

# Validation of SMOS and Aquarius Salinity Data in the Agulhas Region



Nicole Button

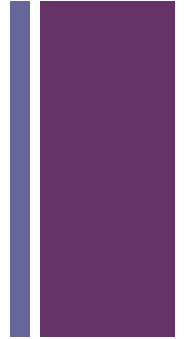
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# + Outline

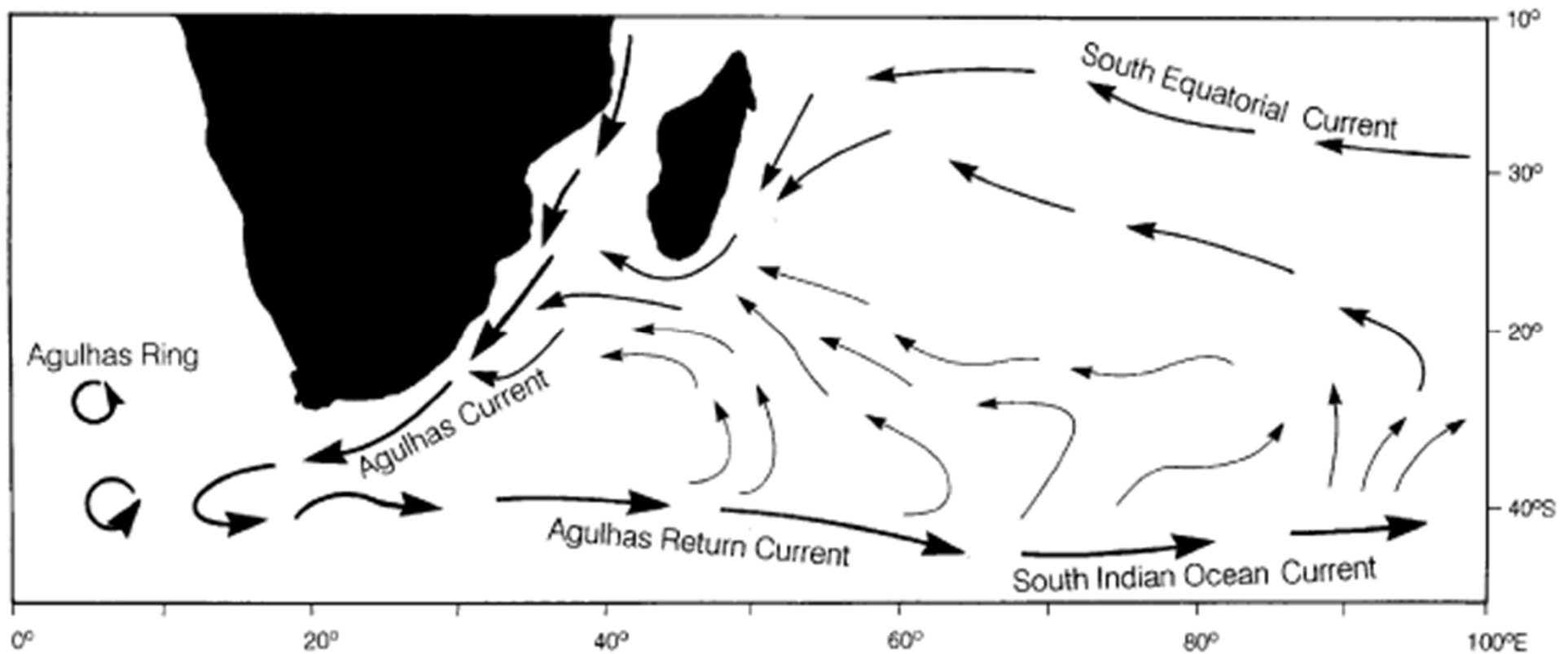


- Agulhas Current
  - Features
  - Why is salinity important in this region?
- Aquarius and SMOS
  - Salinity measurements within this region
  - Validation
- SSS and SST Correlations
- Conclusions



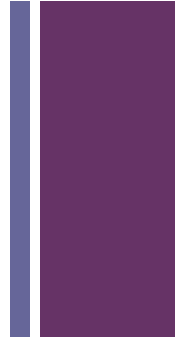
Why is it important to study  
salinity in the Agulhas Current?

# + Schematic of Agulhas Current




Lutjeharms et al., 2001

# + Why is this study important?



- Strongest current in the Southern hemisphere
  - Heat and salt flux into the Atlantic Ocean in the form of rings
- Aquarius and SMOS provide the first complete spatial and temporal coverage of salinity in the Agulhas Current
- Objectives
  - Determine accuracy of SMOS and Aquarius SSS measurements in the Agulhas Current
  - Develop an understanding for the role of salinity

