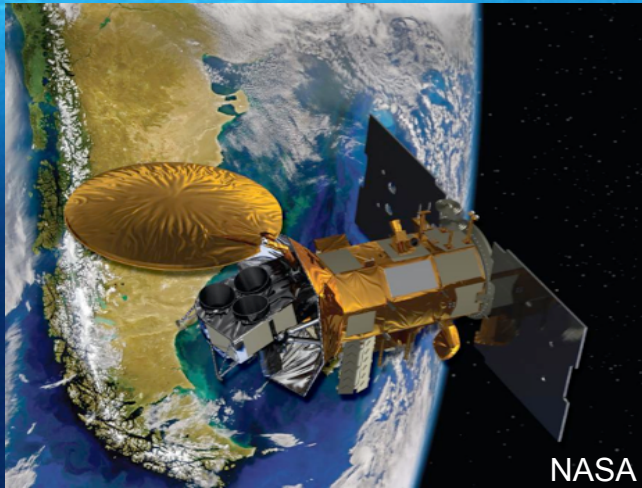


Investigating the Temporal Variability in Salinity from Ascending and Descending Passes in SMOS and Aquarius

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Aim

- Produce level 3 products suitable for scientific exploitation
- Validation against (Argo and) model output
- Start with monthly...



L3 SSS

Sept 2011 → Aug 2012

Median SSS in 1°x1° monthly grid

separately for asc and descending passes

ESA SMOS L2 v5.50

Only keep SSS where:

- L2 retrieval error < 1
- > 40 km from land
- summary flag for geophysical issues is OK (e.g. glint)
- summary flag for retrieval is OK (e.g. convergence)
- $N_{obs} > 25$
- PLUS weighted mean version using error

Aquarius L2 v1.3

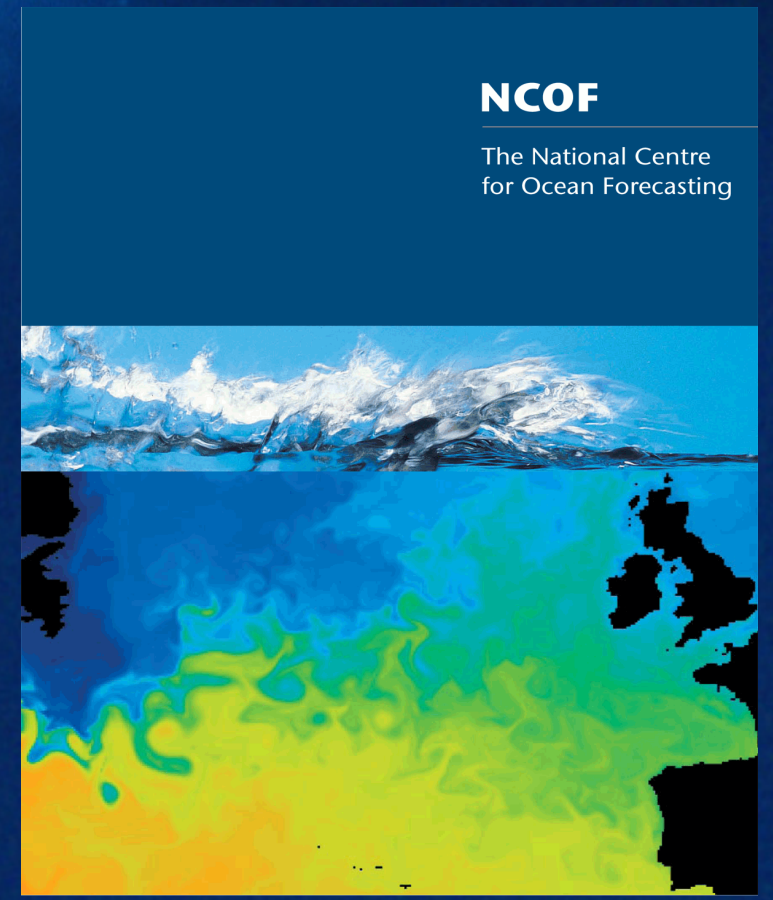
Only keep SSS where:

- $30 < SSS < 40$
- $-1.9^{\circ}\text{C} < SST < 40^{\circ}\text{C}$ and
- $0 \text{ ms}^{-1} < \text{wind speed} < 60 \text{ ms}^{-1}$
- $N_{obs} > 5$
- NO FLAGS

Model Output – FOAM/NEMO

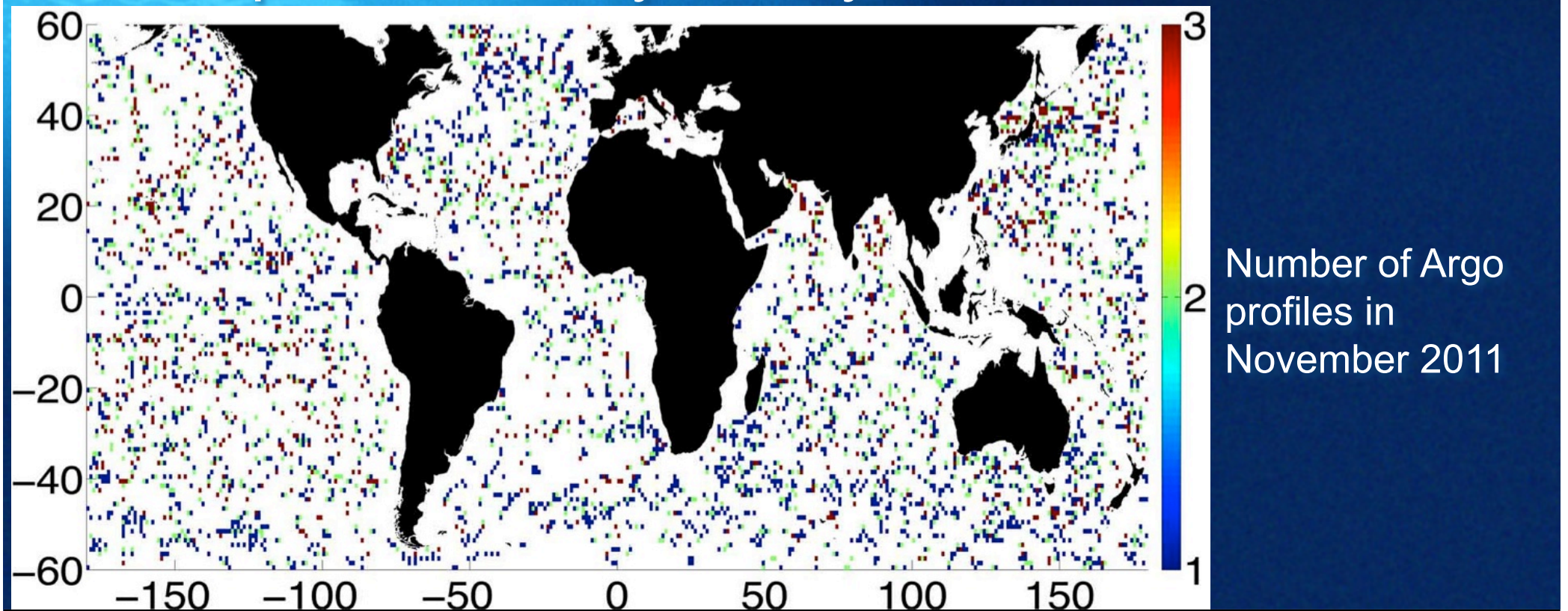
Forecasting Ocean Assimilation Model based on
Nucleus for European Modelling of the Ocean

- $1/4^\circ$ resolution daily
- Averaged (mean) to 1° and then monthly
- Assimilates Argo data, as well as satellite SST, SSH and sea ice data

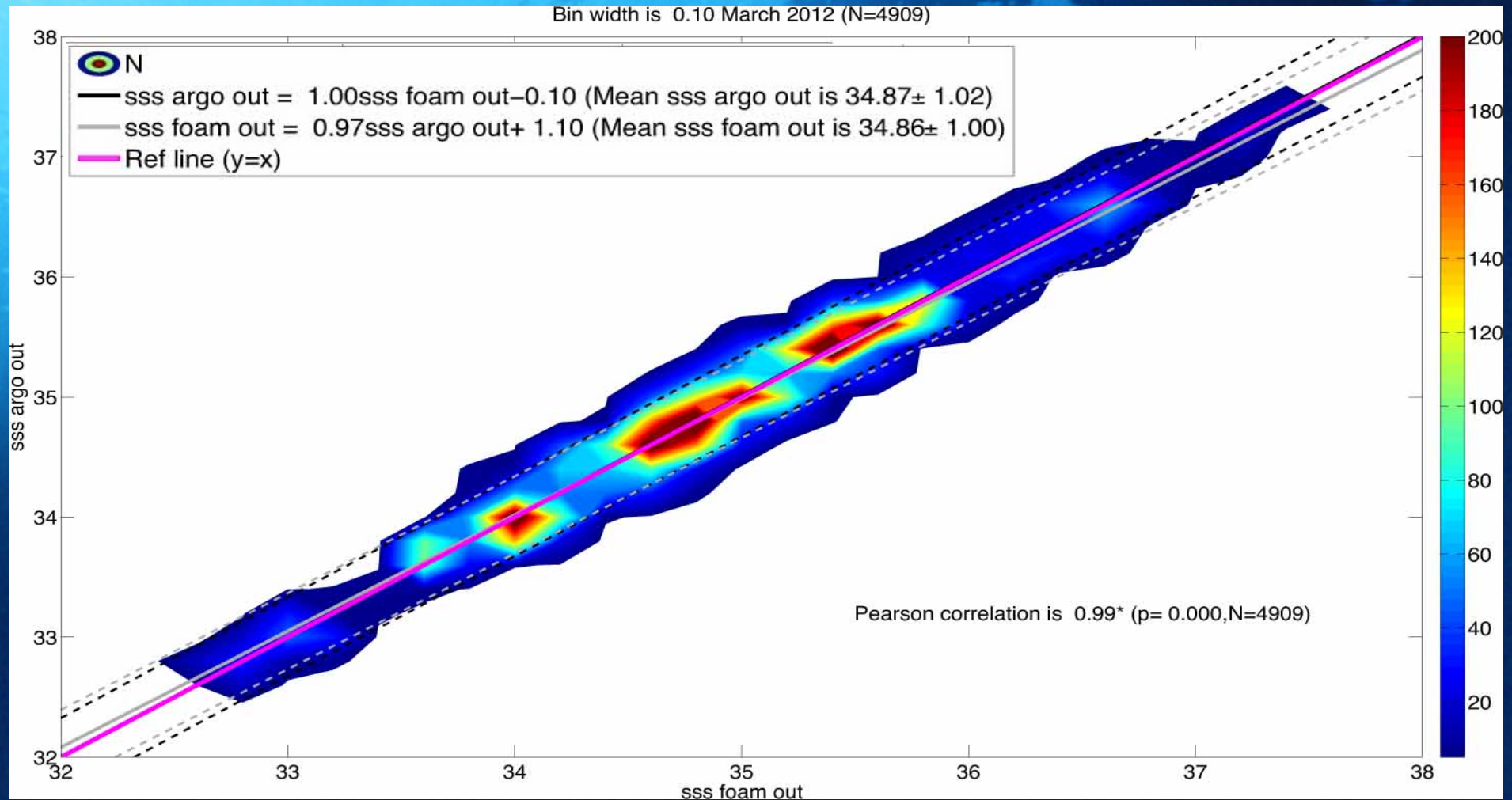


Why not Argo?

