THE SALINITY SIGNAL OF THE SHELF/DEEP-OCEAN EXCHANGE IN THE SOUTHWESTERN ATLANTIC: Remote observations

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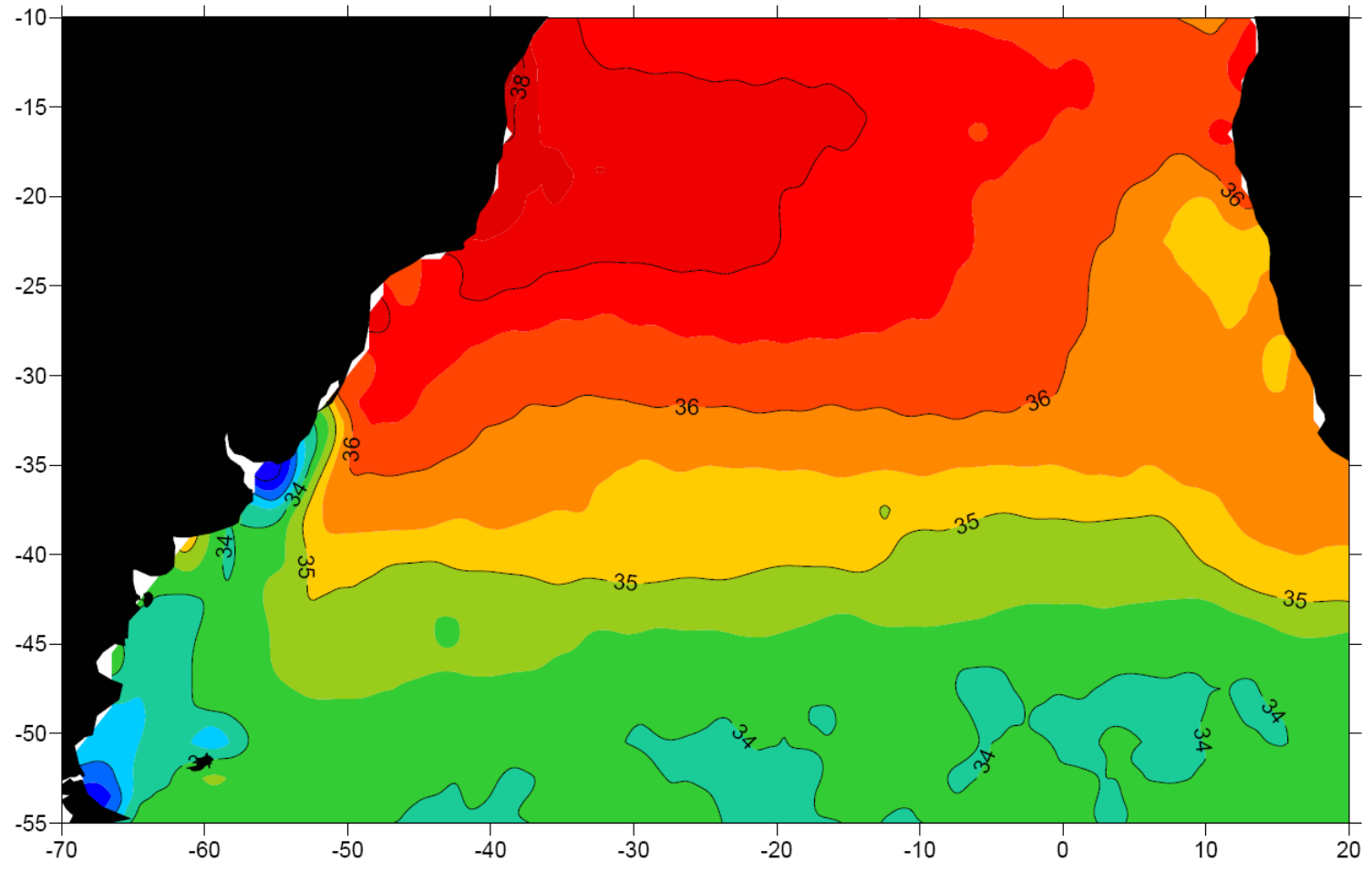
INIDEP

Ministerio de Ciencia, Tecnología e Innovación Productiva
Presidencia de la Nación

