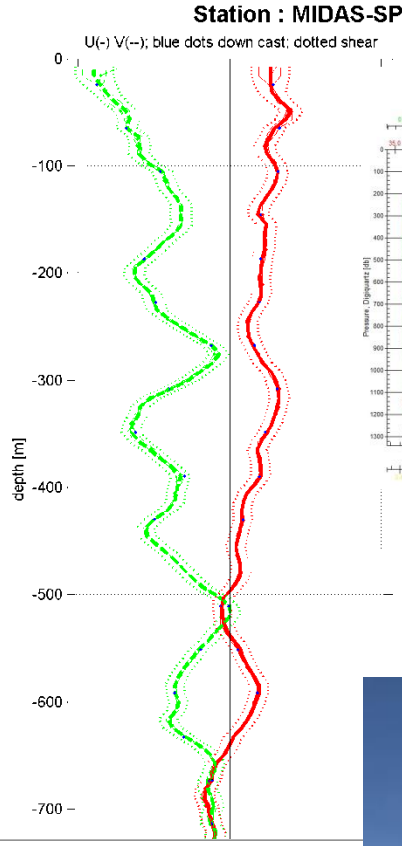


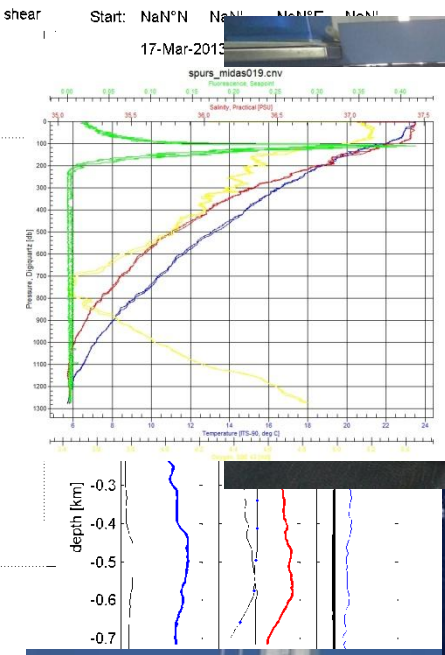
Perfilador APEX: salinity

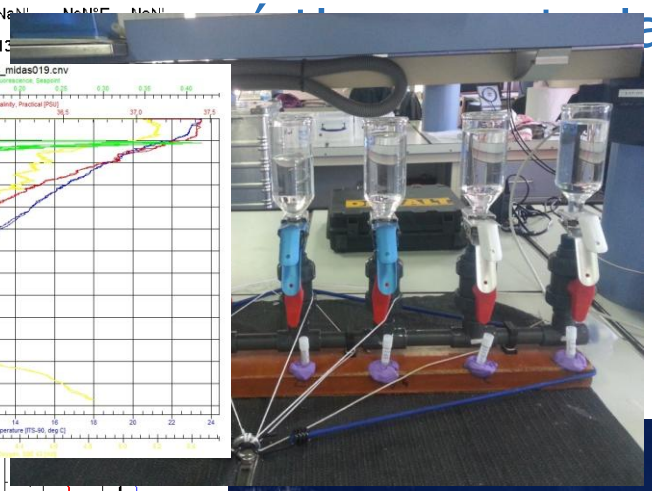
J. Salvador

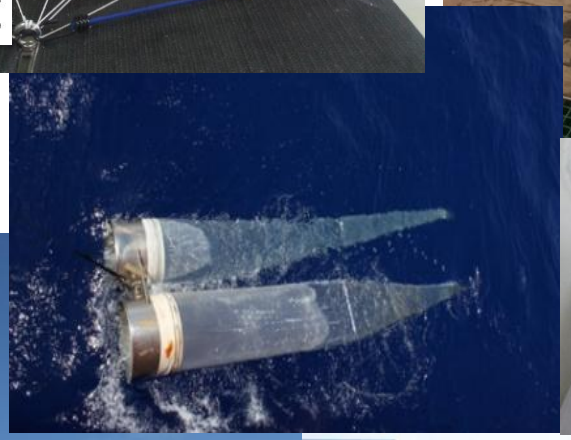


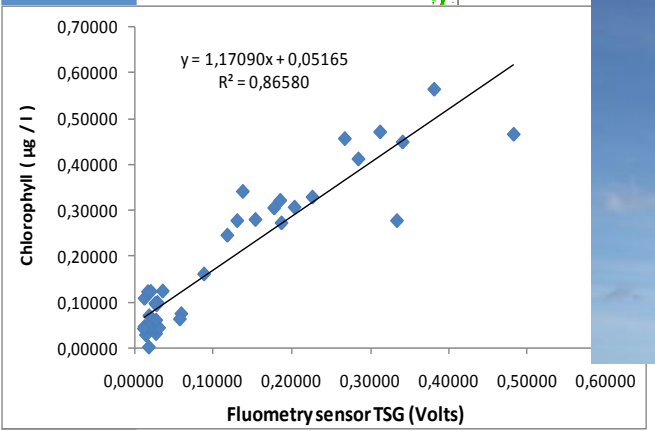
Other measurements