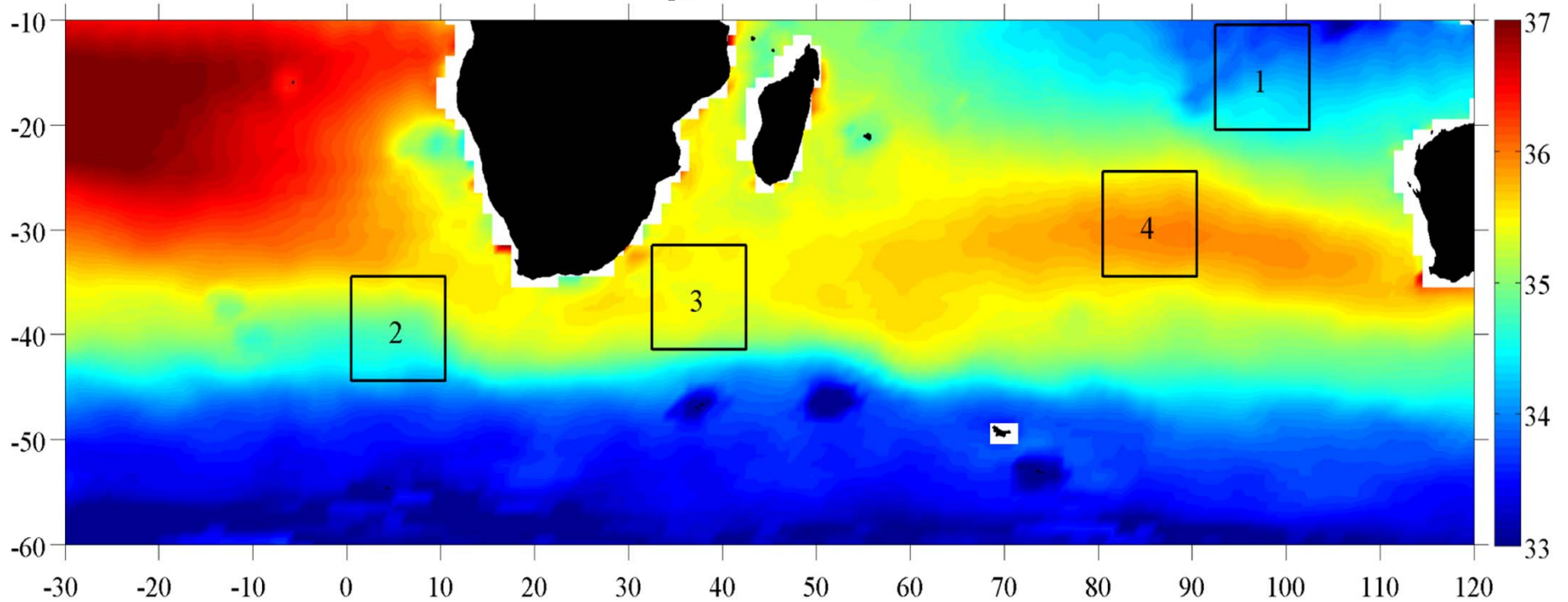


+ Validation of Aquarius and  
SMOS in the Agulhas Current

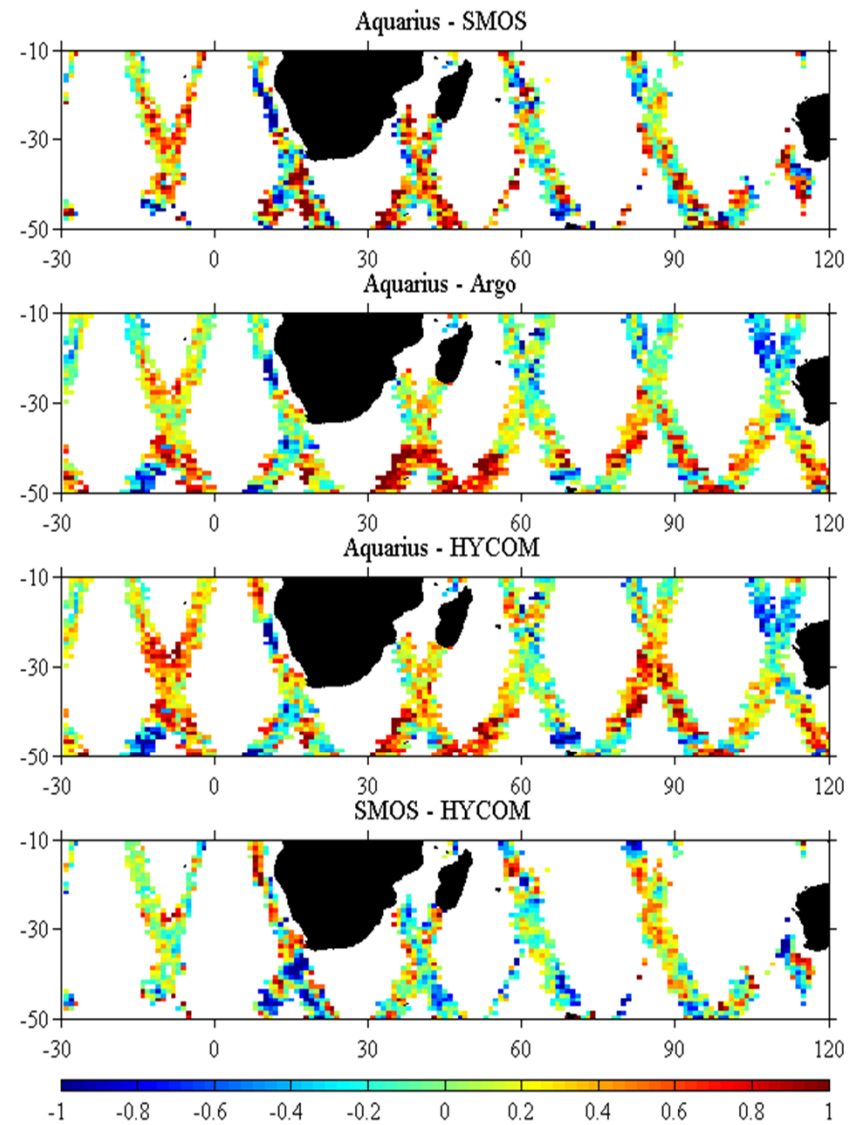
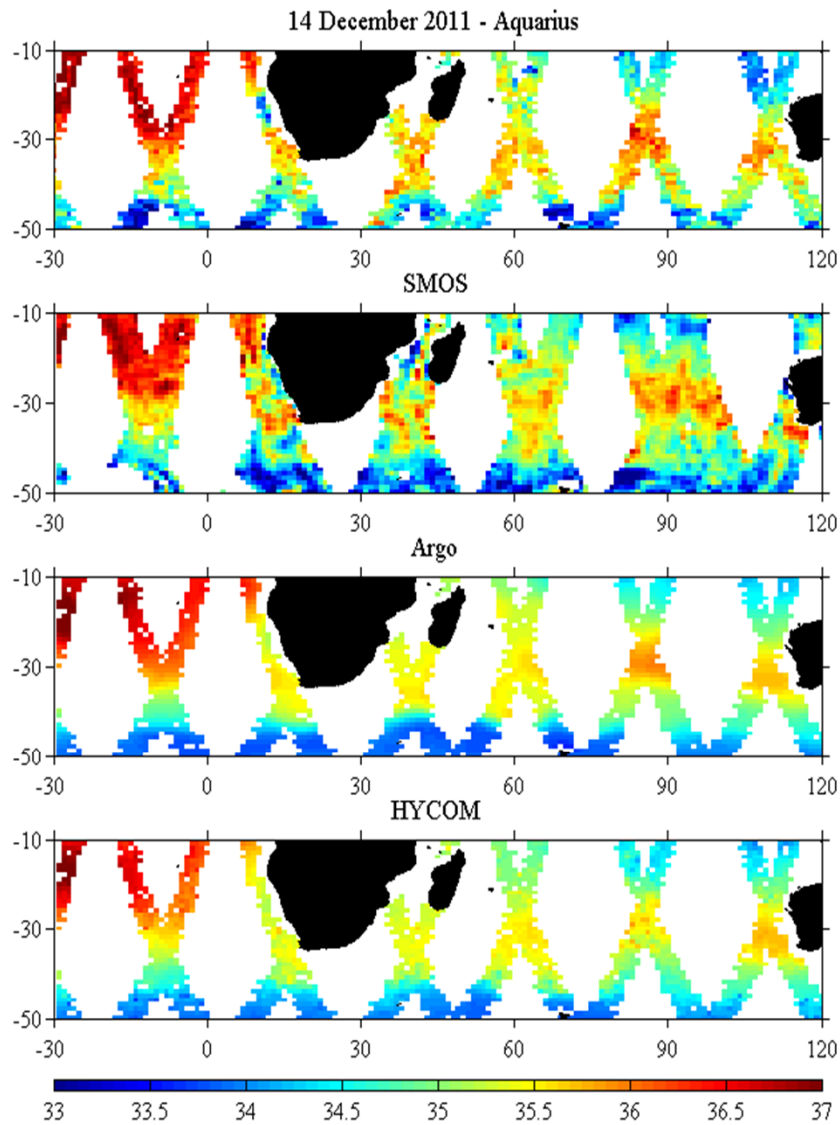
# + Annual Mean of Salinity (September 2011 – August 2012)



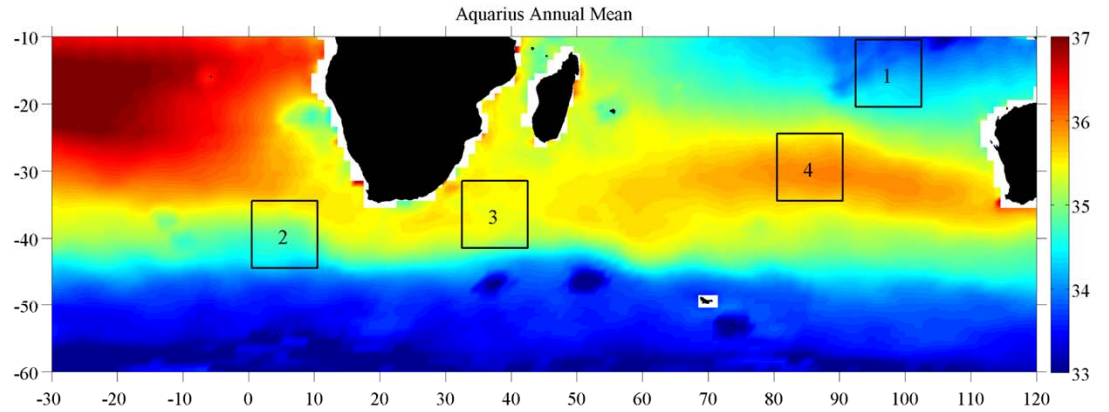
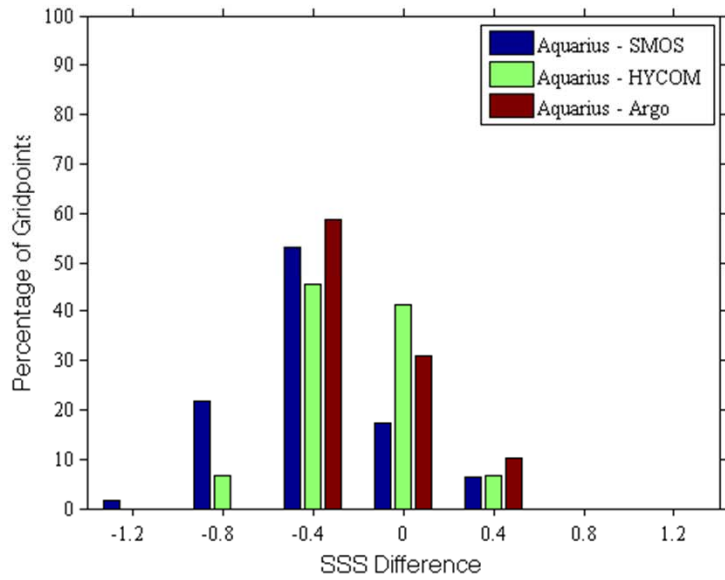
Aquarius Annual Mean



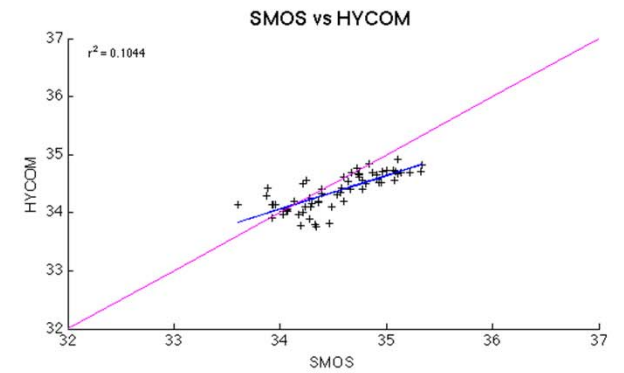
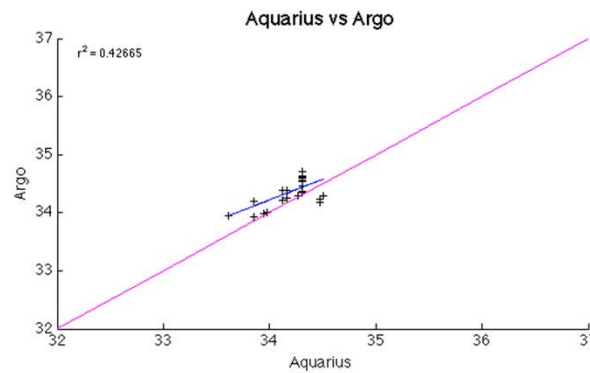
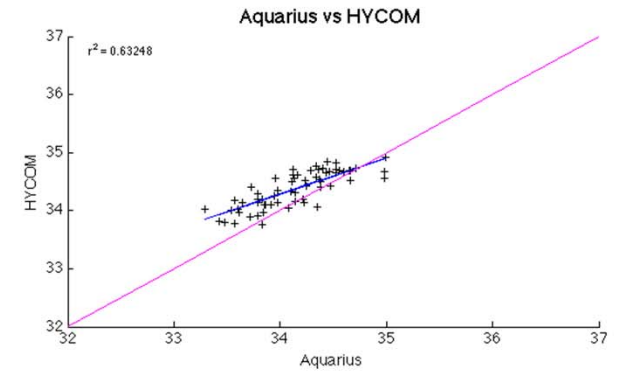
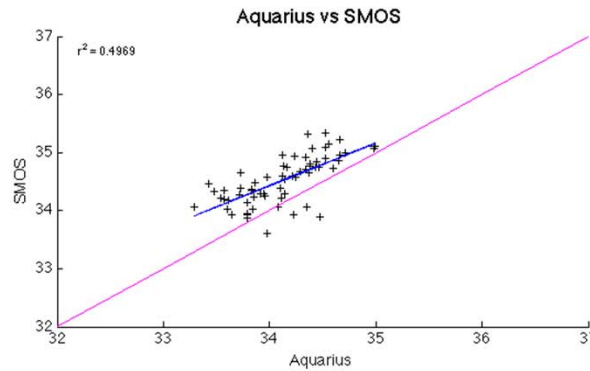
# + Daily Passes