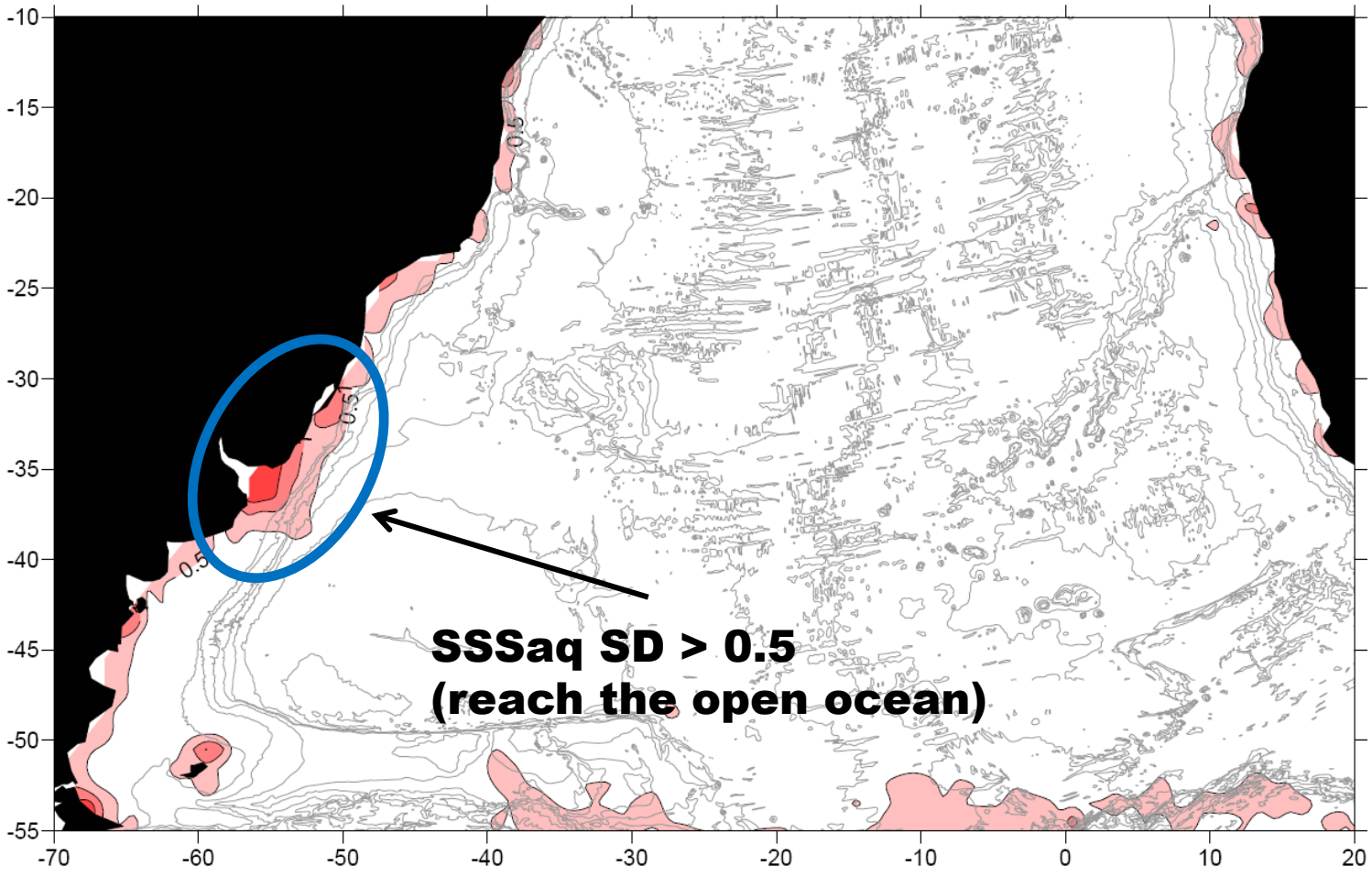
CONAE

- **Monthly resolucion**
- **1° x 1° grid resolucion**
- **Accuracy: 0.2 (Steel a targent)**

24 months Mean SSSaq (L3 v2.0)



SSSaq standard deviation (L3 v2.0 24 months)