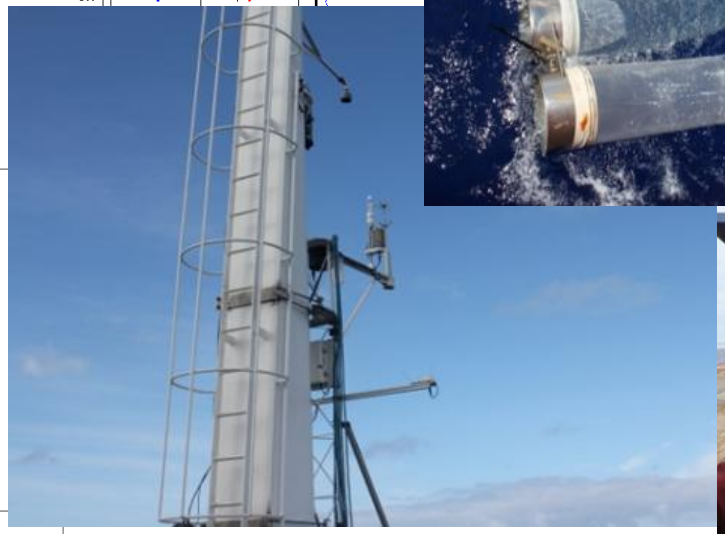






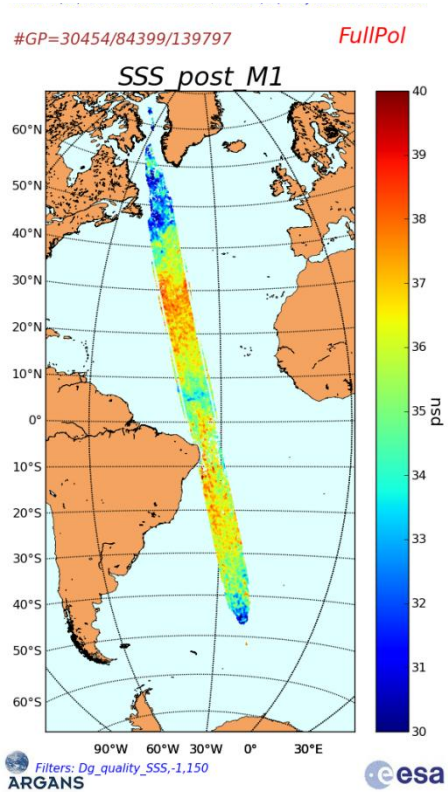


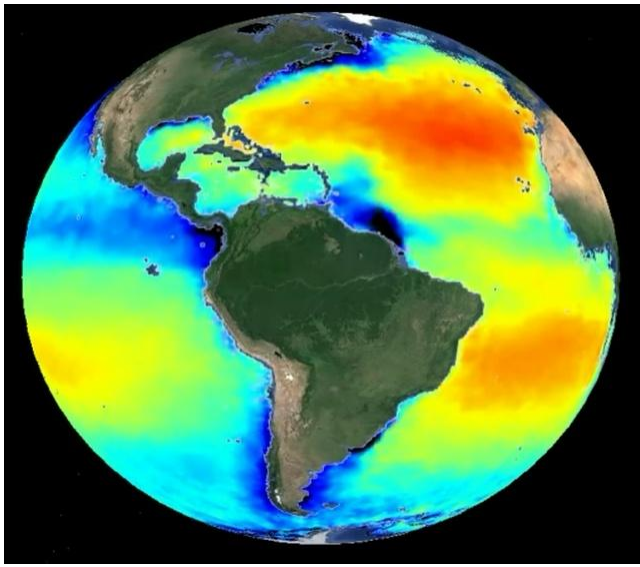




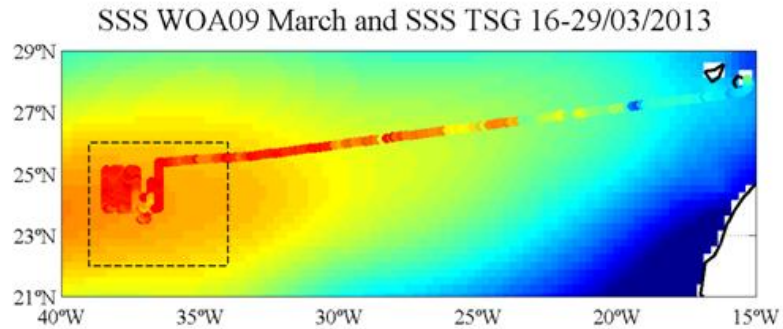
SMOS Sea Surface Salinity

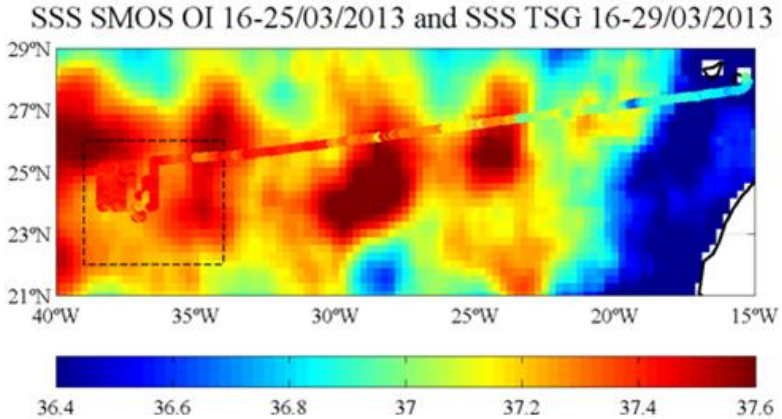
- SMOS, Soil Moisture and Ocean Salinity satellite mission (ESA): Interferometric L-band imaging radiometer, ~40 km measurement resolution, aimed at providing global and regular ocean salinity maps with an accuracy of the order of 0.1 practical salinity units, at 100 – 200 km spatial and 10 – 30 days temporal resolution