- Shallowest salinity data ~ 5-10 m
- >3000 floats worldwide, vertical profiles of salinity & temperature every 10 days



Is FOAM/NEMO suitable for validation?

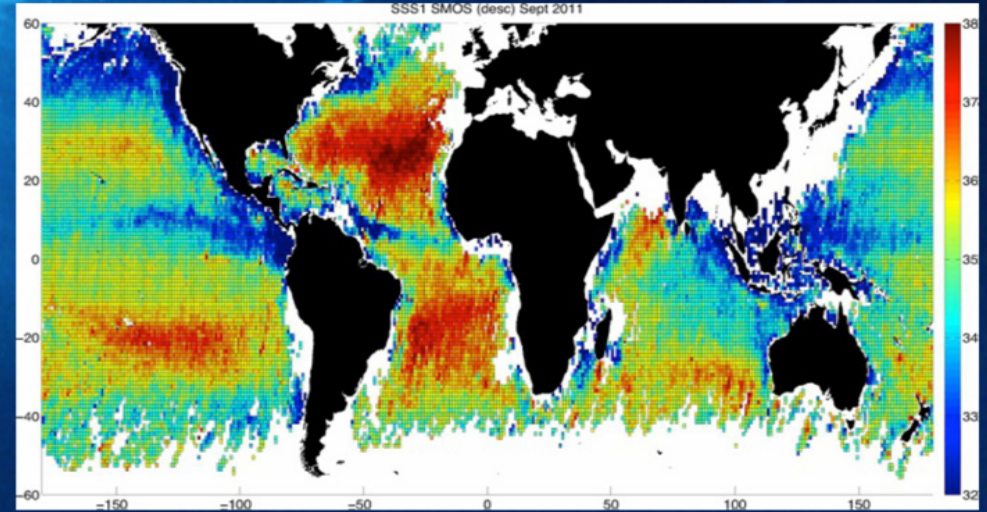
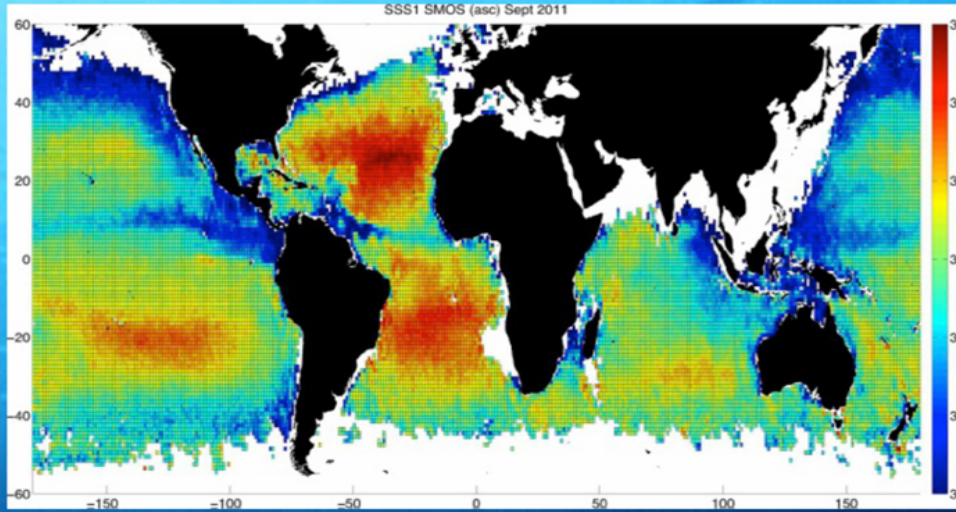


L3 SSS September 2011

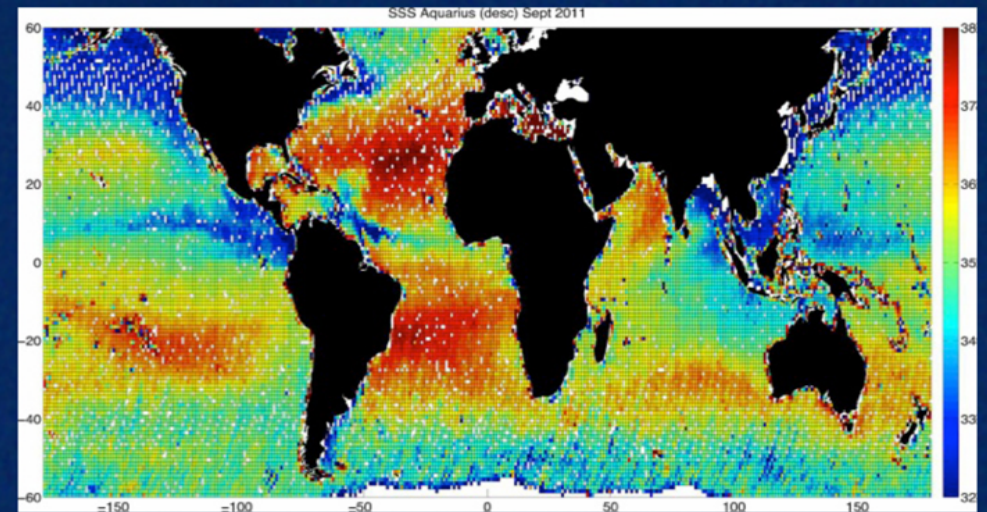
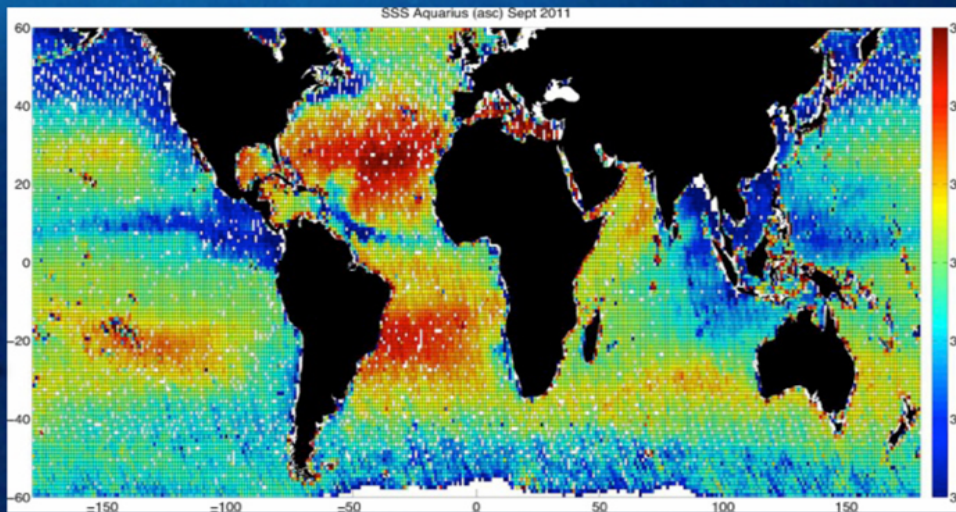
Ascending

Descending

SMOS



Aquarius

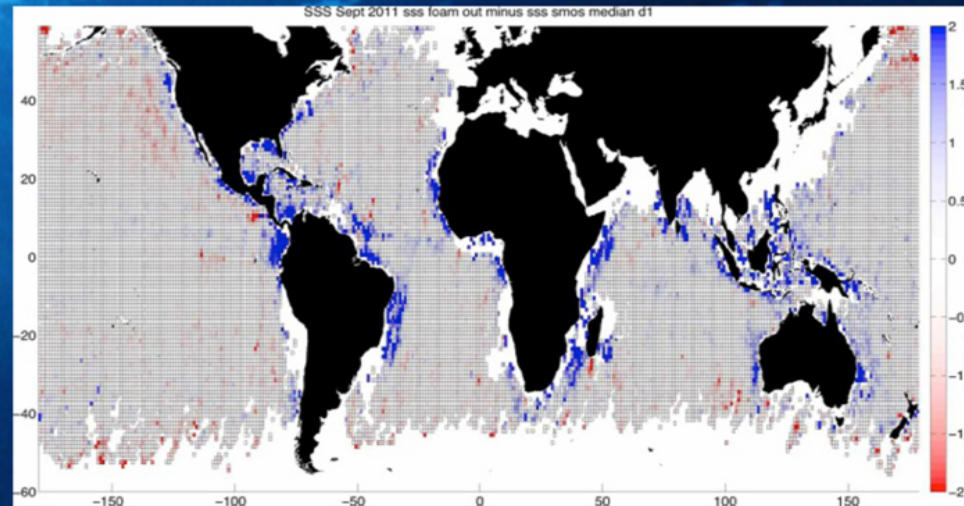
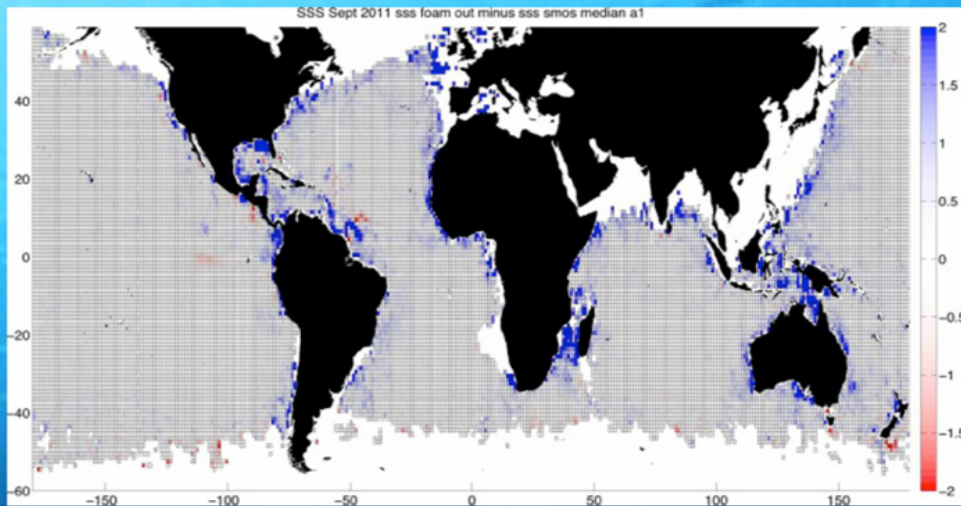


L3 SSS September 2011 FOAM/NEMO minus...