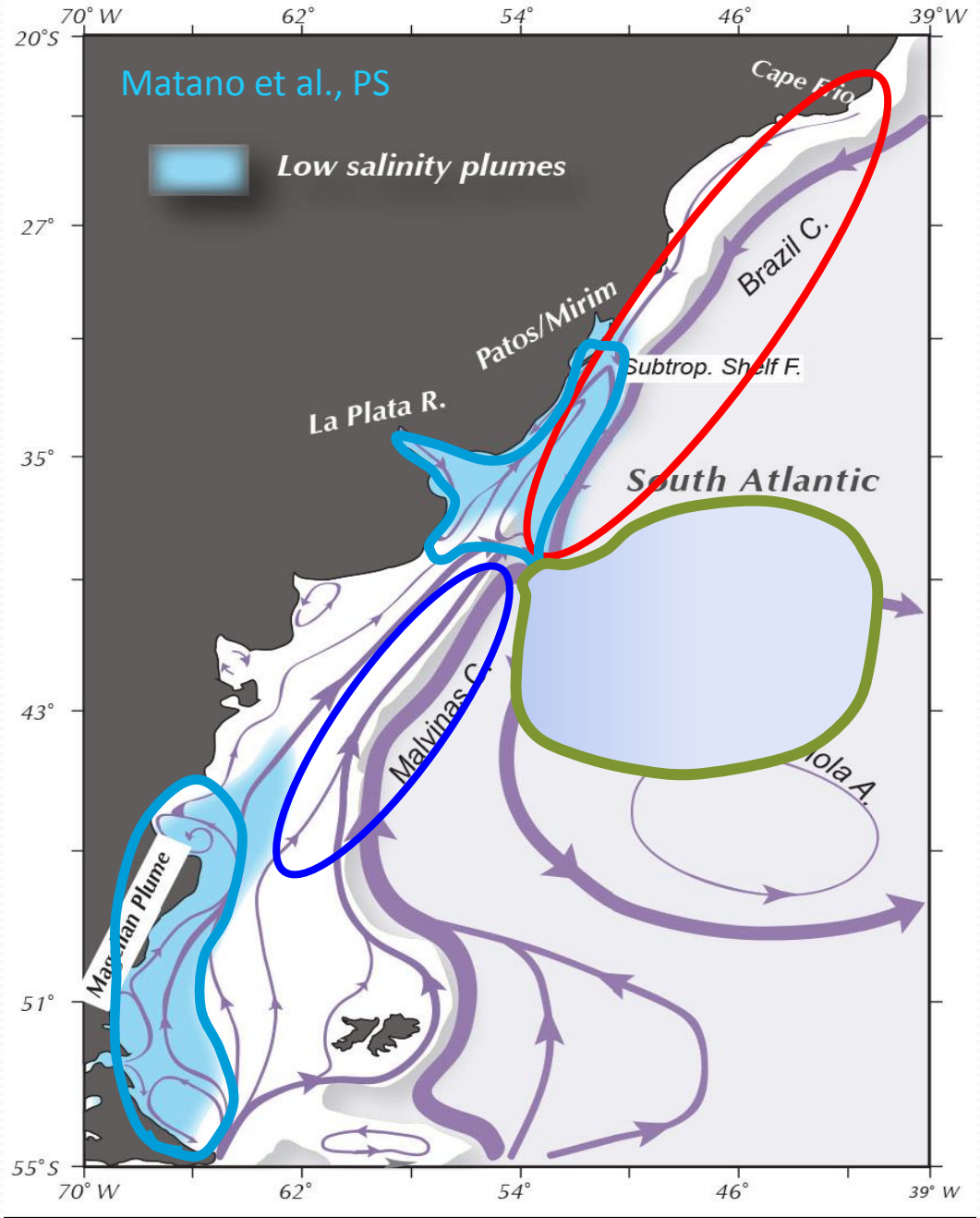


Brazil current:
Warm & Salty

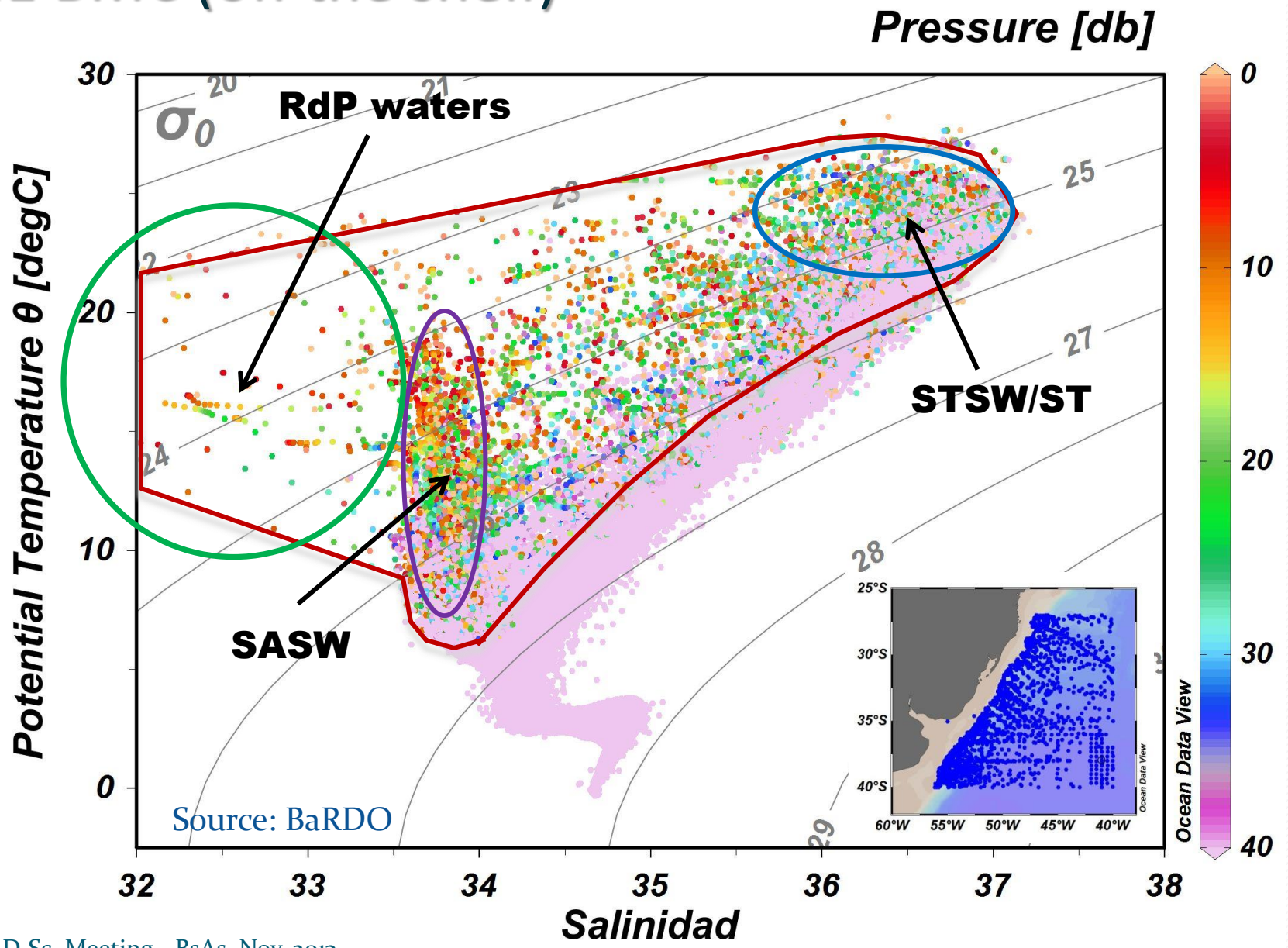
Malvinas current:
Cold and fresh

Shelf waters:
Low salinity
(Magellan ch. &
Rio de la Plata)

The Confluence:
Collition zone
B/M jet
(large meso-scale
variability)



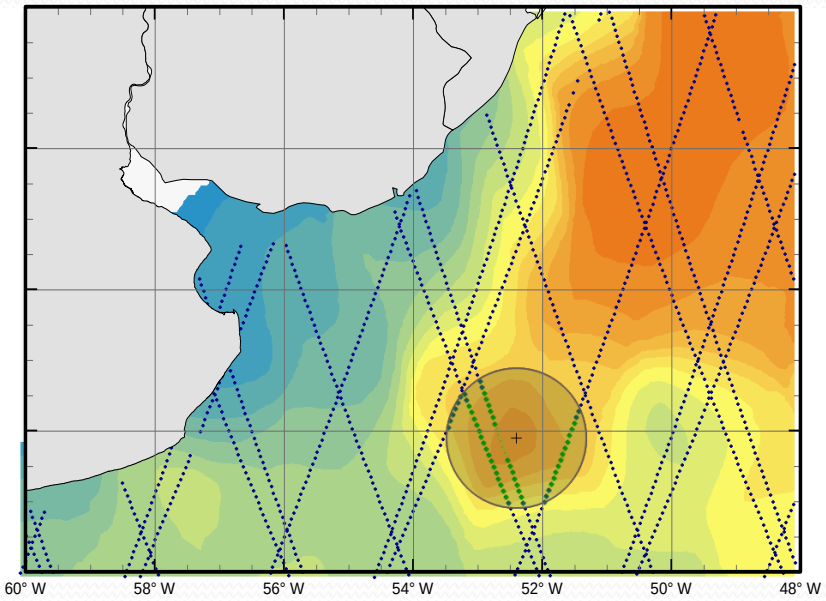
Water Masses at the surface/sub-surf. in THE BMC (off the shelf)



MESO-SCALE processes

time scales → weeks
Spatial scales → 100 km

Weights (60 ...
0,033051
0,032723
0,032407
0,031451
0,030847
0,029345
0,028508
0,026578
0,025577
0,023907
0,0237
0,023406
0,023367
0,022801
0,022279
0,02224
0,021288
0,020509
0,019943
0,019287
0,01884
0,018357
0,017749
0,017572
0,0174
0,016958
0,016887
0,016554
0,016522
0,015946
0,015754
0,015468
0,015286
0,014468
0,014267
0,013703
0,013443



Remote SST ✓
Remote SSH ✓
Remote SSS ✗

A Challenge for Aquarius???

Gridding technique:

Local polynomial

(Lilly and lagerloef (2008)

- **Kernel density estimator (K)**
  - **Gaussian function (k(z))**
  - **Bandwidth = 0.75 (h)**
- **L2 – weekly**
- **SSS range: 20 → 38**
- **Grid size: 0.5 x 0.5**
- **Search Radius = 1° x 1°**
- **Smoothing Factor = 0.001**