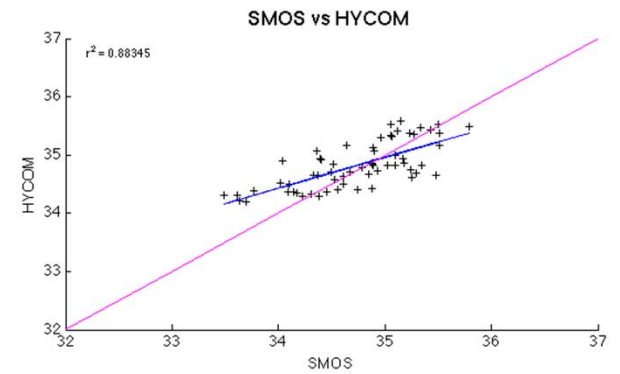
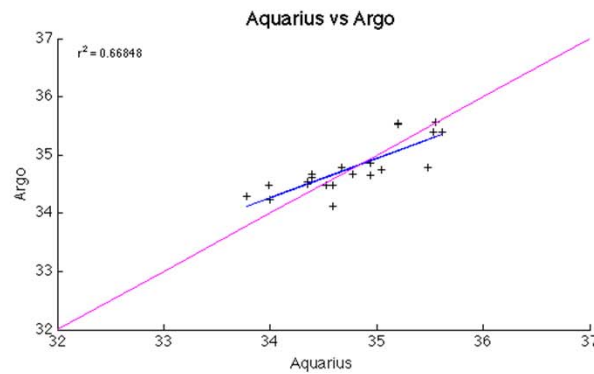
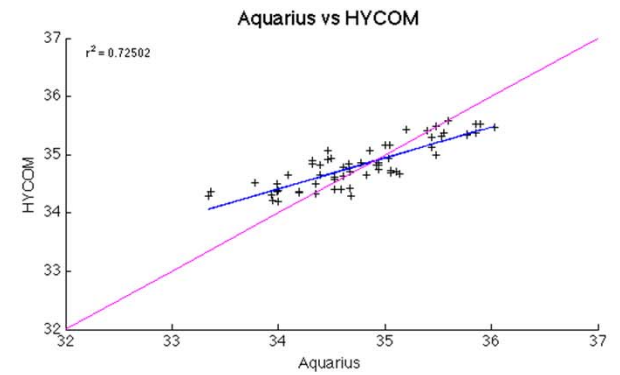
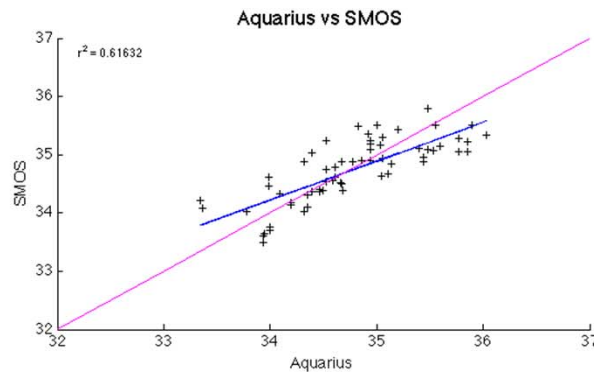
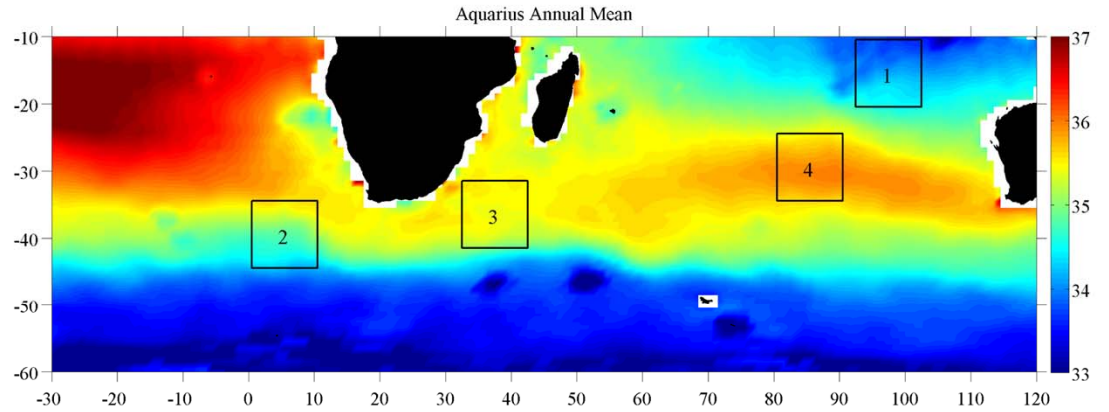
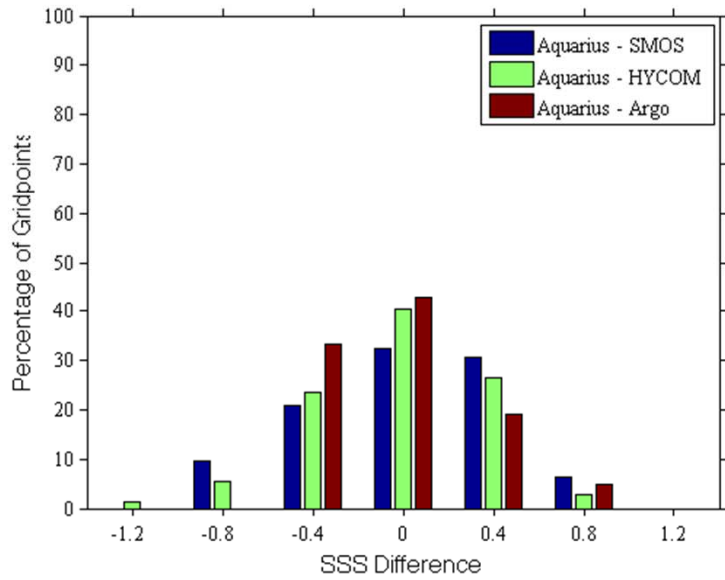