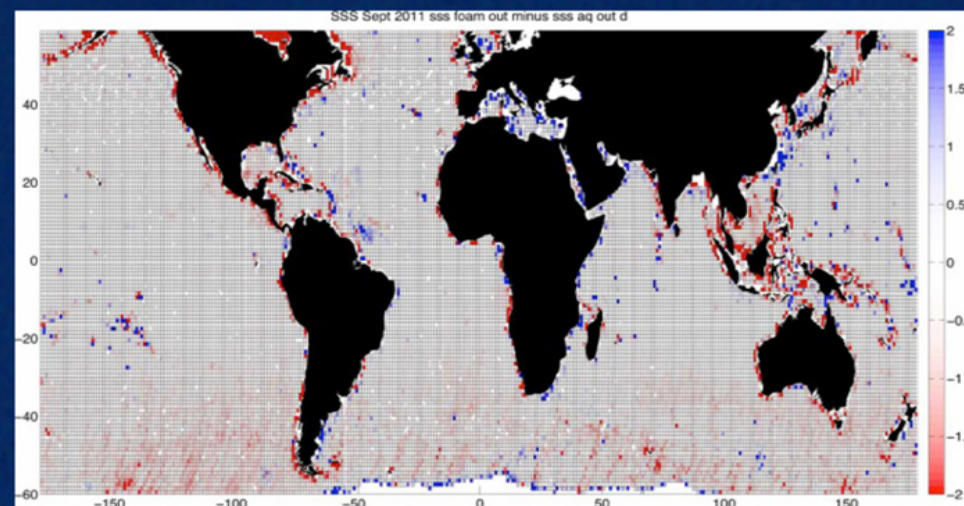
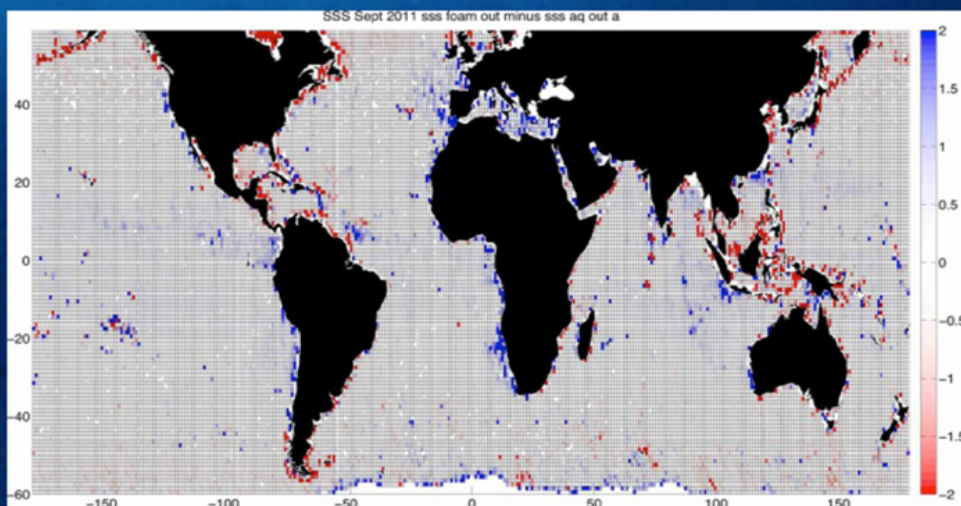
Ascending

Descending

SMOS



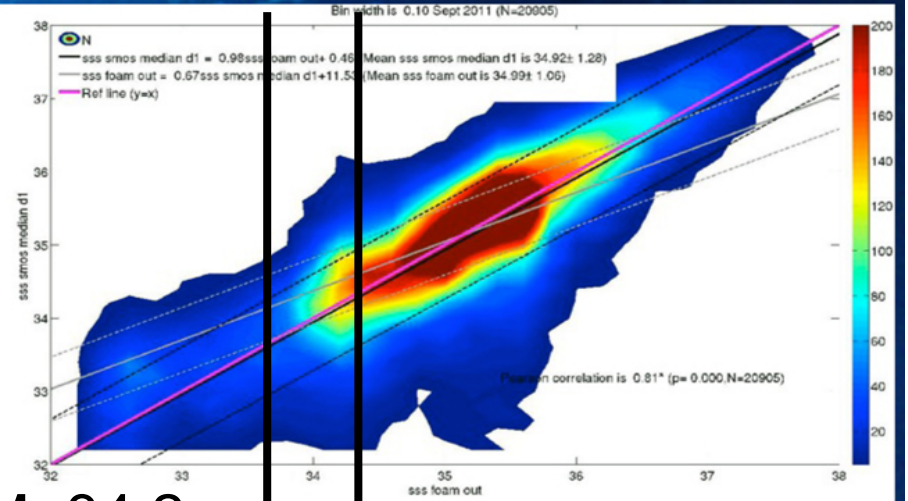
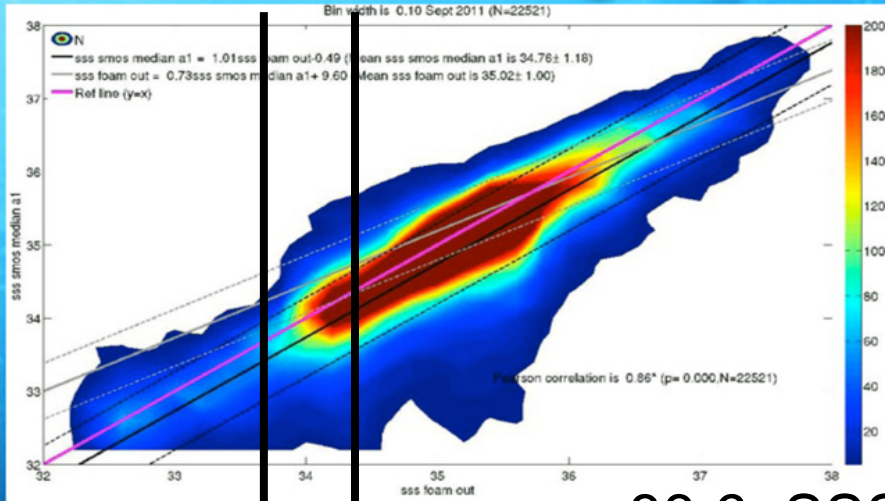
Aquarius



L3 SSS September 2011

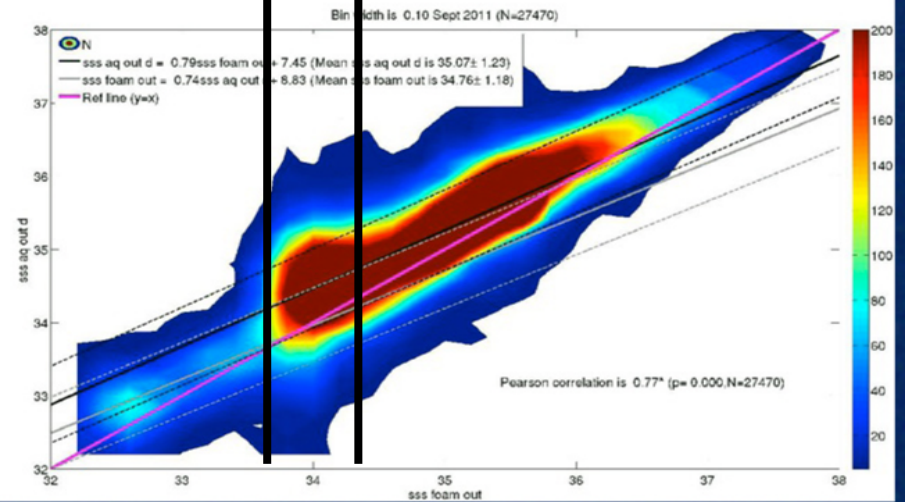
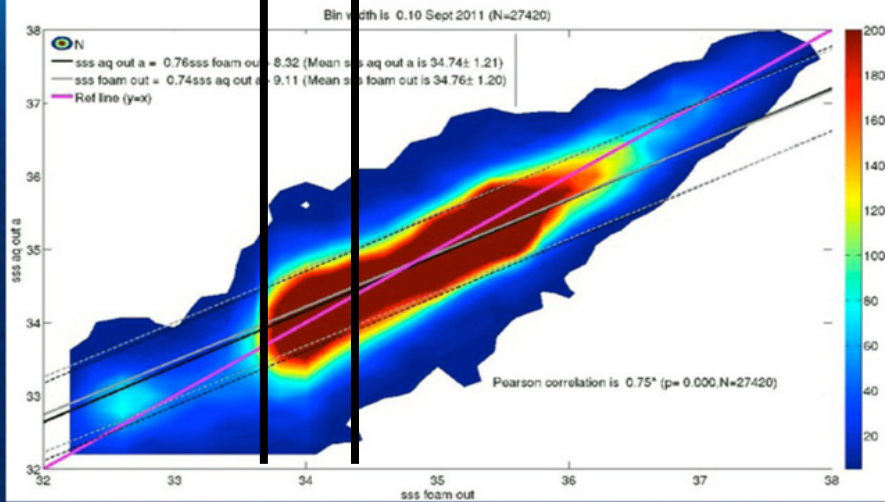
Ascending Descending