$$f(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x - X_i}{h}\right)$$

$$K(z) = \frac{1}{\sqrt{2\pi}}\exp\left(-\frac{z^2}{2}\right)$$

$$z = \frac{(x - X_i)}{h}$$

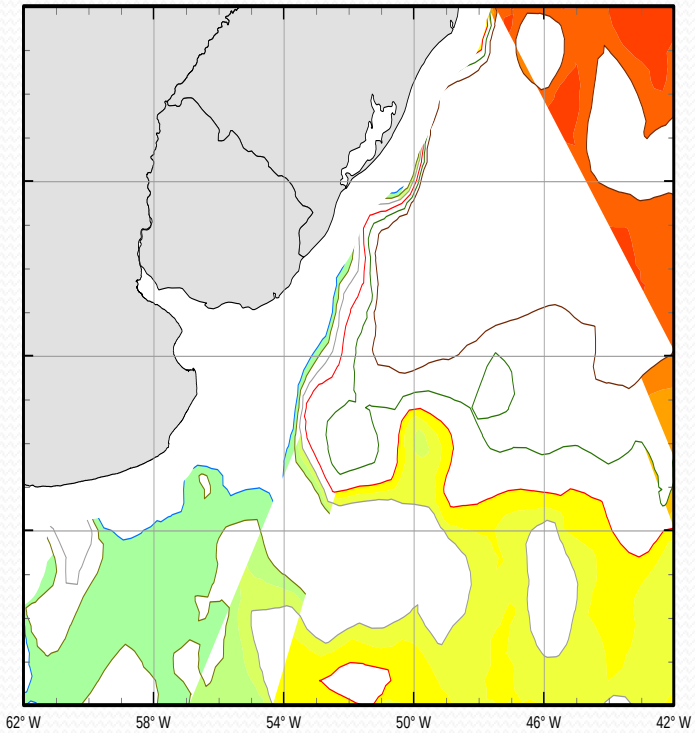
$$h = \frac{0.9\,A}{n^{1/5}}$$

$$A = mín\left[\sigma, \left(\frac{RangoInterCuartil}{1.349}\right)\right]$$

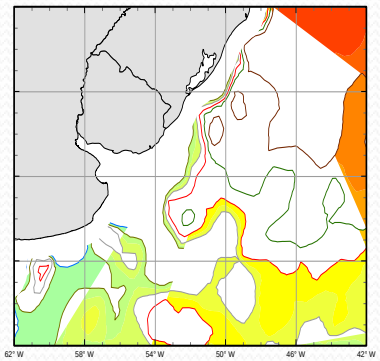
Individual polynomial adjustments every search radius; optimizing in its environment for a better representation of the local variation

3 Weeks Weighted Moving Averange (3WeMA)

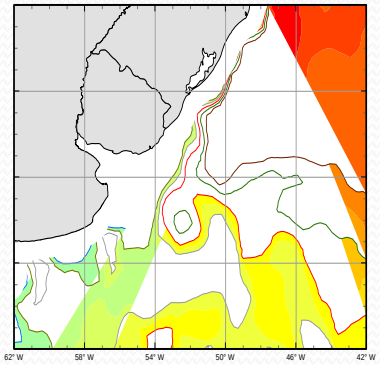
50%
(WEEK 2)



25%
(WEEK 1)



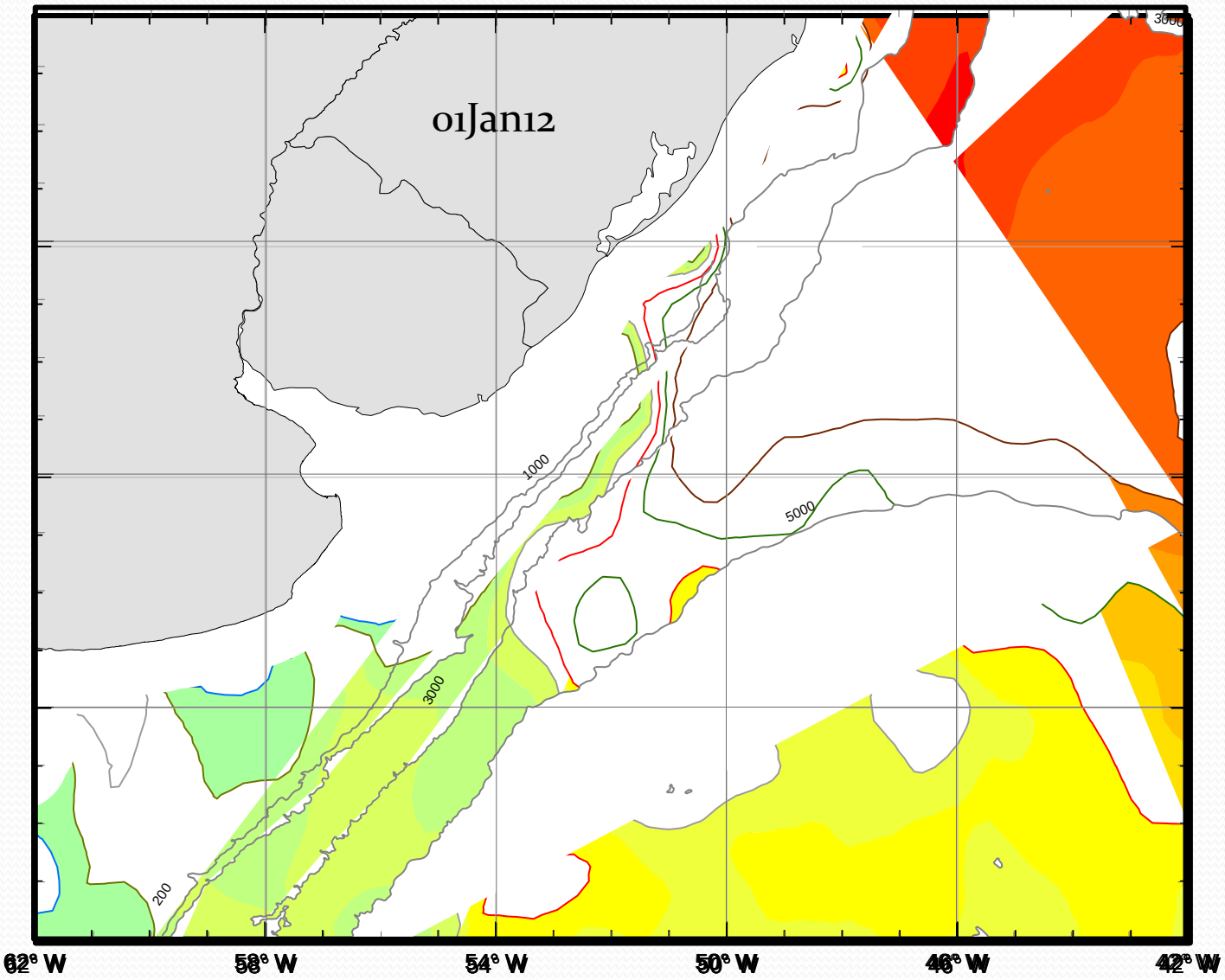
25%
(WEEK 3)