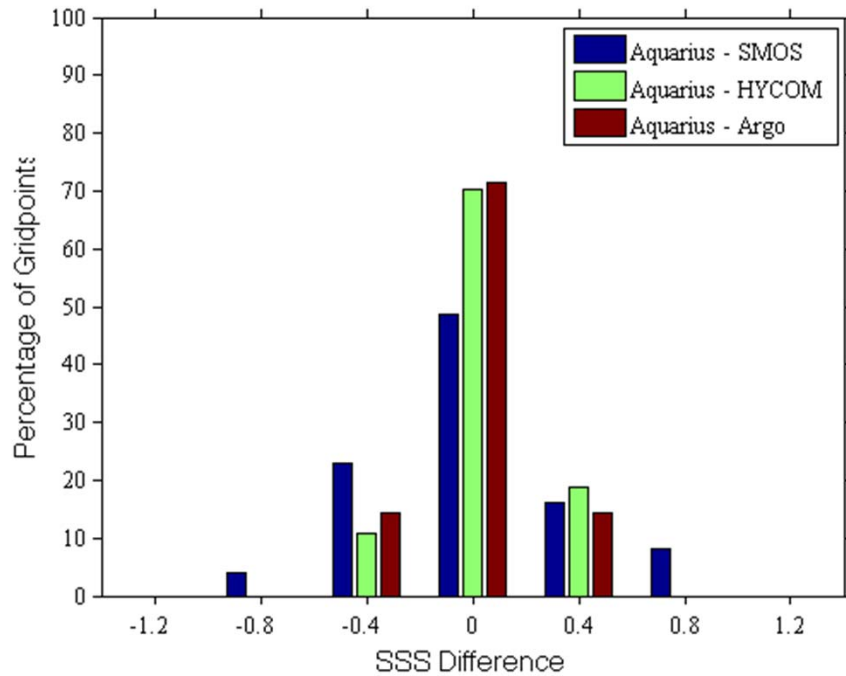
Box 1:  
2 July 2012



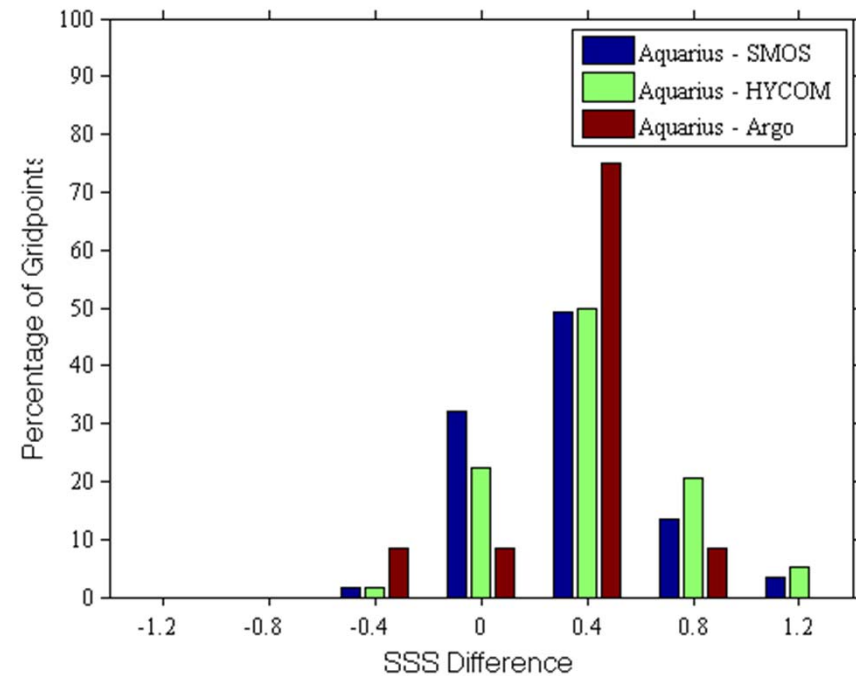


**Box 2:**  
**16 February 2012**

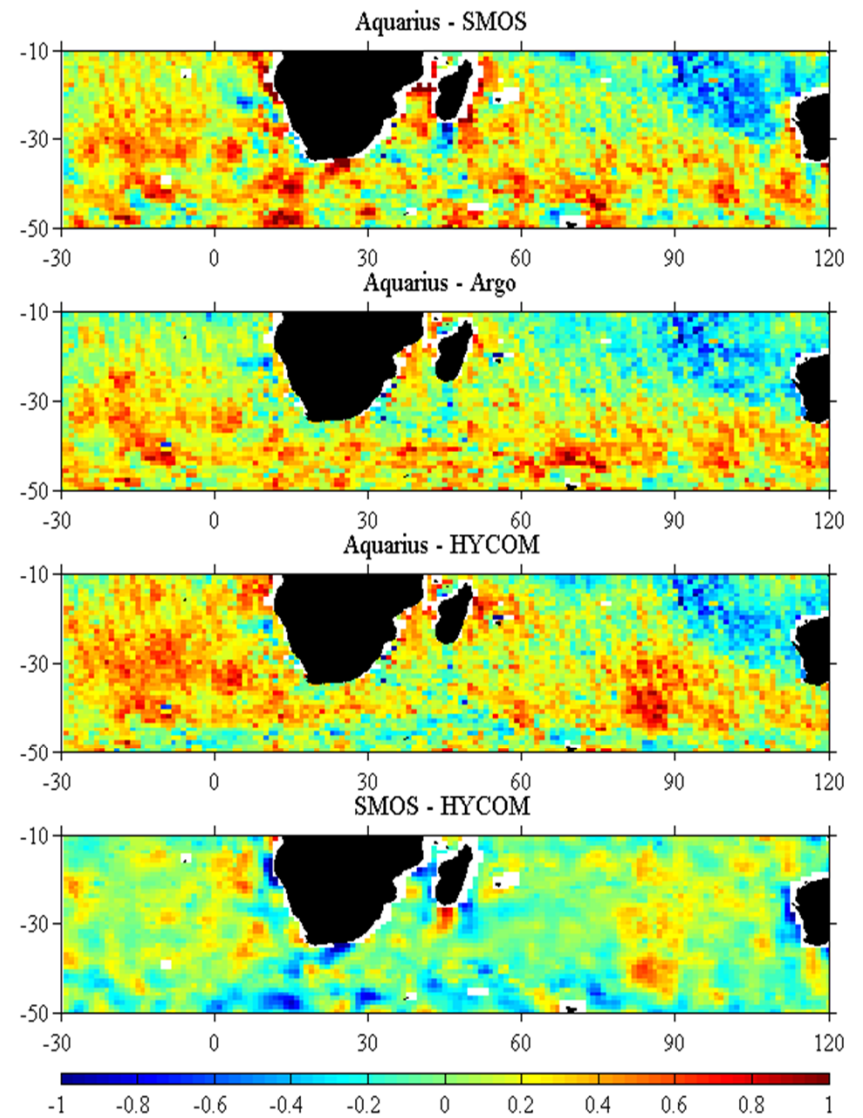
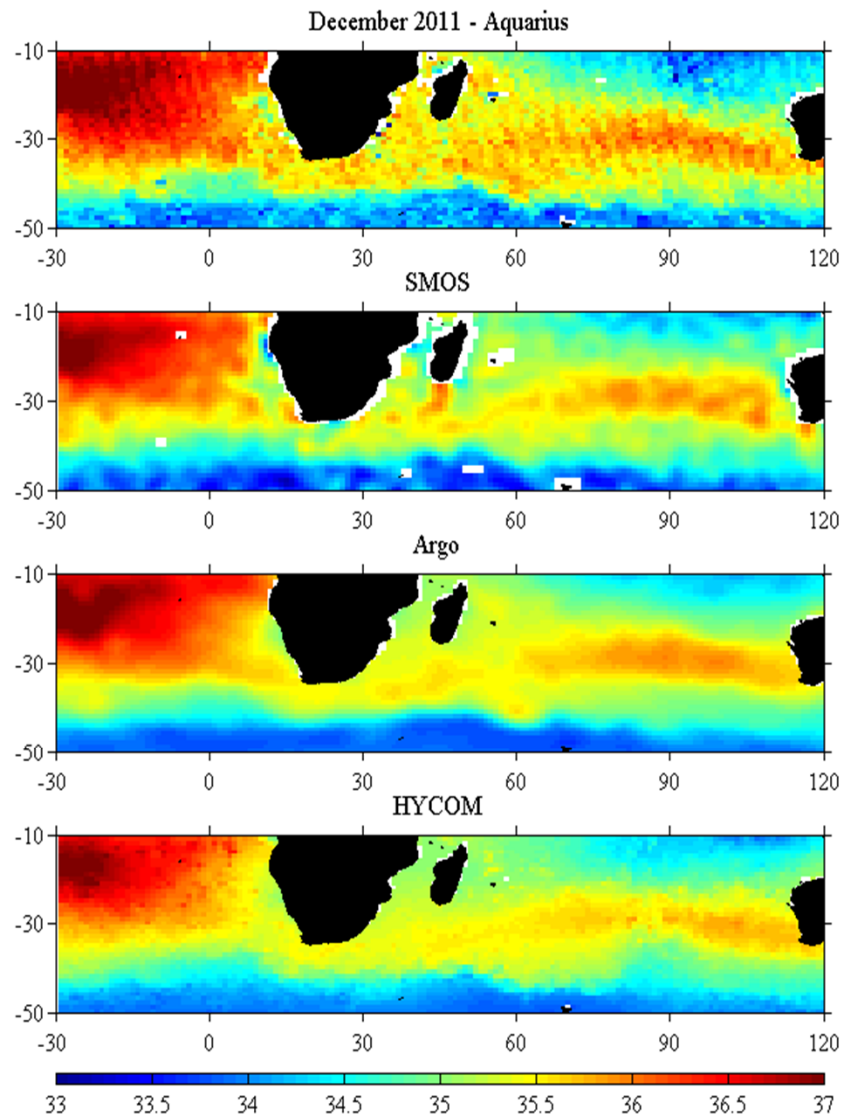
# Box 3: 29 January 2012

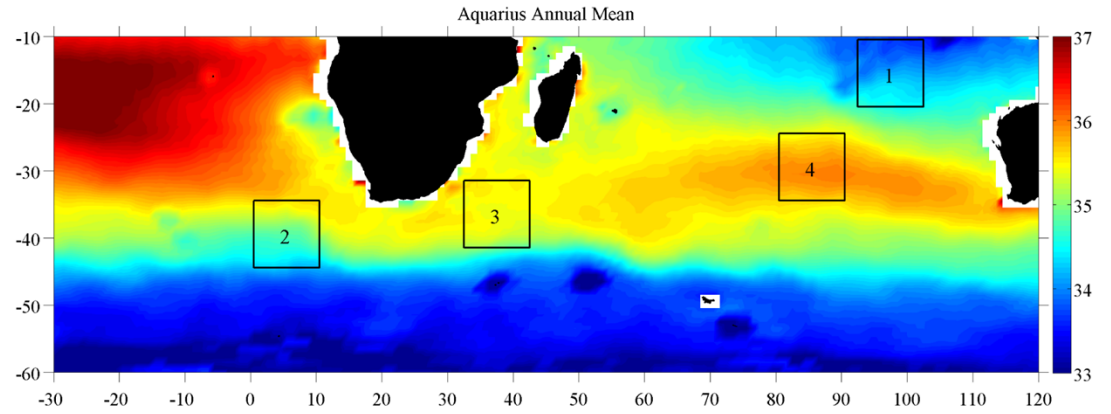
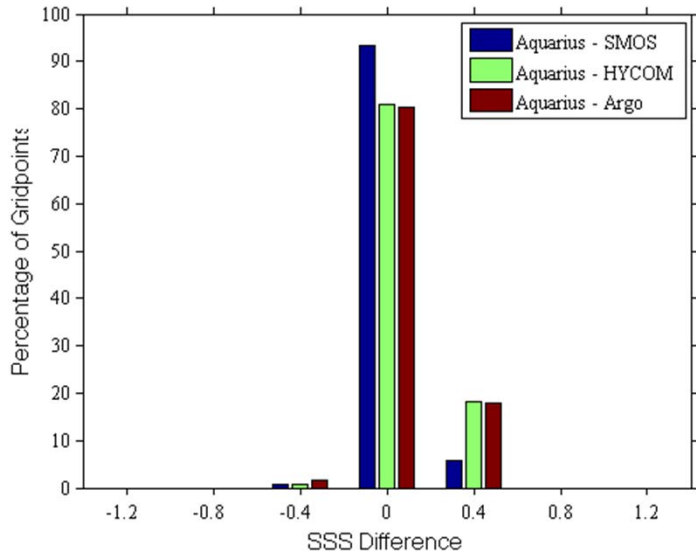


# Box 4: 10 September 2011

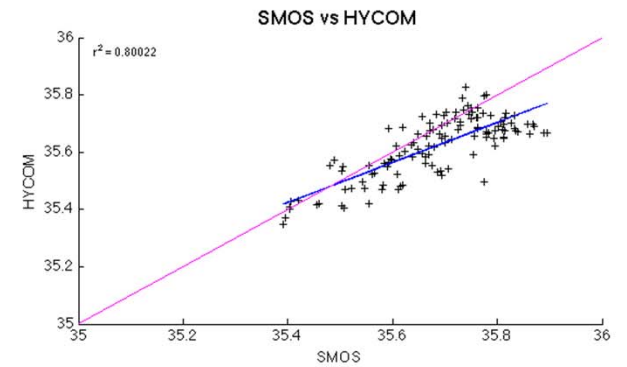
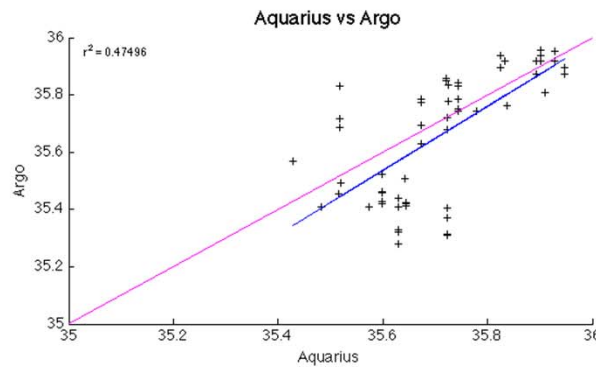
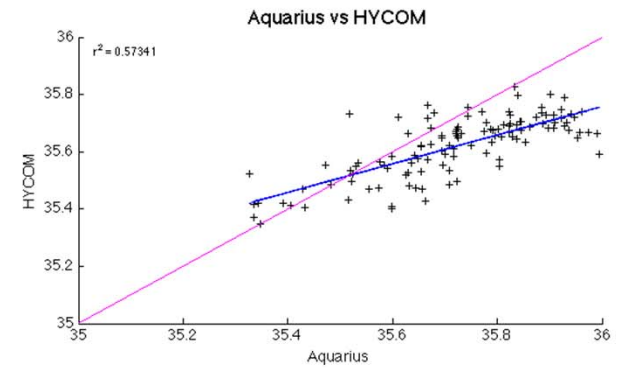
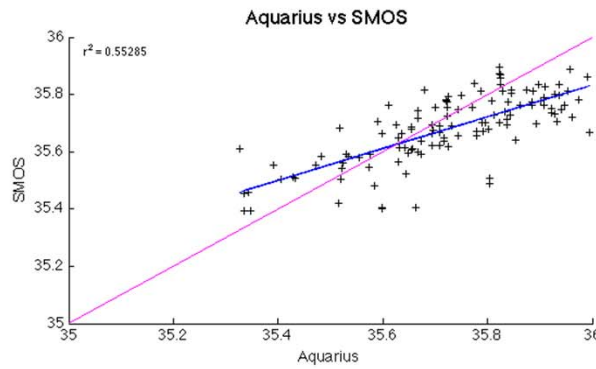