SMOS



33.6 < SSS FOAM < 34.2

Aquarius



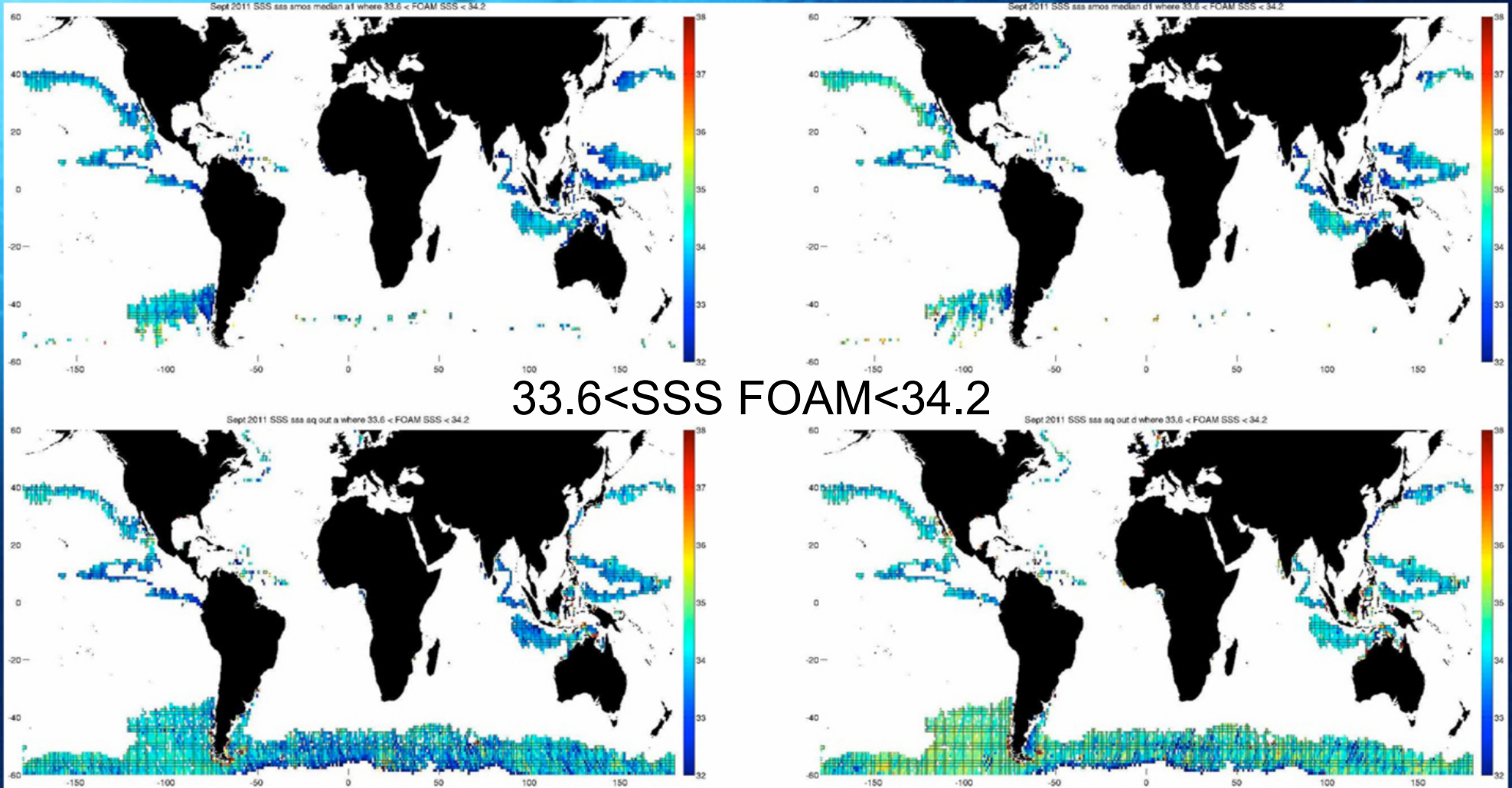
L3 SSS September 2011

Ascending

Descending

SMOS

Aquarius

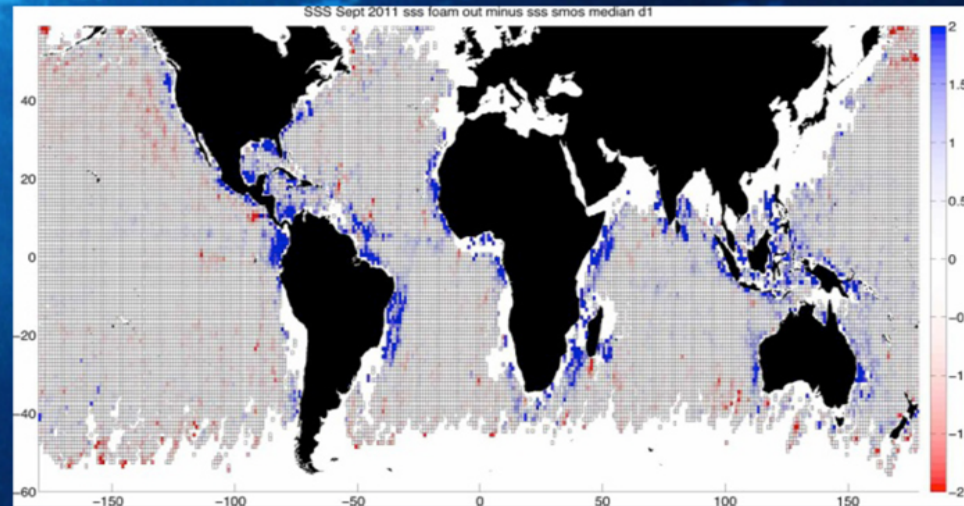
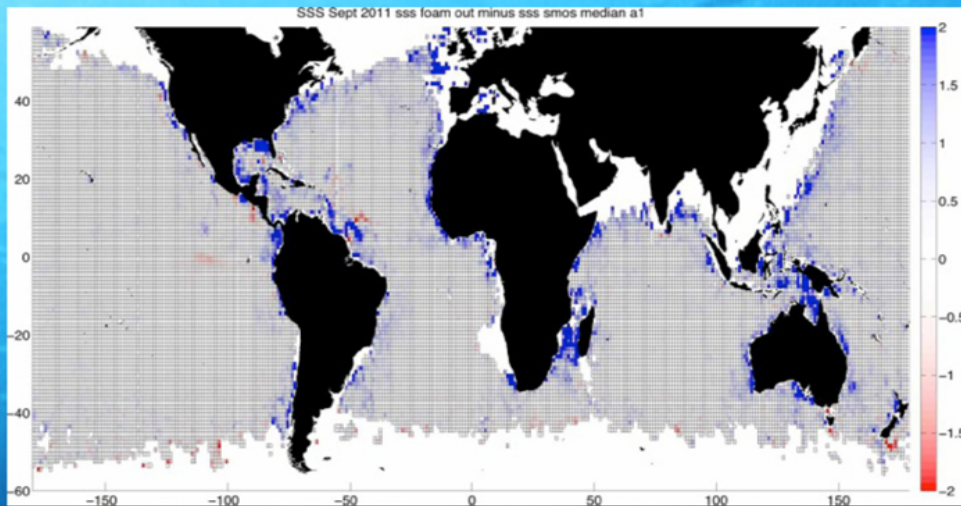


L3 SSS September 2011 FOAM/NEMO minus...

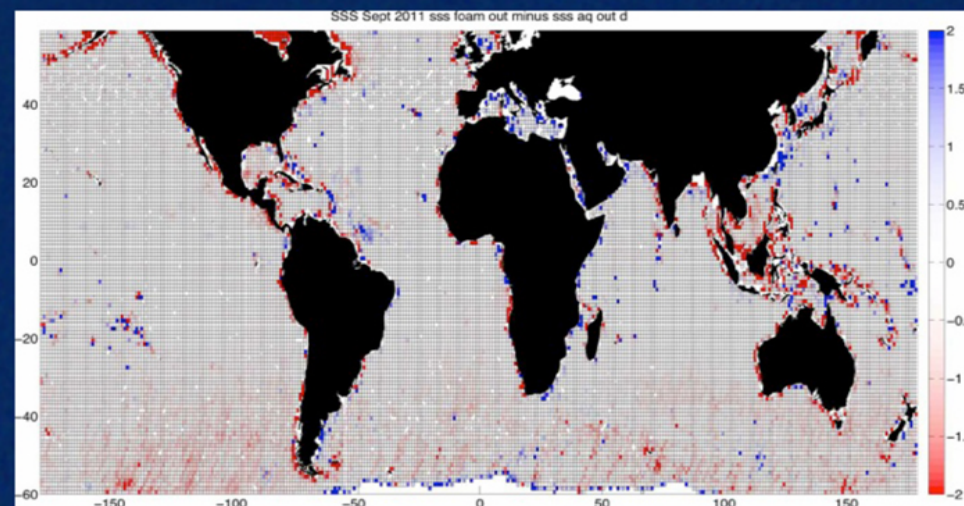
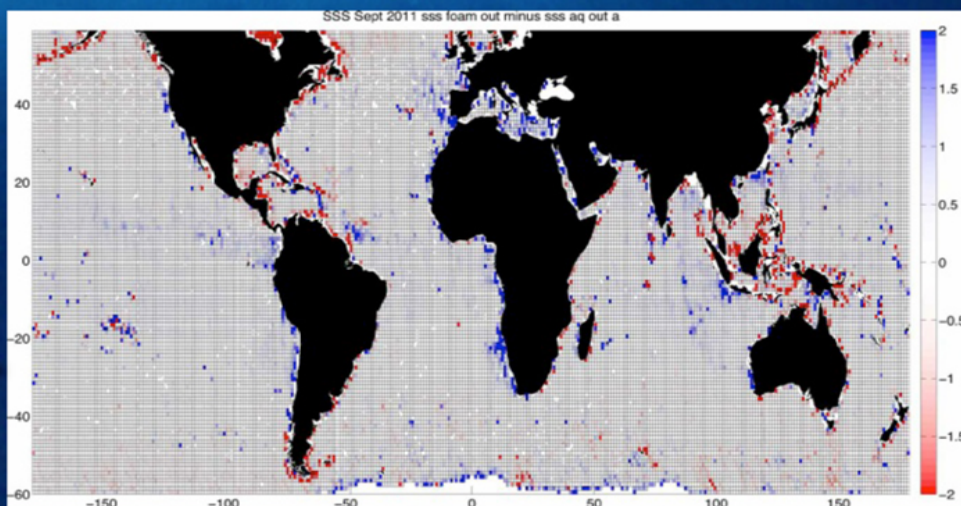
Ascending