20-60-20% → 15-70-15%

SEAMS TO BE IMPROVEMENTS

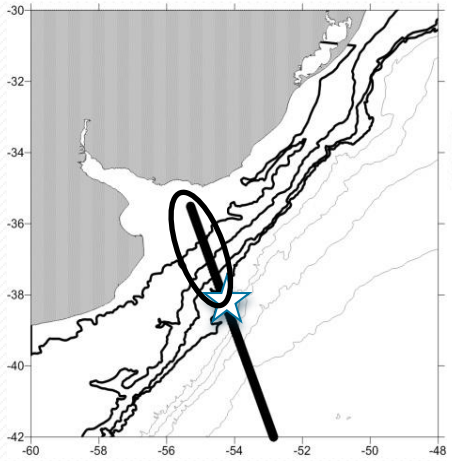
RdP Low salinity plume into the Confluence



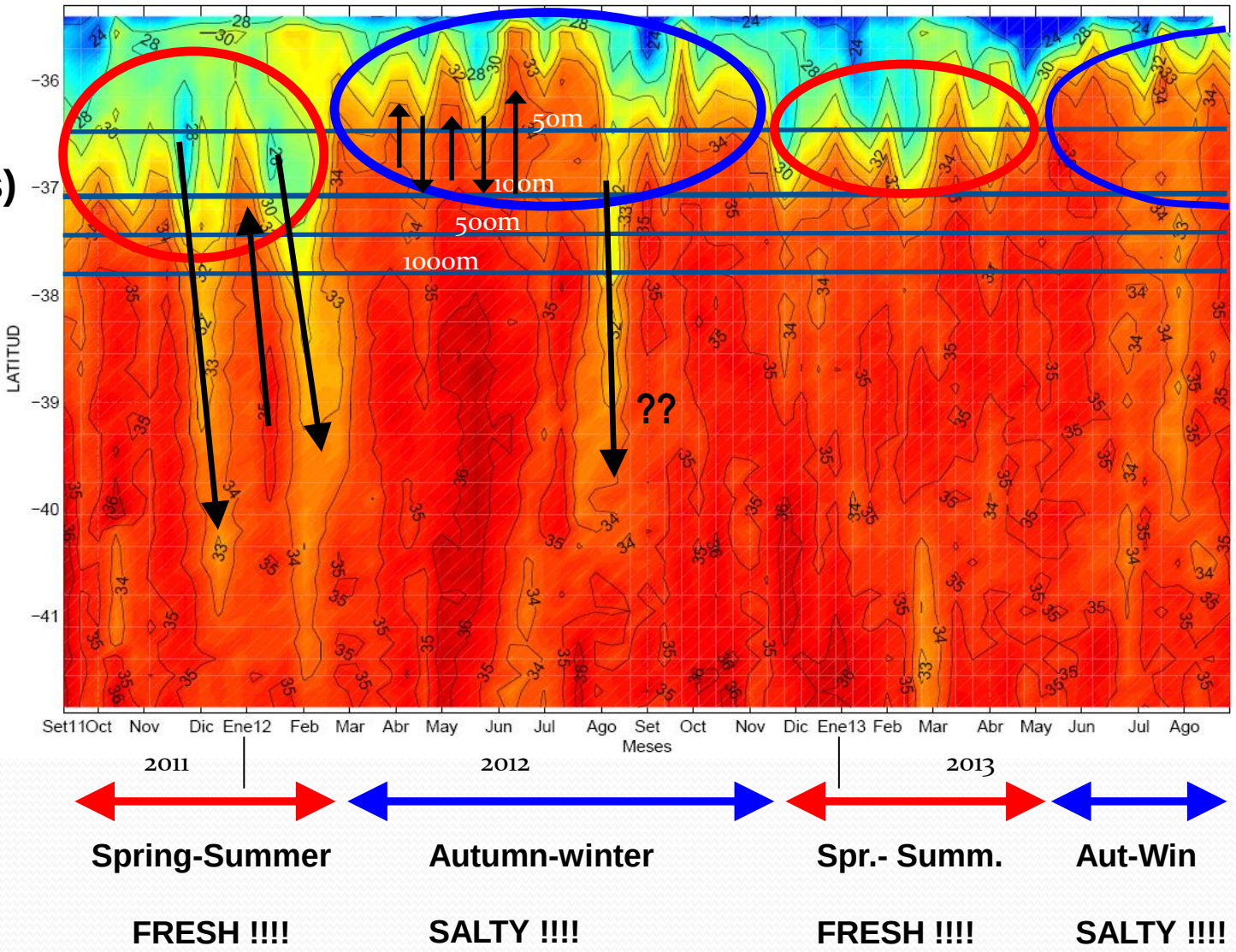
Along Beams time evolution

VARIABILITY
(at differente time and spacial scales)