# + Monthly Composites

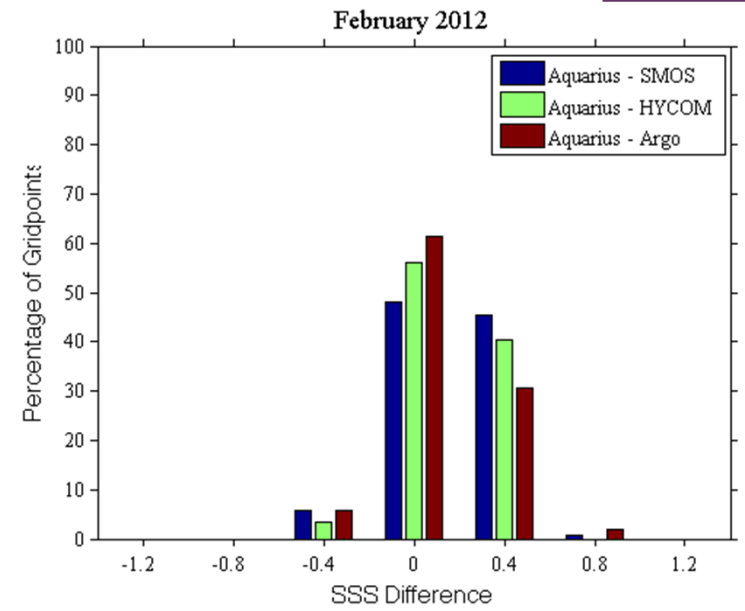
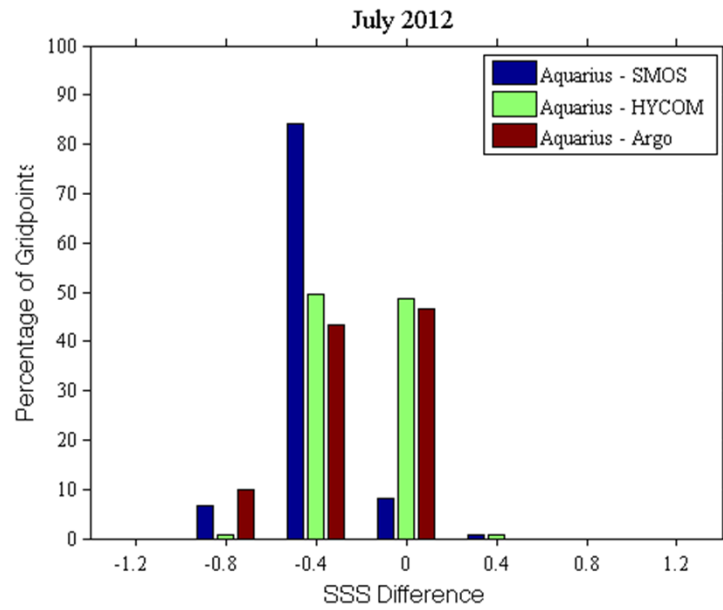




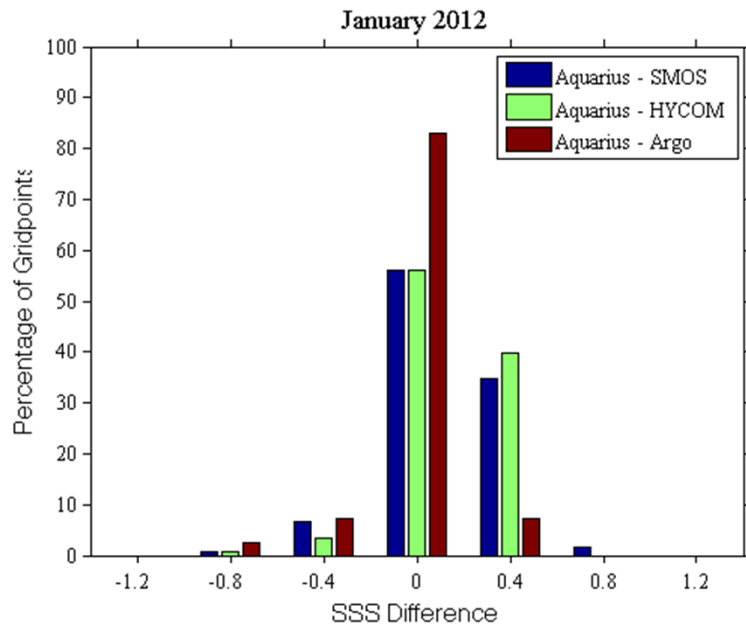
## Box 4: July 2012



# Box 1



# Box 2



# Box 3

# + Average salinity for each box region

Box 1	Salinity
Aquarius	34.10
SMOS	34.49
HYCOM	34.44
Argo	34.36

Box 2	Salinity
Aquarius	34.94
SMOS	34.81
HYCOM	34.80
Argo	34.78

Box 3	Salinity
Aquarius	35.38
SMOS	35.39
HYCOM	35.34
Argo	35.50

Box 4	Salinity
Aquarius	35.77
SMOS	35.68
HYCOM	35.53
Argo	35.80

<b>Box</b>	<b>Difference</b>	<b>Daily Box Average</b>	<b>Monthly Box Average</b>
1	Aquarius - HYCOM	-0.26 +/- 0.12	-0.34 +/- 0.07
	SMOS - HYCOM	0.08 +/- 0.08	0.05 +/- 0.06
2	Aquarius - HYCOM	0.01 +/- 0.30	0.13 +/- 0.21
	SMOS - HYCOM	-0.06 +/- 0.06	0.01 +/- 0.04
3	Aquarius - HYCOM	0.05 +/- 0.27	0.04 +/- 0.15
	SMOS - HYCOM	0.09 +/- 0.09	0.05 +/- 0.05
4	Aquarius - HYCOM	0.26 +/- .24	0.24 +/- 0.16
	SMOS - HYCOM	0.17 +/- .13	0.15 +/- 0.11

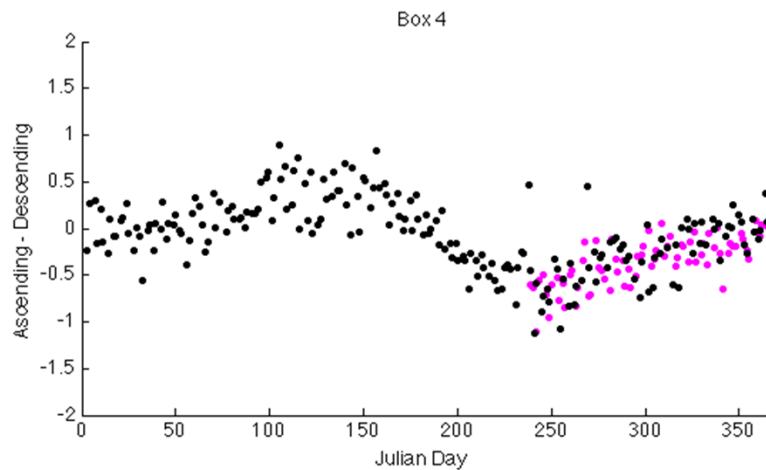
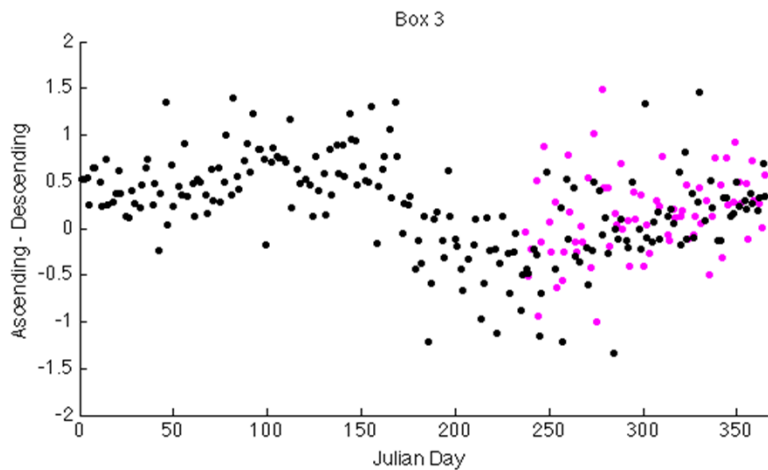
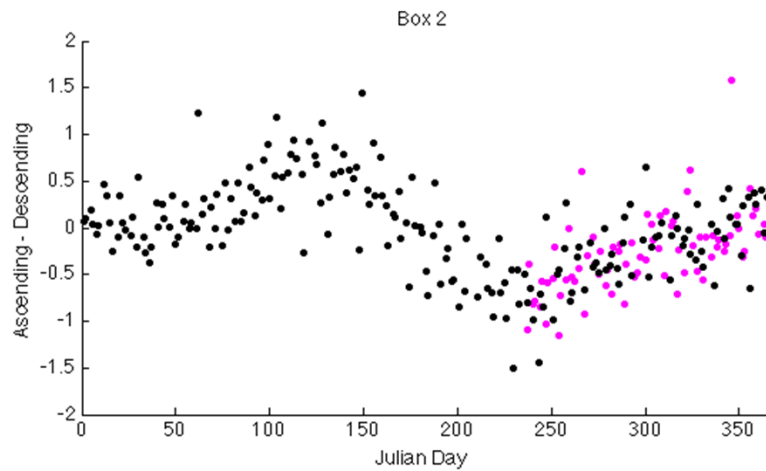
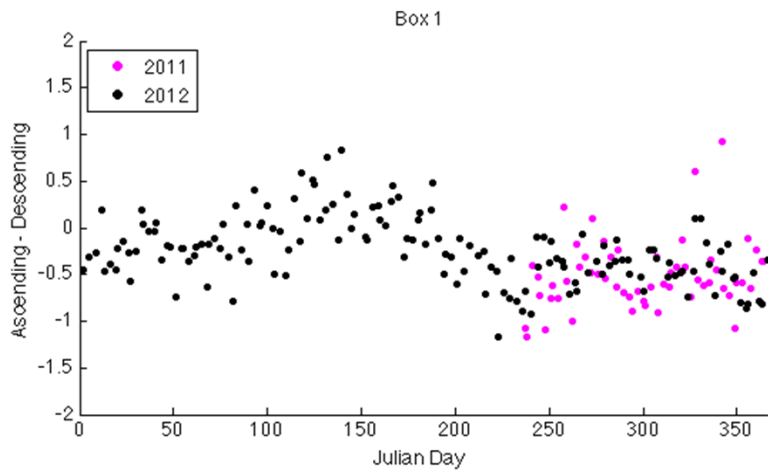