Descending

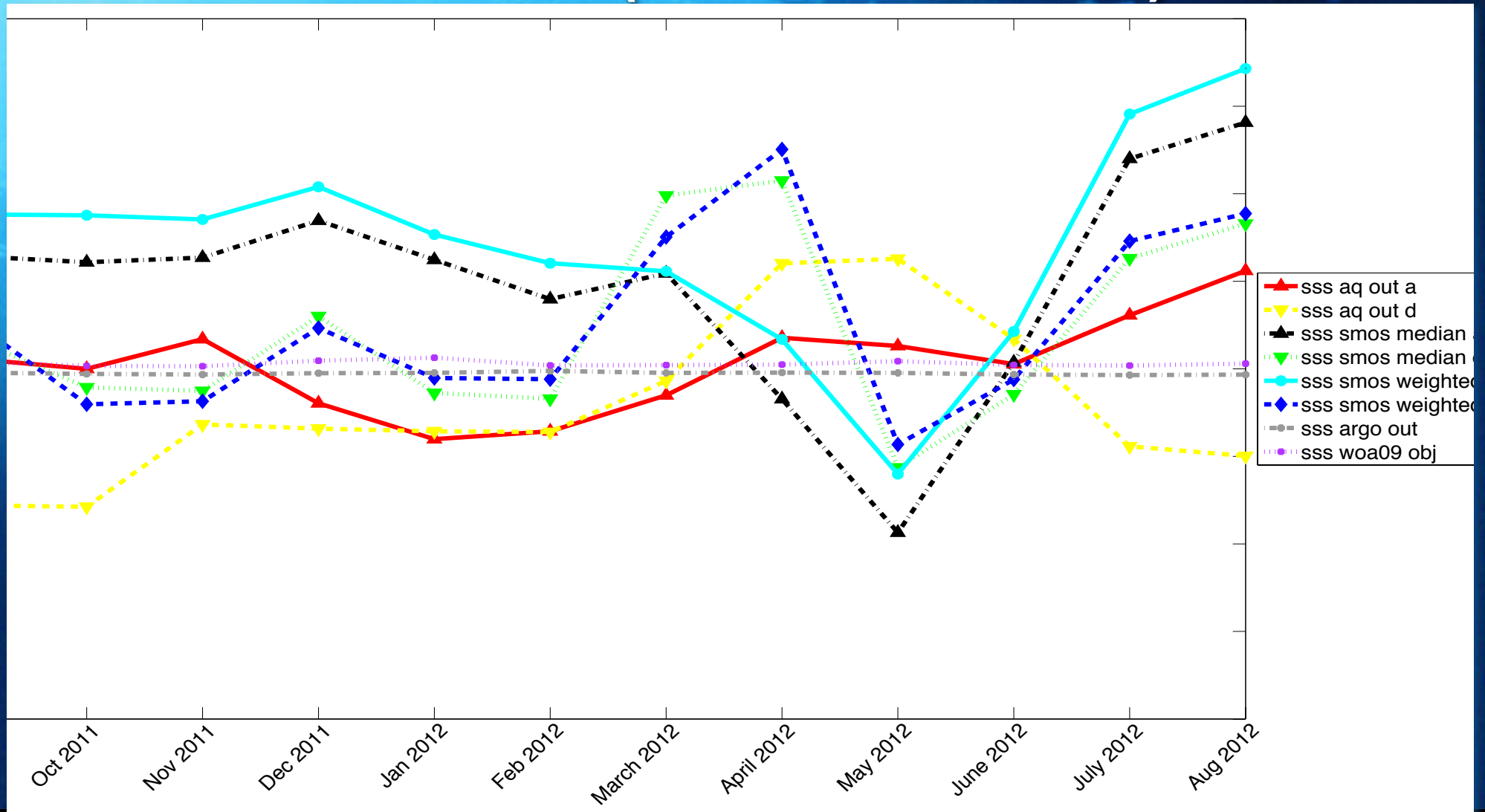
SMOS



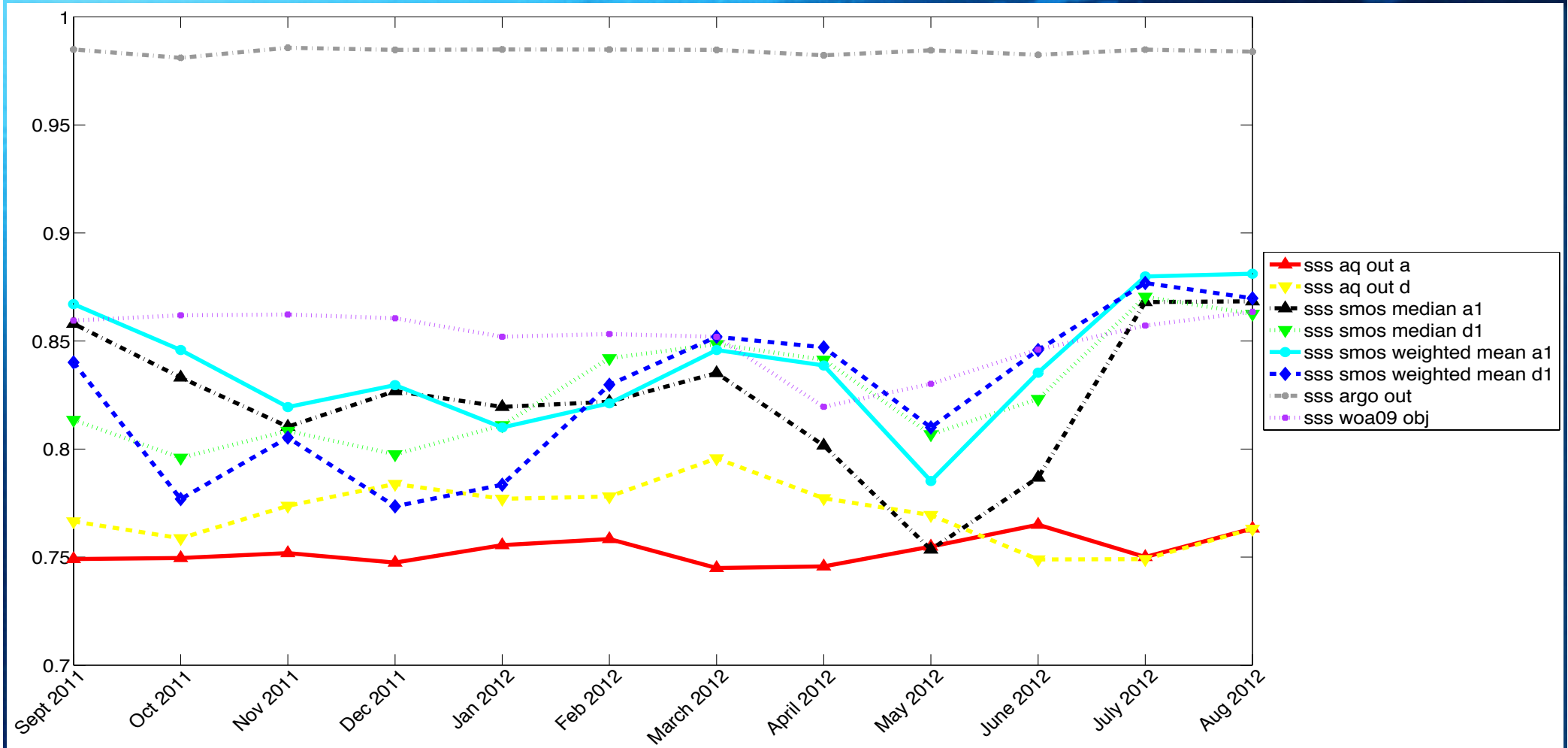
Aquarius



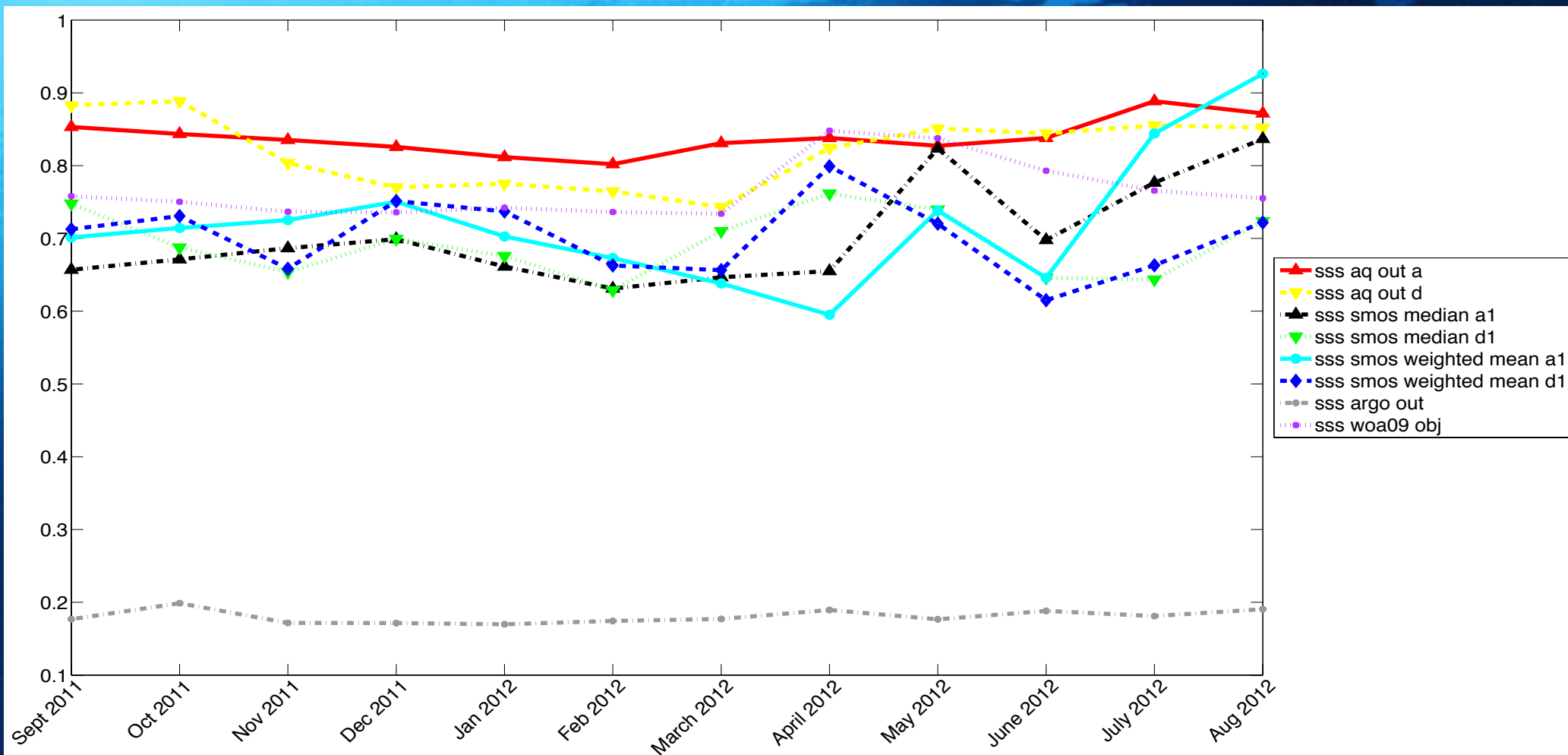
SSS Bias (FOAM - satellite)