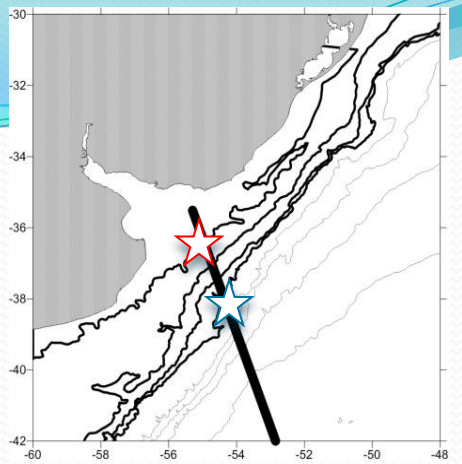
Hovmoller
Beam2.asc

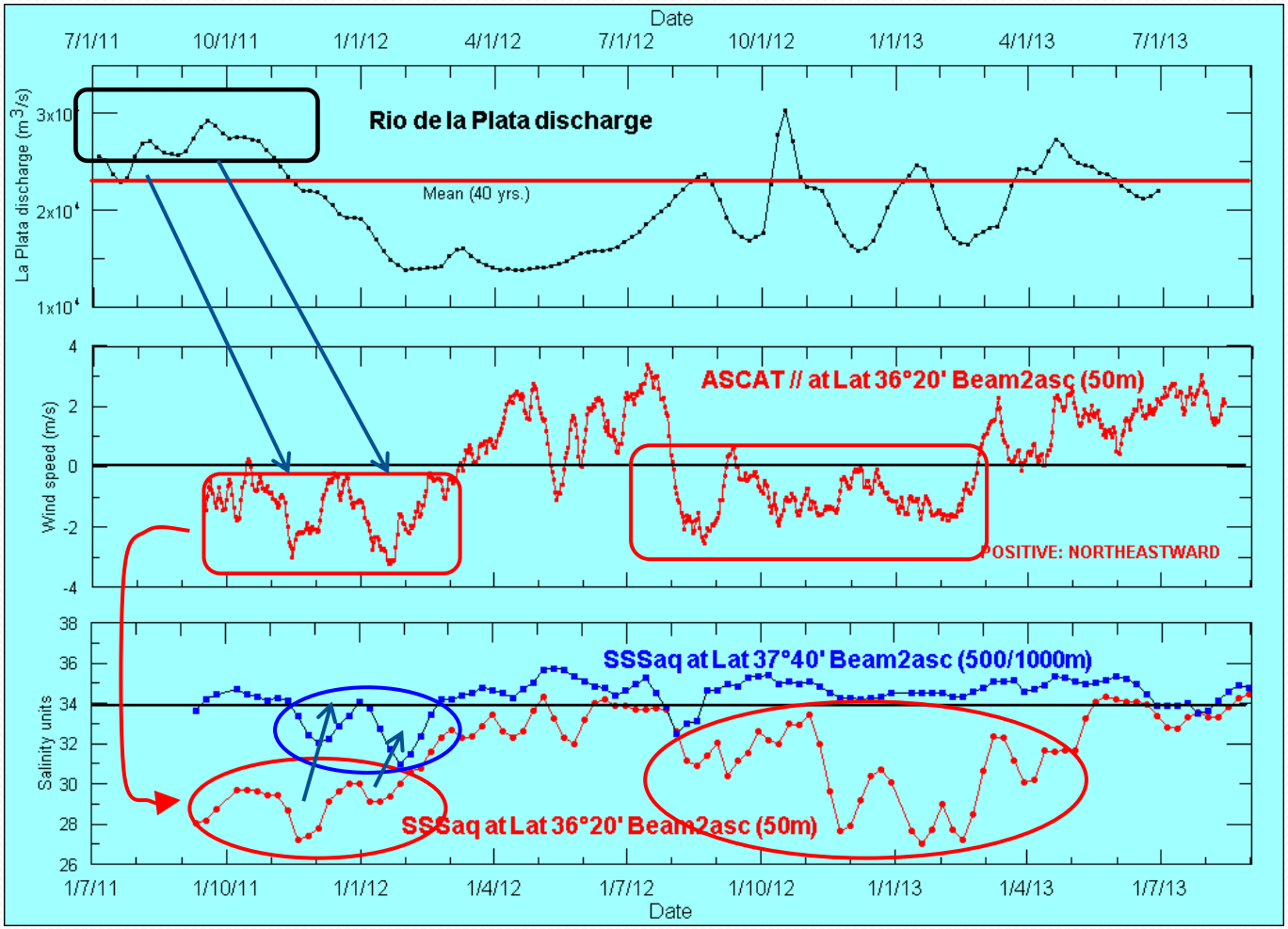


In response to WIND, runoff, BMC dynamics



What force the exchange ?