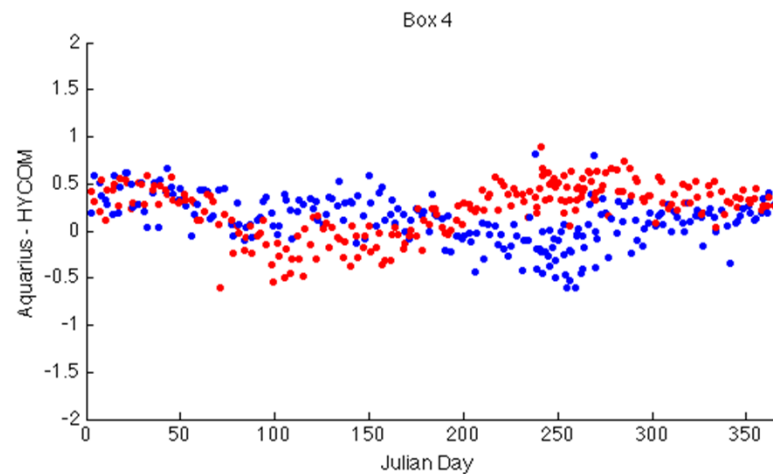
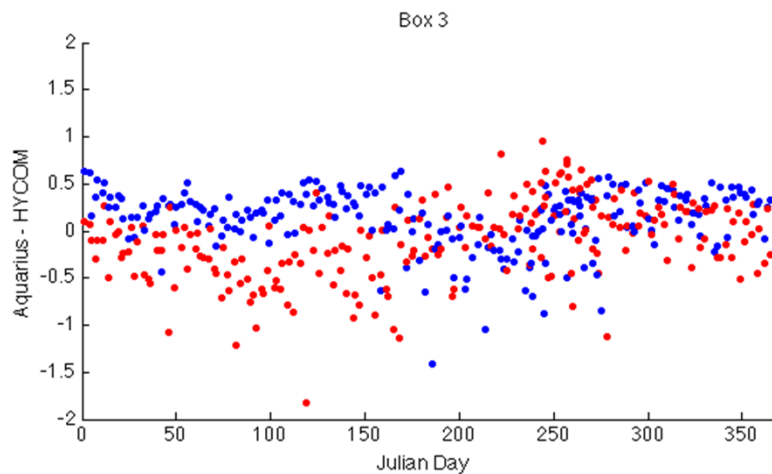
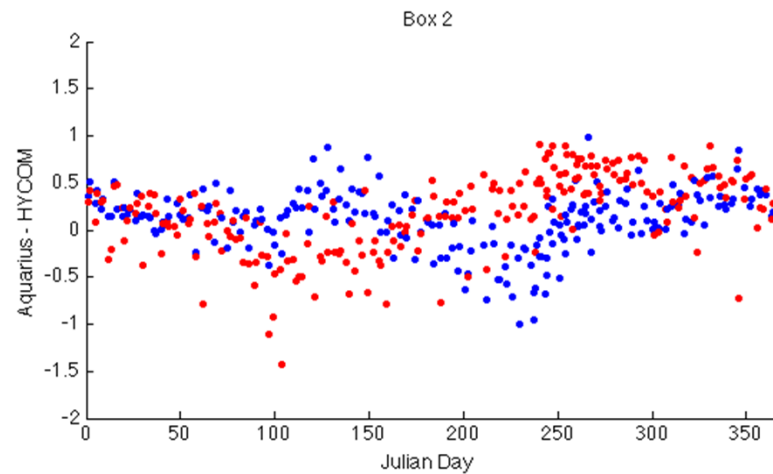
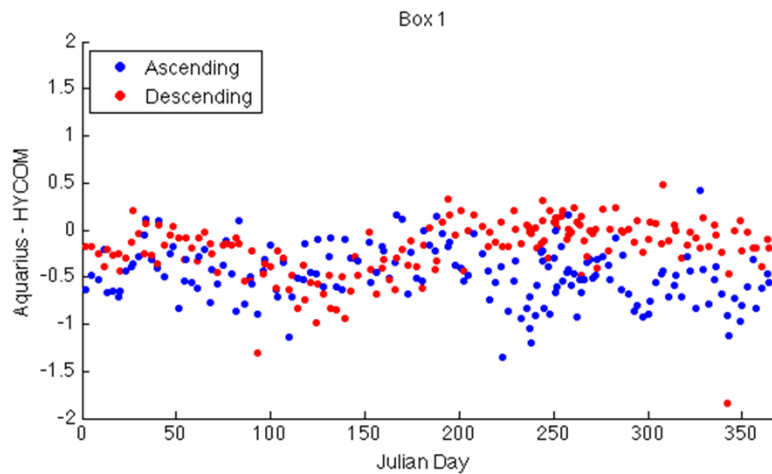
+

Ascending and Descending

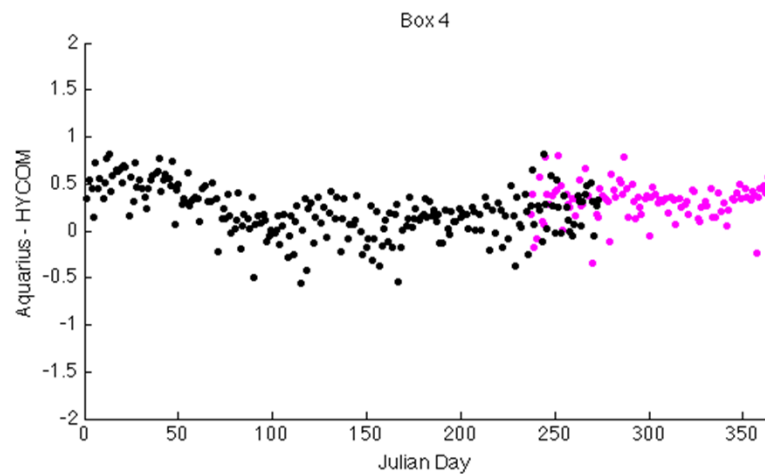
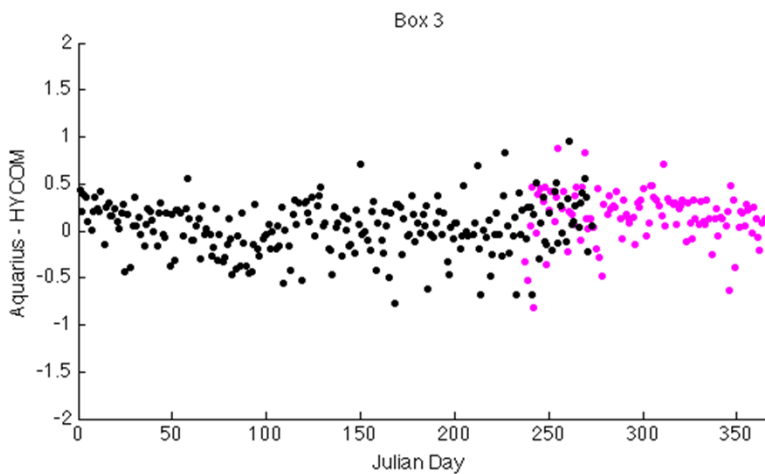
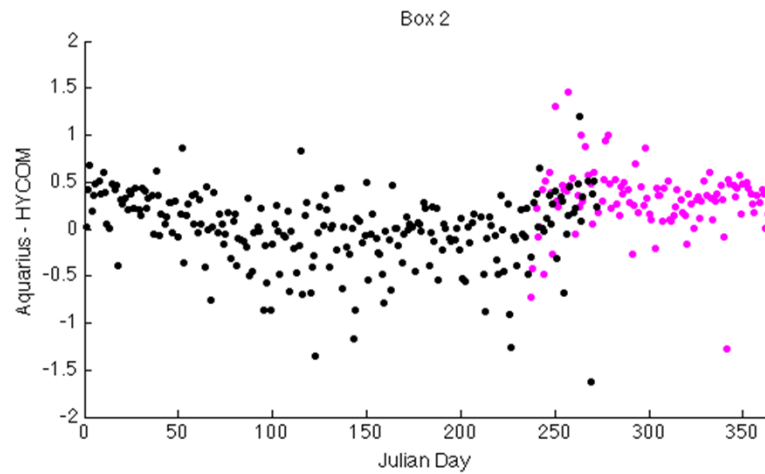
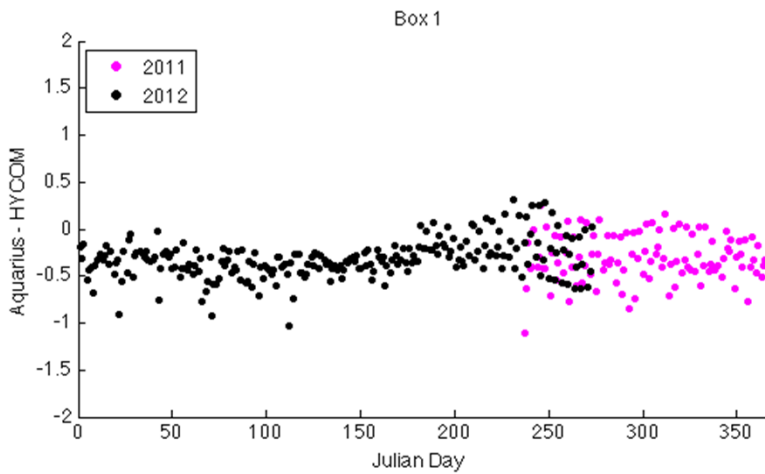
# + Comparison between Aquarius Ascending and Descending passes