SSS Correlation (FOAM & satellite)



SSS RMSD (FOAM & satellite)



Daily L3 SSS

Median SSS in daily, 'Light touch' filtering

ESA SMOS L2 v5.50

1 Sept 2010 – 31 Jan 2013

Only keep SSS where:

- L2 retrieval error < 1

Aquarius L2 v1.3

1 Sept 2011 – 31 Dec 2012

Split by beam

Only keep SSS where:

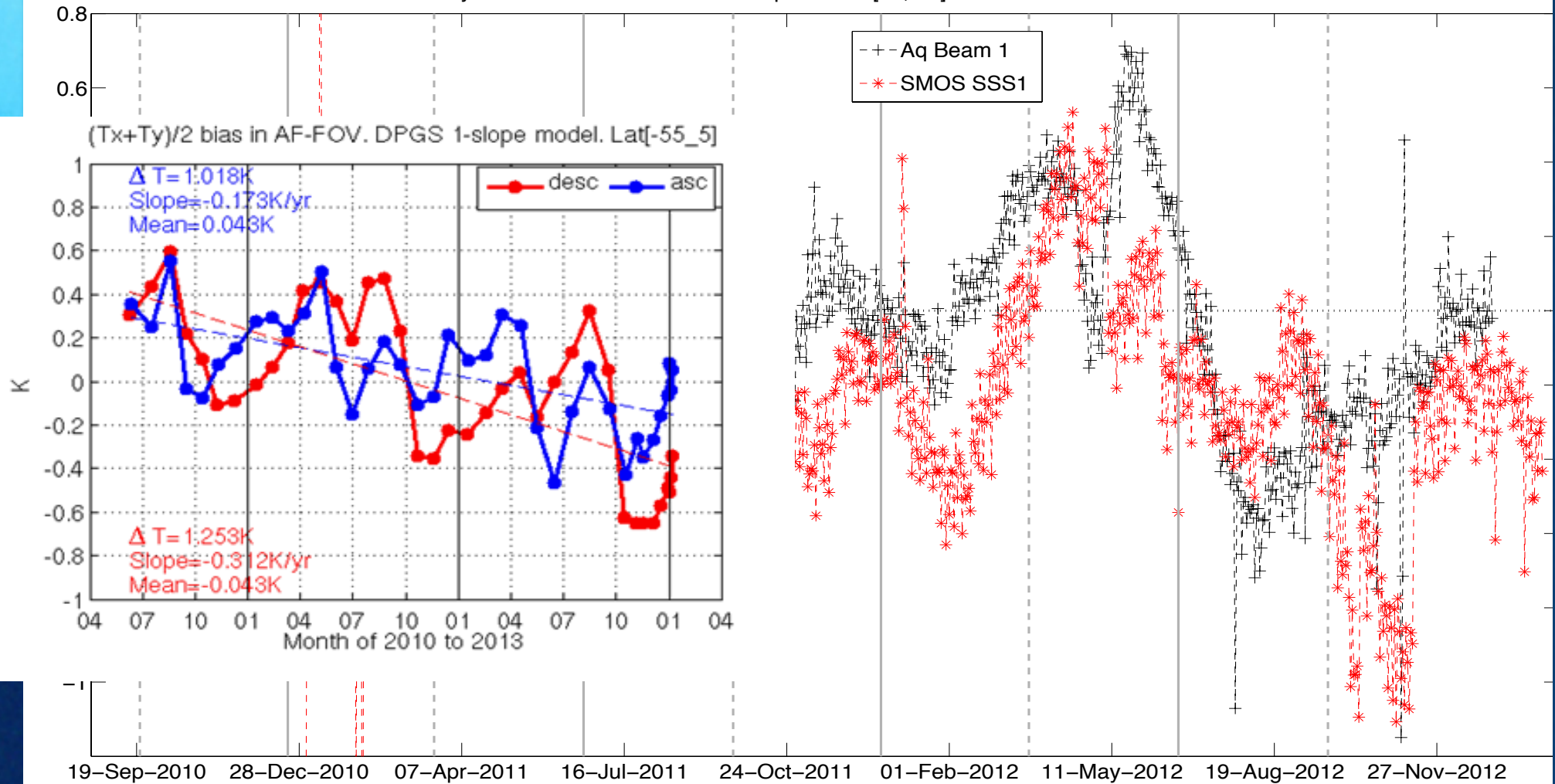
- $25 < \text{SSS} < 40$

Find SSS (ascending) minus SSS (descending)

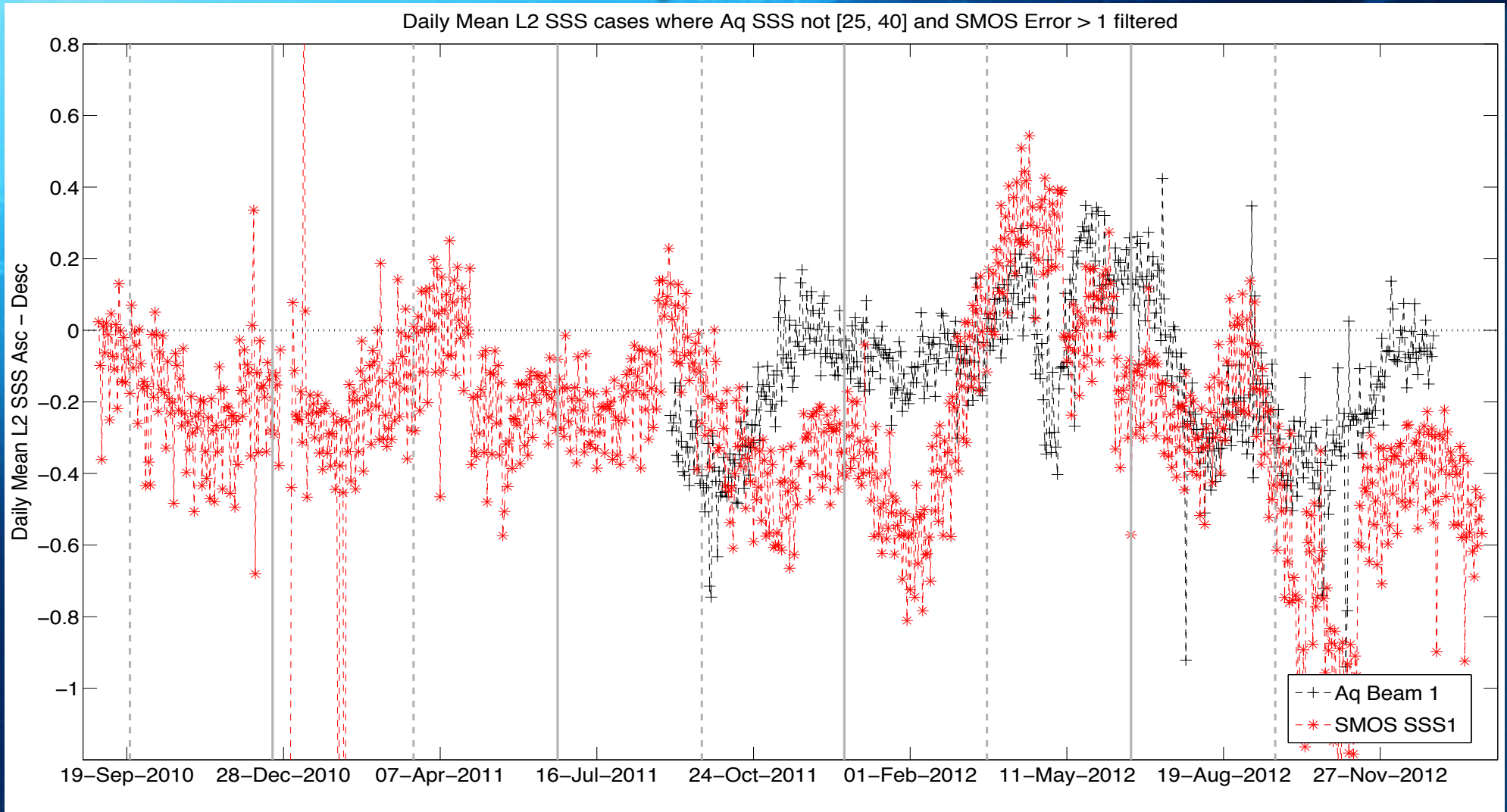
For whole study region and in grid (1° to 5°)