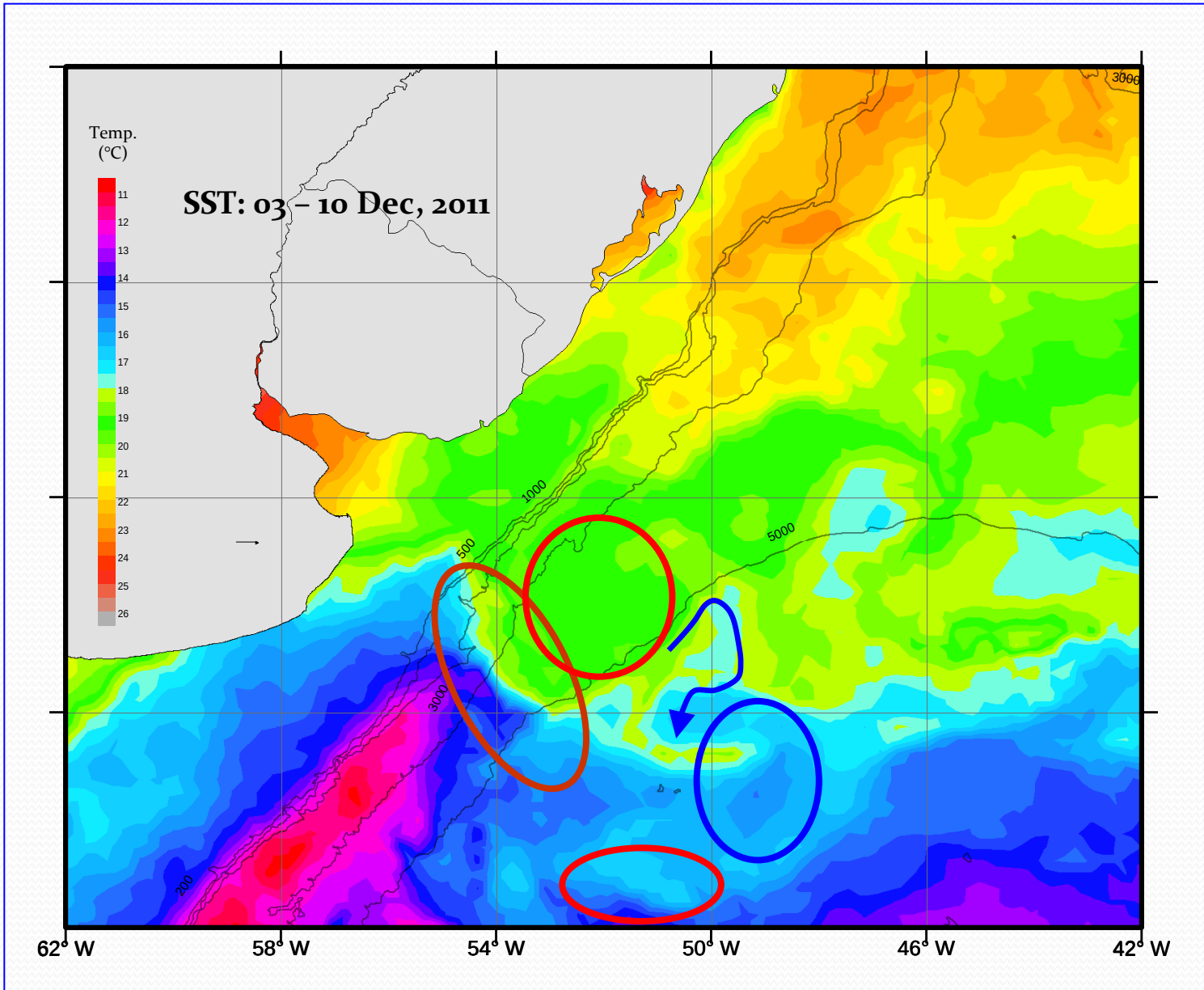


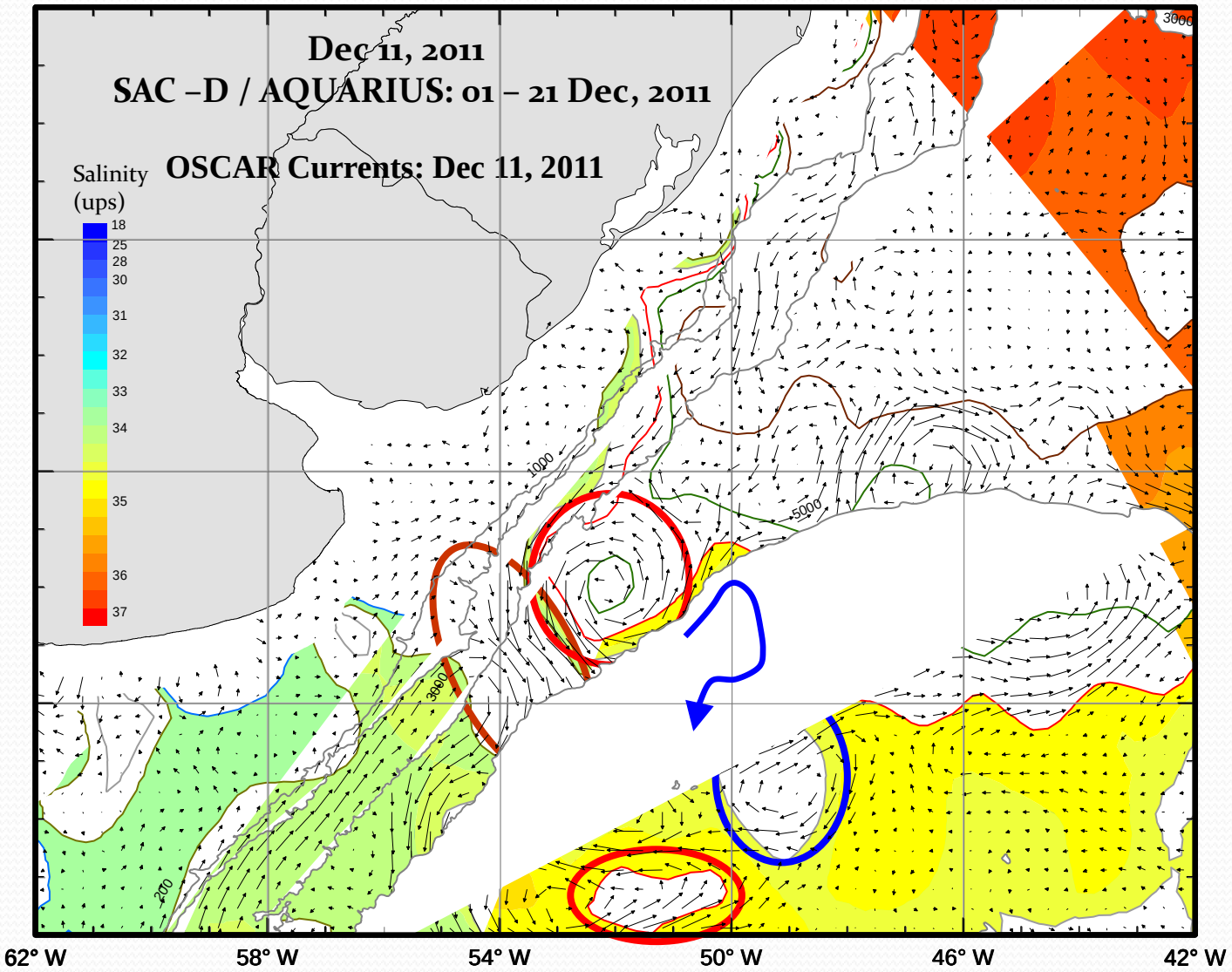
1. Fresh water in the Continental shelf (anomalous?)