# + Comparison of Ascending and Descending Passes with HYCOM



# + Comparison of Aquarius (combined passes) with HYCOM



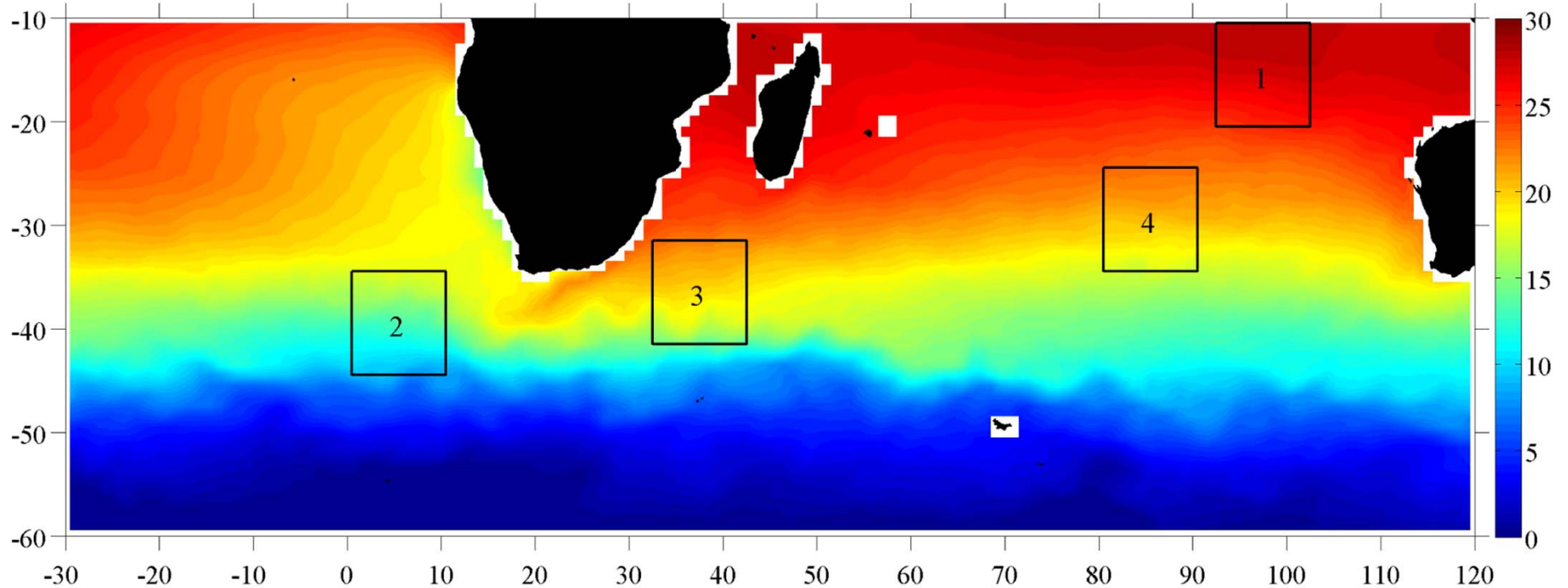


+ Correlation between  
SSS and SST

# + Annual Mean of SST (September 2011 – August 2012)



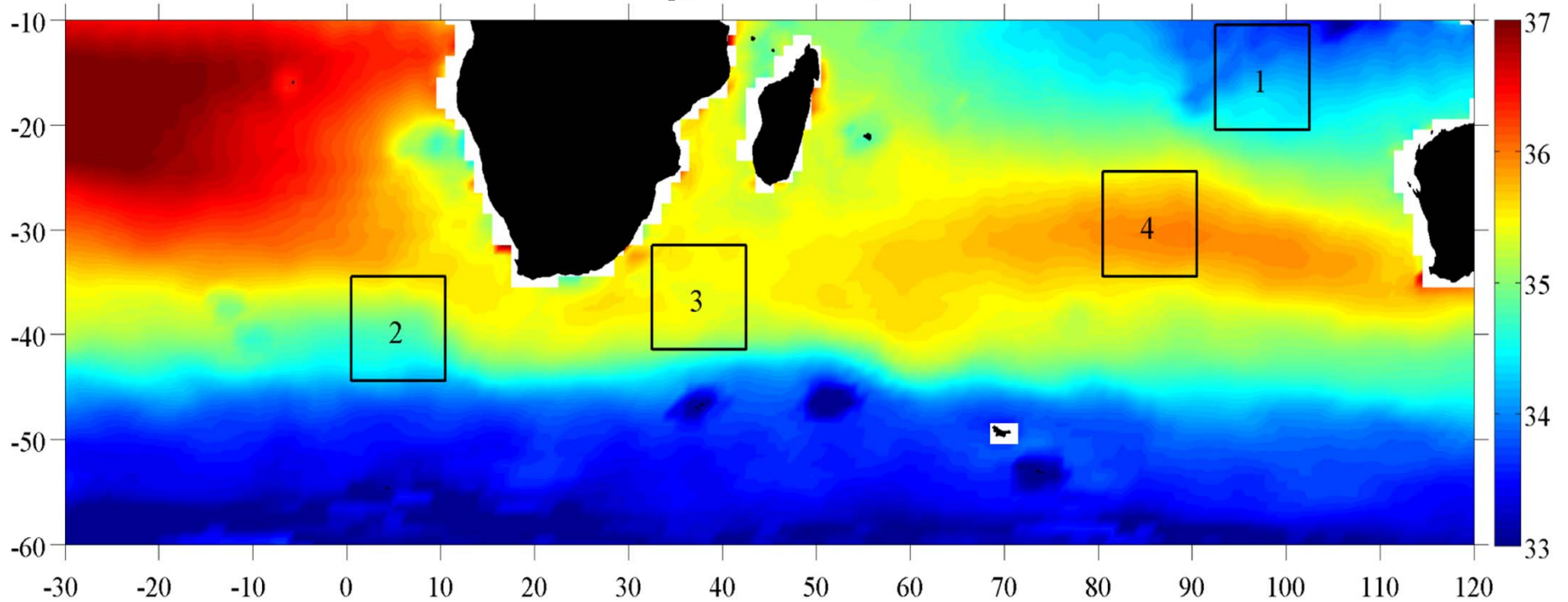
AVHRR Annual Mean



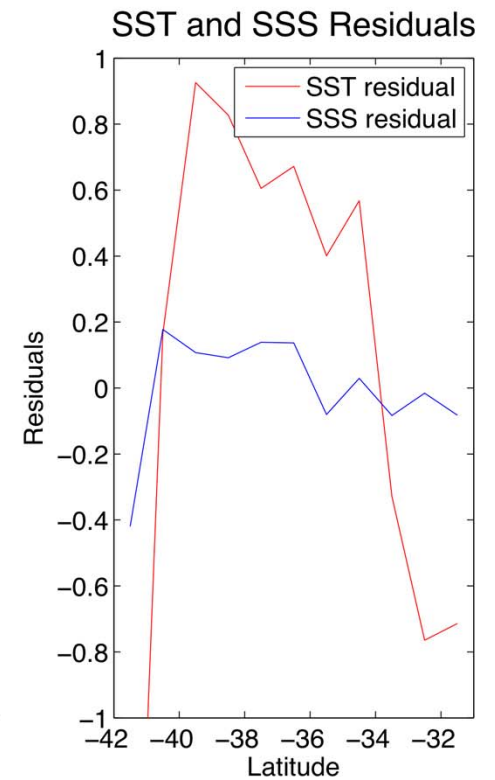
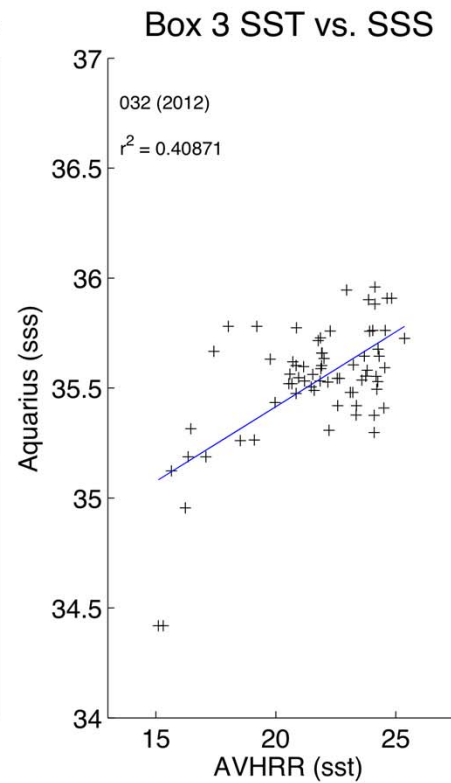
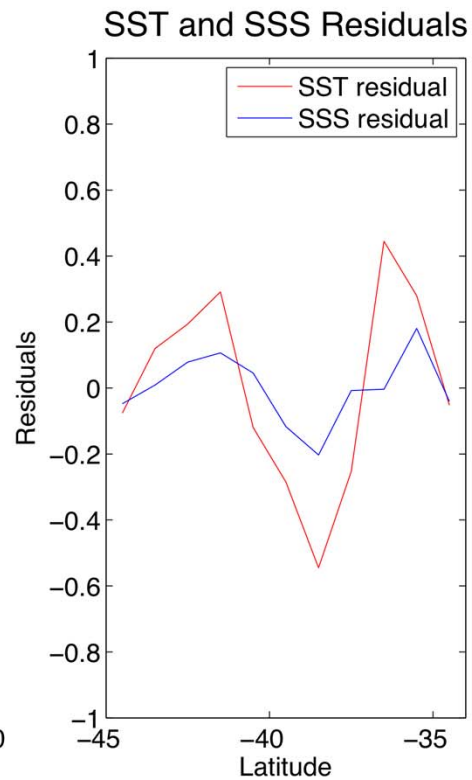
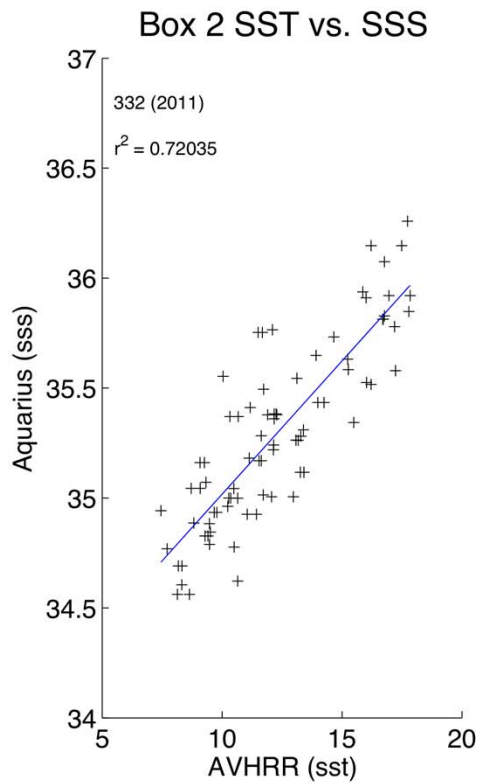
# + Annual Mean of Salinity (September 2011 – August 2012)



Aquarius Annual Mean

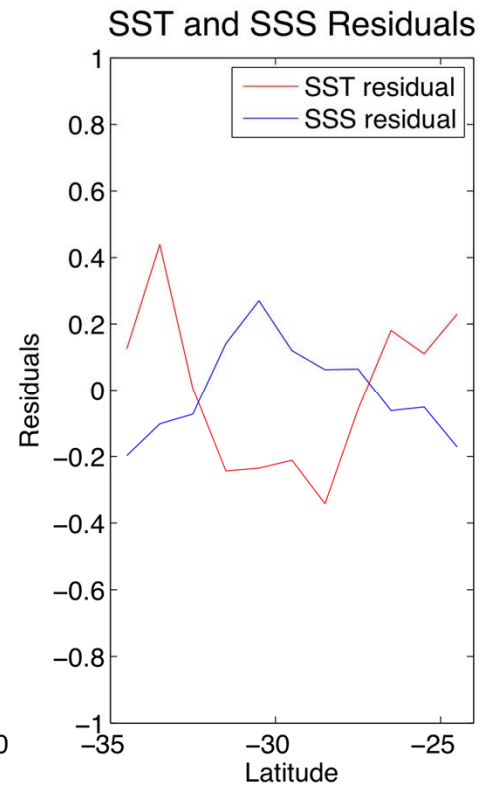
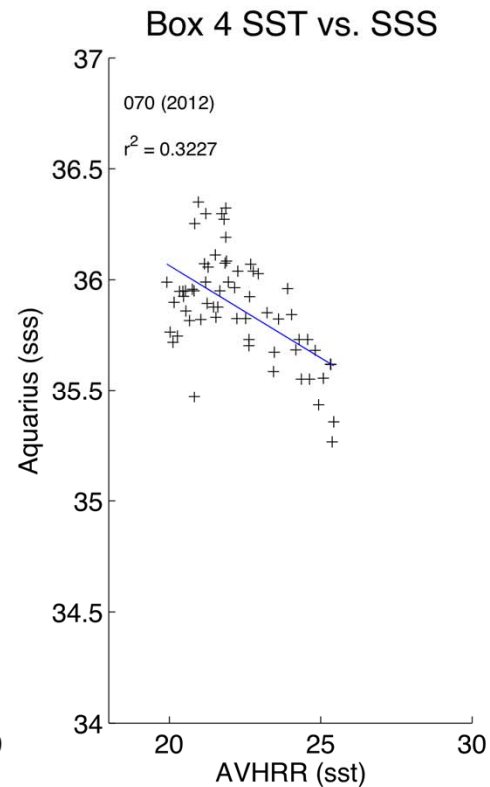
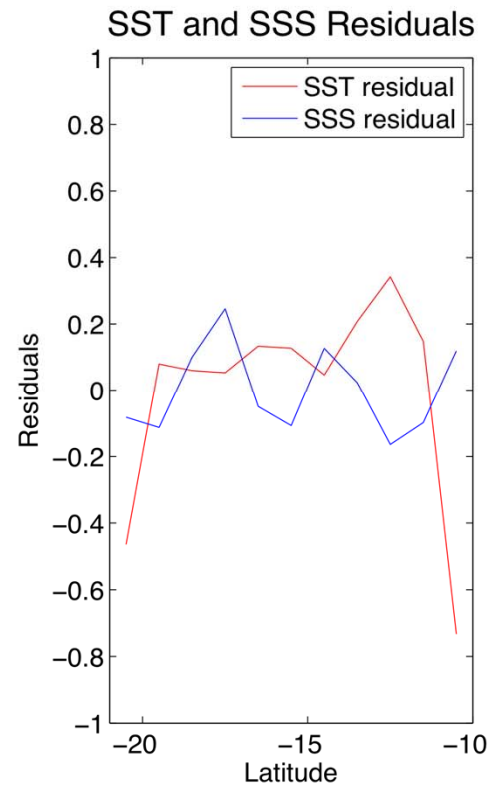
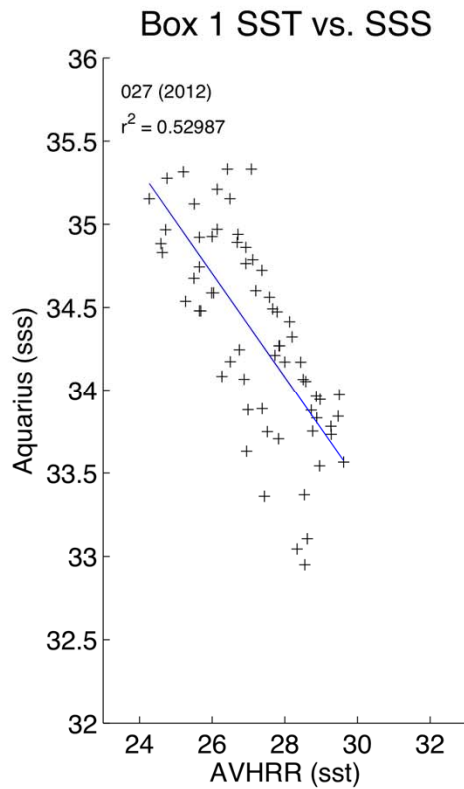