Global

Daily Mean L2 SSS cases where Aq SSS not [25, 40] and SMOS Error > 1 filtered

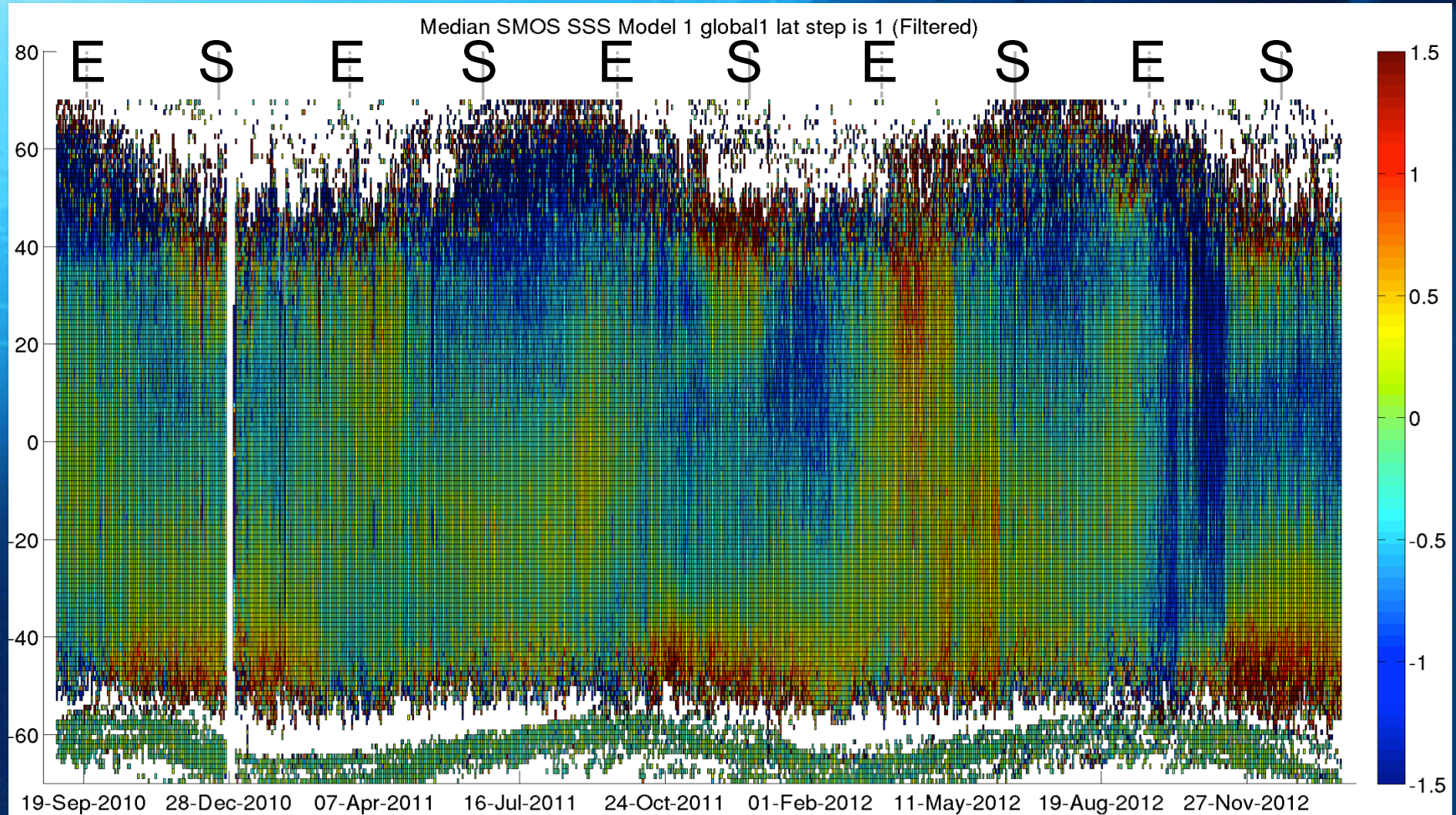


Equatorial

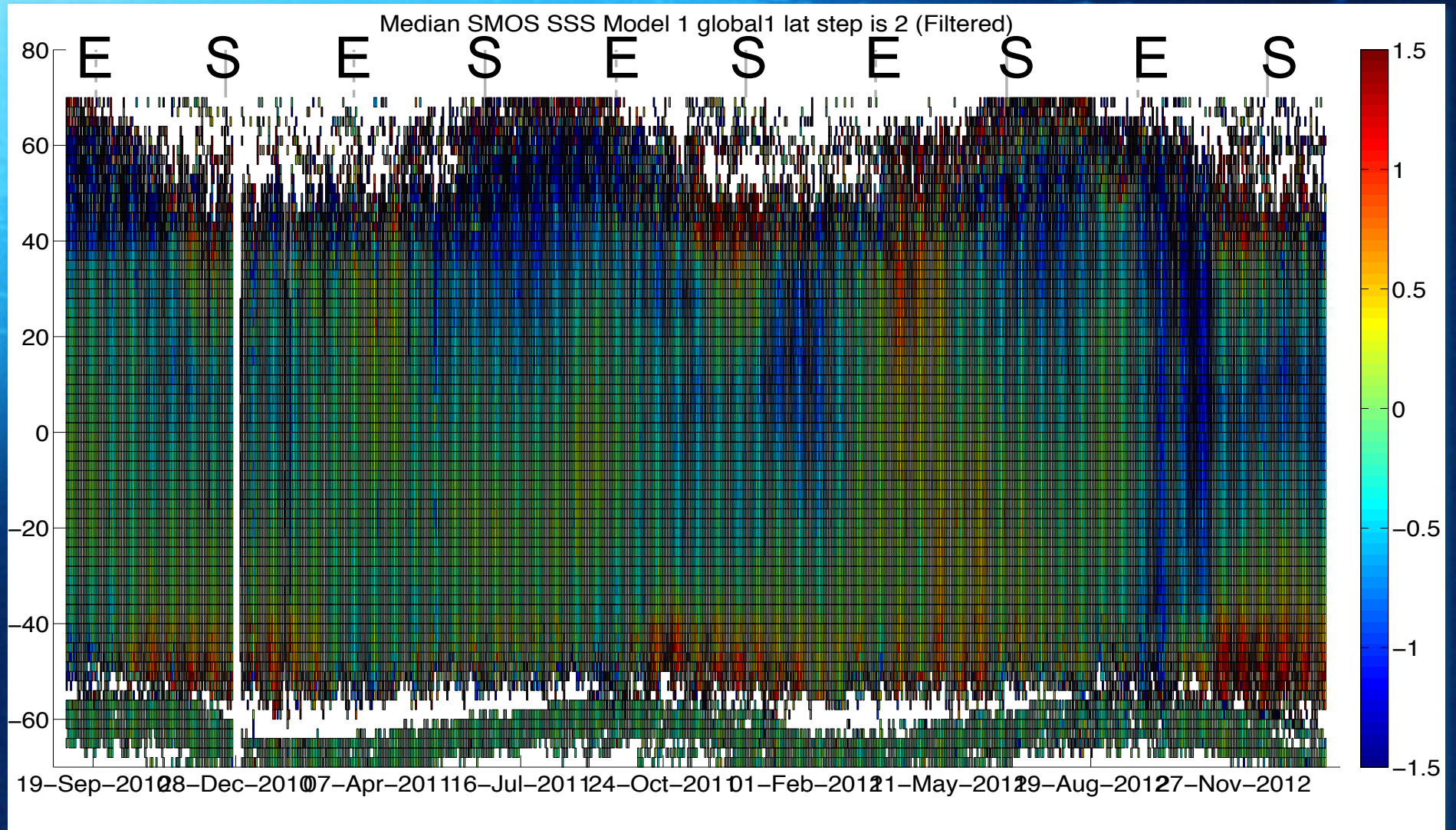


SMOS Model 1 (1°)

Median SMOS SSS Model 1 global1 lat step is 1 (Filtered)

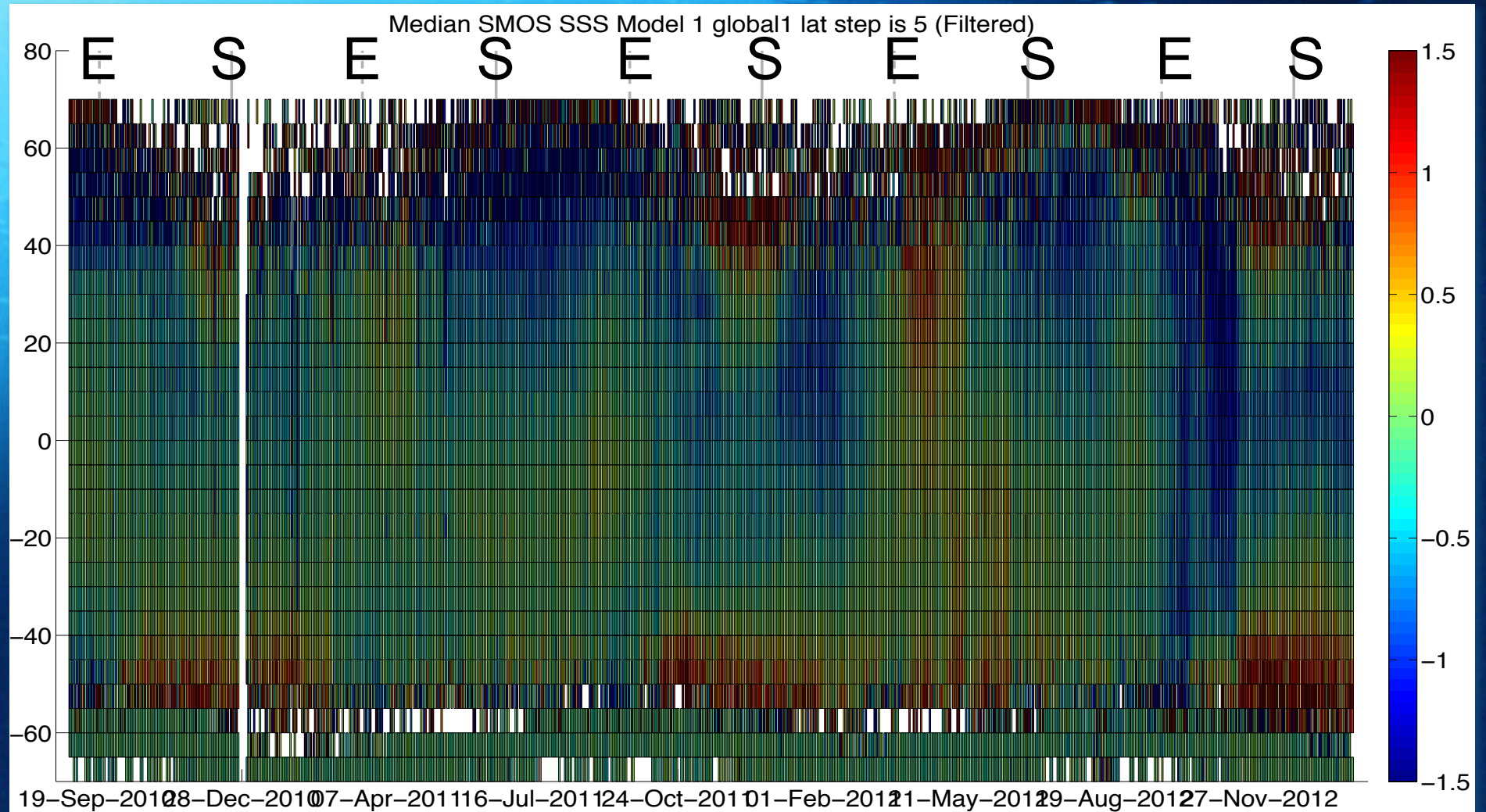


SMOS Model 1 (2°)