2. Retention → favorable winds on the shelf (south-eastward)

3. Advection into And thru the Confluence region

Validating meso-scale features seen with Aquarius



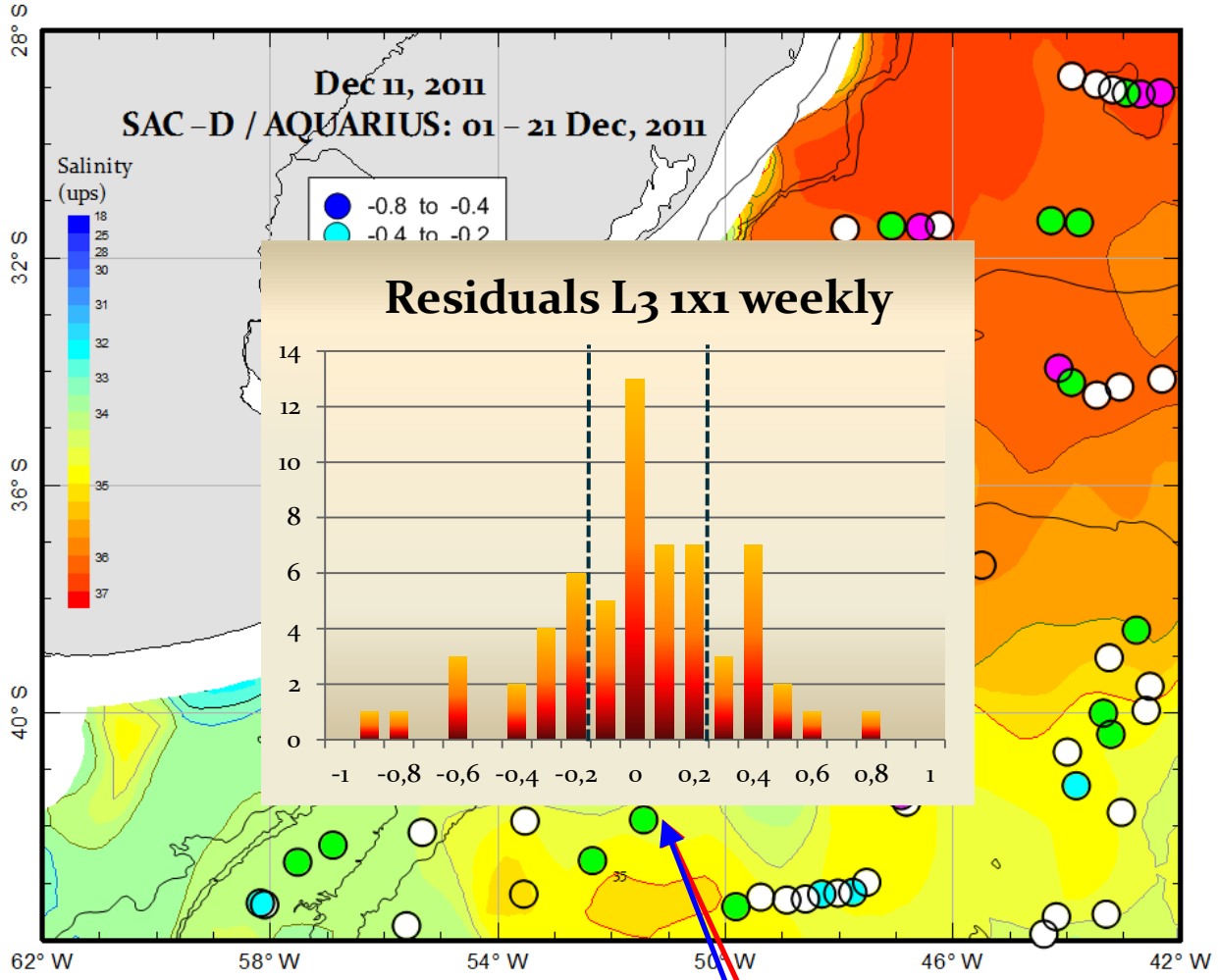

Dec 11, 2011
SAC –D / AQUARIUS: 01 – 21 Dec, 2011
OSCAR Currents: Dec 11, 2011
Salinity (ups)
18
25
28
30
31
32
33
34
35
36
37
3000
1000
5000
3000
200
62° W
58° W
54° W
50° W
46° W
42° W

ERROR ANALYSIS

3WRM &
L3 1x1
vs
ARGO

Period: (3 months)
Dic. to Feb. 2012

ARGO Profiles (goods): **63**



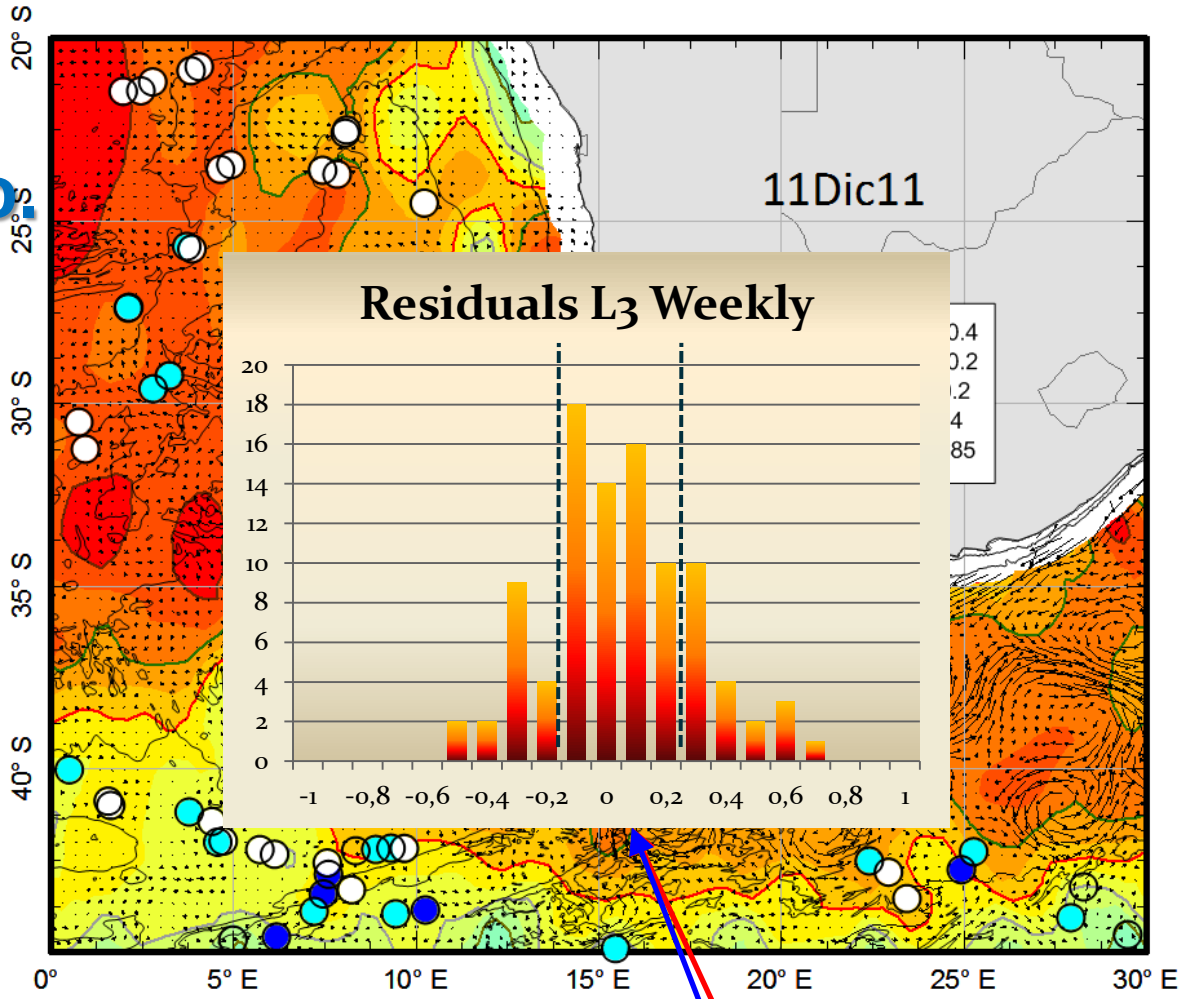
SSSaq at ARGO	N	Mean (bias)	RMS (residuals)	Nobs (-0.2 & +0.2)	% of Obs (-0.2 & +0.2)
3WRM (0.5x0.5)	63	0.074	0.259	42	66.7
L3 (1x1)	63	0.141	0.335	32	50.8

ERROR ANALYSIS on The Agulhas retro.

3WRM &
L3 1x1
vs
ARGO

Period: (3 months)
08 to 28 Dic. 2011

ARGO Profiles (goods): **126**



SSSaq at ARGO	N	Mean (bias)	RMS (residuals)	Nobs (-0.2 & +0.2)	% of Obs (-0.2 & +0.2)
3WRM (0.5x0.5)	126	0.124	0.219	91	72
L3 (1x1)	126	0.135	0.262	87	70

Outcomes:

- The shelf and deep-ocean ST/SA Confluence region presents the highest variance in the southern South Atlantic SSSaq signal.
- Salinity from Aquarius provides insight of meso-scale variability in the presence of high salinity gradients.
- 3-week weighted moving average data contribute to understand meso-scale processes of the shelf/deep-ocean exchange.
- This processing may reduce the target RMS error of Aq mission, but further analysis needed over the whole time serie and larger areas.
- We can't wait to test Version 2 !!!