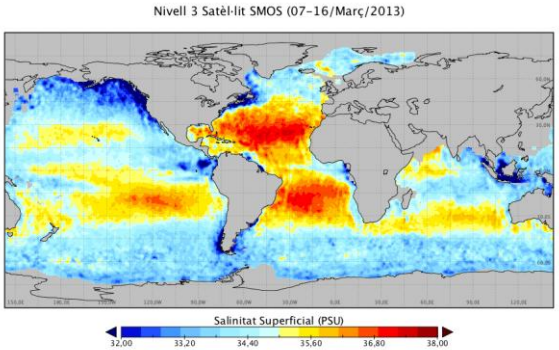




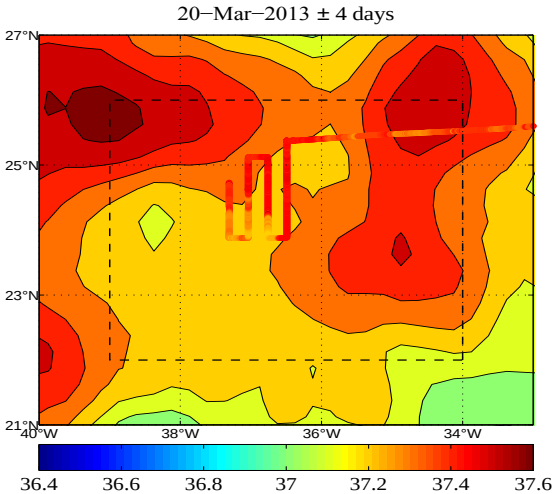
SMOS compared to SPURS data

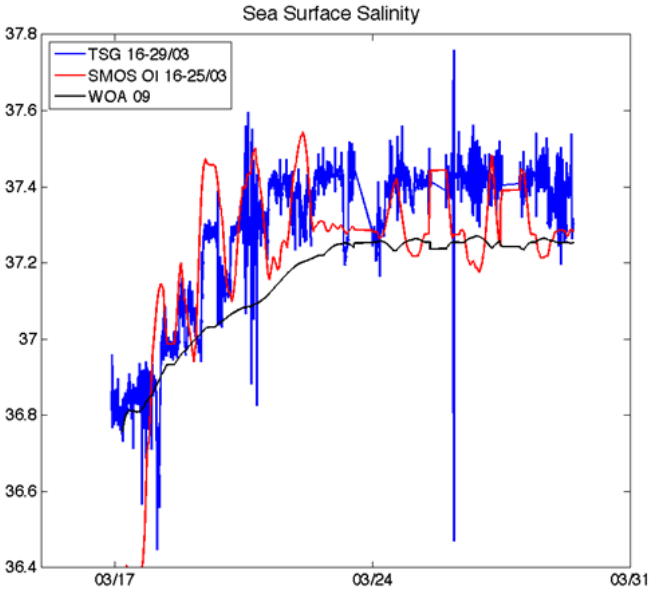






First comparisons made on board



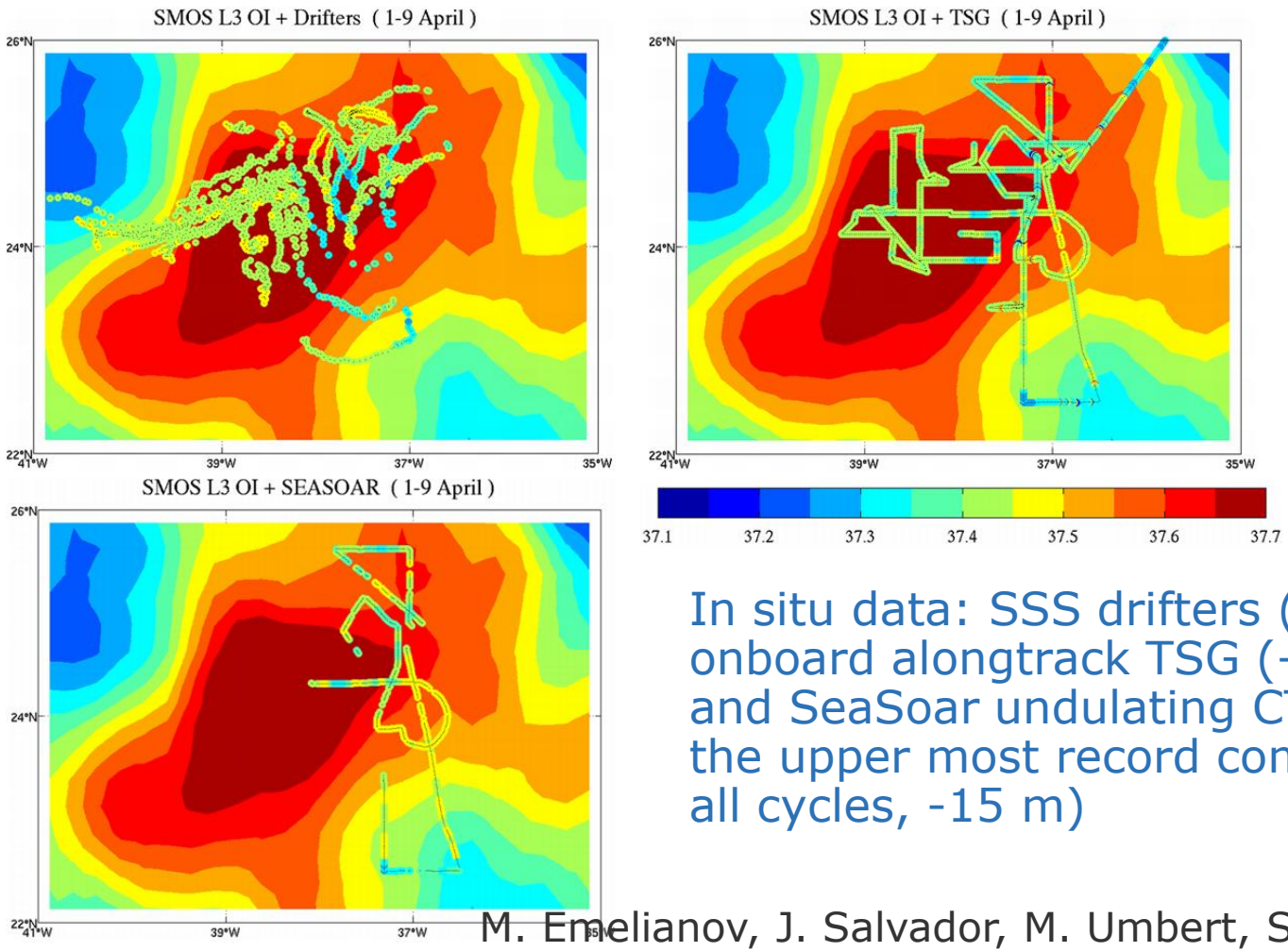


M. Umbert, S. Guimbard, J. Martínez

SMOS compared to SPURS data

SSS in the SPURS area, 1-9 April 2013

9-days 0.25° optimally interpolated SMOS maps (http://cp34-bec.cmima.csic.es). Measurement at -1 cm



In situ data: SSS drifters (-50 cm), onboard alongtrack TSG (-4 m) and SeaSoar undulating CTD (at the upper most record common to all cycles, -15 m)