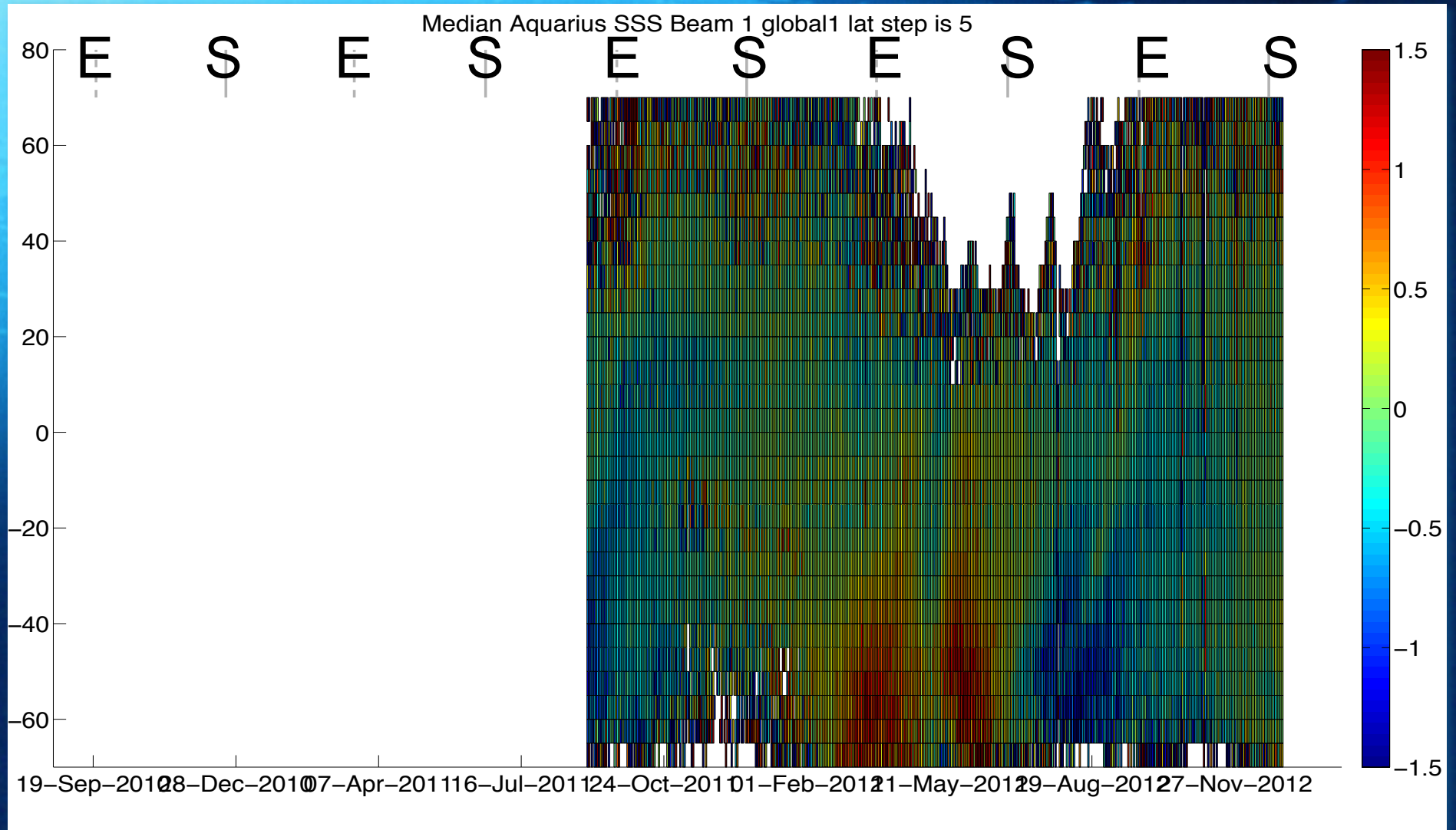


SMOS Model 1 (5°)

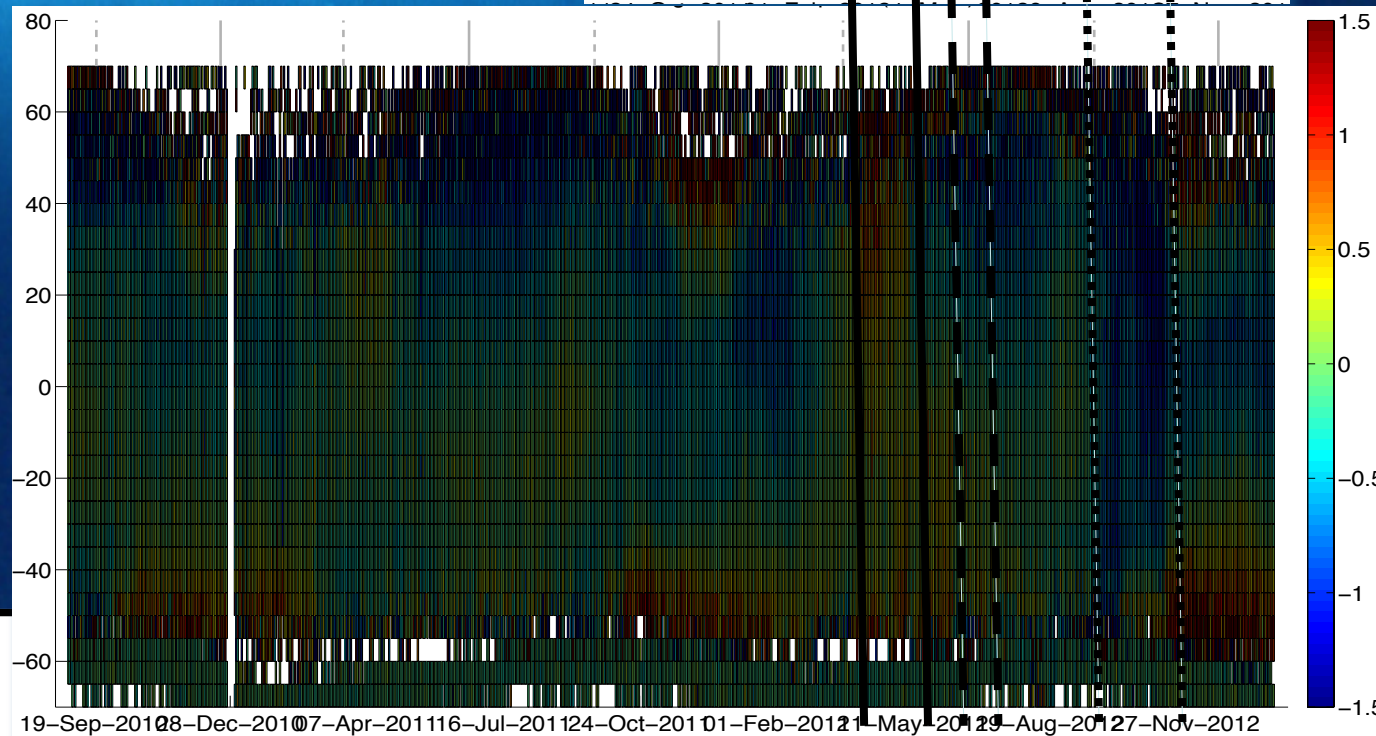
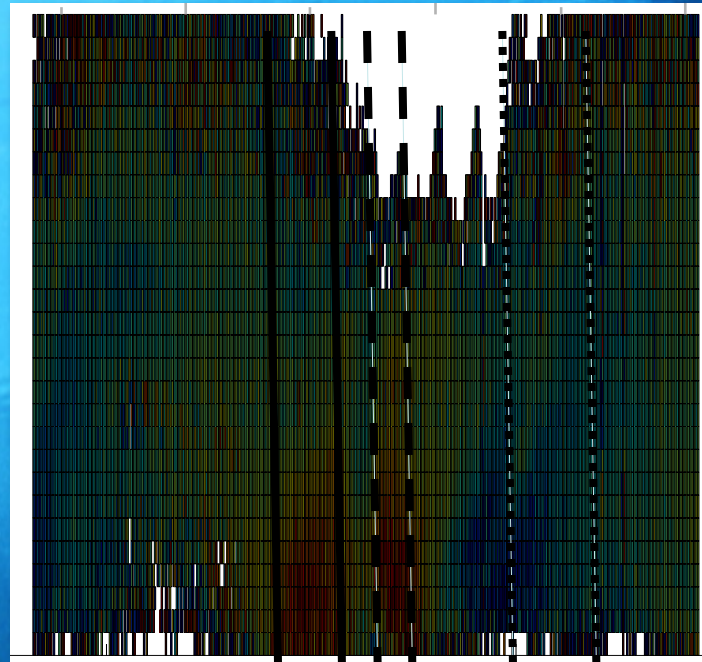
Median SMOS SSS Model 1 global1 lat step is 5 (Filtered)



Aquarius Feed Horn 1 (5°)



Aquarius Feed Horn 1 (5°)



SMOS Model 1 (5°)



Conclusions

- Issues in Southern Ocean – wind? ice? galactic noise?
- Not comparing like with like (SMOS vs. Aquarius filtering high southern latitudes)
- Aquarius V2 reprocessing...
- SMOS+SOS will consider ascending versus descending in SMOS study region (SMOS and Aquarius)

Thanks to



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www.nceo.ac.uk



www.smos-mode.eu



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support to science element

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LearnEO! Lesson Writing Competition

- Objectives:
 - Promote the use of EO data (particularly **ESA data** on its own or in synergy with data from other sources
 - Contribute to new **Bilko** lessons from different application areas and geographical regions

Prizes: €5000, €3000, €2000
More on www.learn-eo.org soon