M. Emelianov, J. Salvador, M. Umbert, S. Guimbard

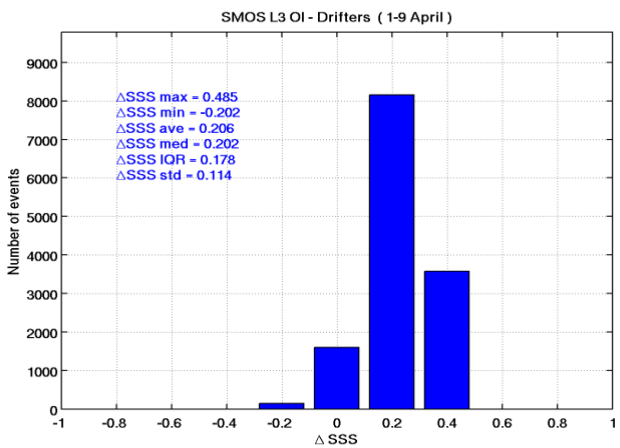
SMOS compared to SPURS data

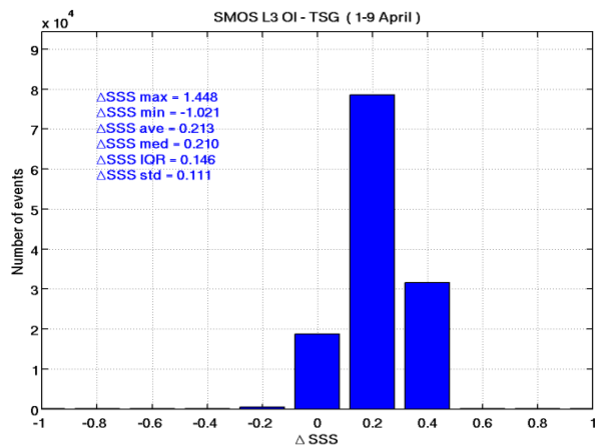
Statistics of the pixel-point comparison between SMOS SSS and the three in situ data sets.

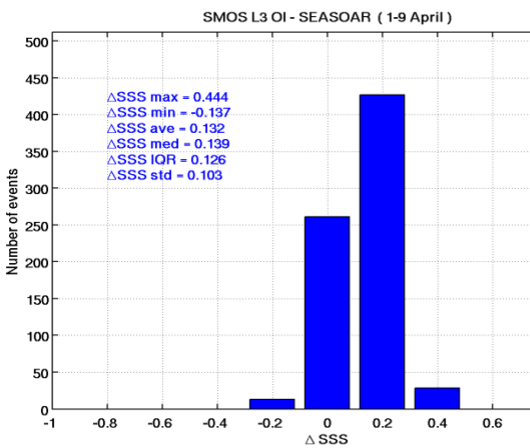
In spite of the different measurement depths within the surface layer, SMOS salinity determinations have in all cases a bias of 0.1-0.2 and a STD of 0.1 wrt in situ data.

Bias removal still an issue with SMOS data processing

STD matches the mission requirement on SSS uncertainty







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