# + Correlations between SSS (Aquarius) and SST (AVHRR)

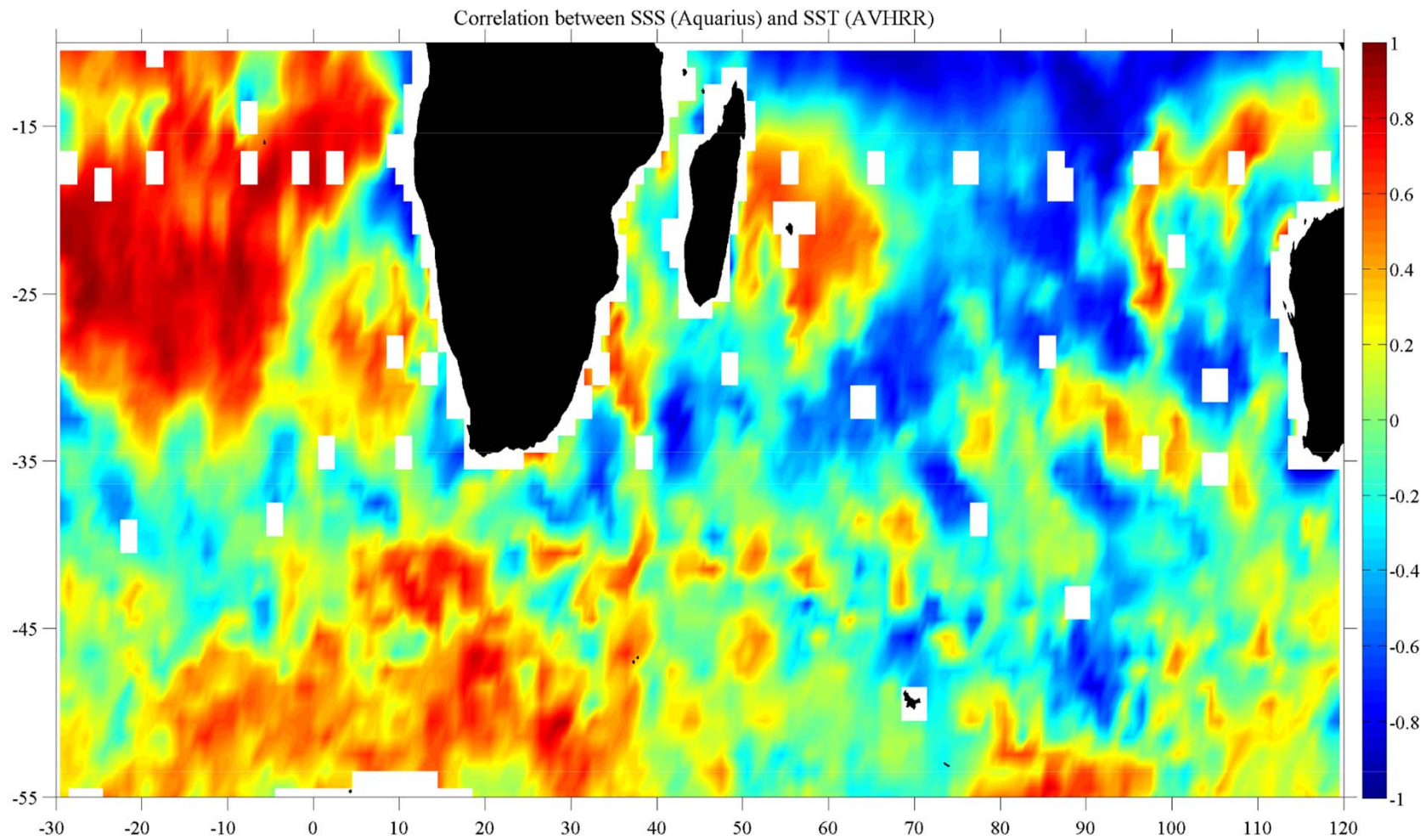




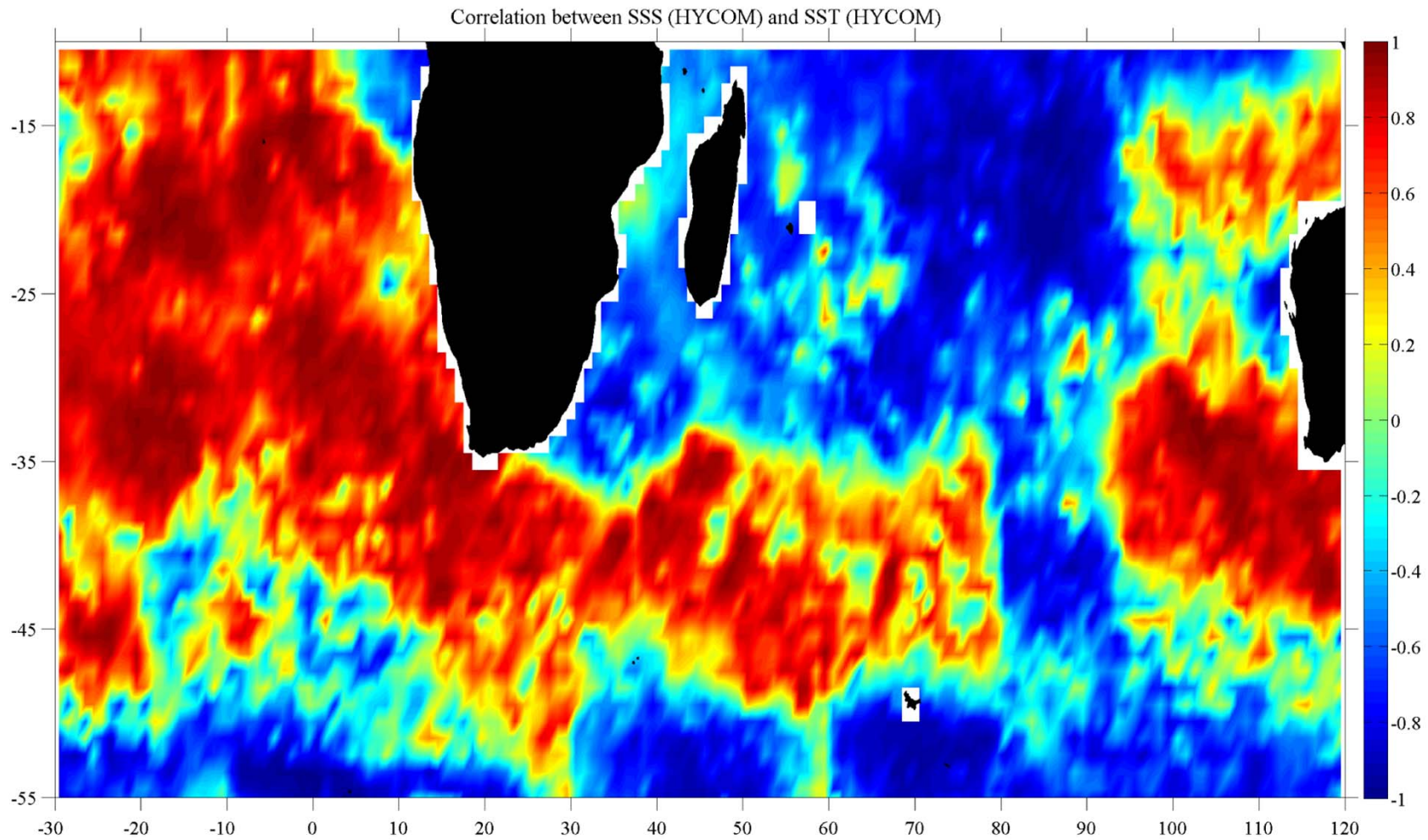
# + Correlations between SSS (Aquarius) and SST (AVHRR)



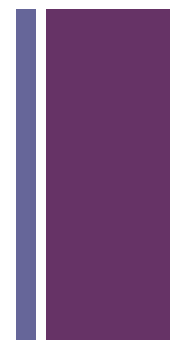
# + SSS and SST Correlation between Aquarius and AVHRR



# + SSS and SST Correlation between HYCOM



# + Summary



- Aquarius daily/monthly measurements
  - Lower than HYCOM in low salinity waters
  - Higher than HYCOM in high salinity waters
  - Decent in Agulhas Current, but high standard deviation
- Aquarius ascending/descending
  - Seasonality with high in austral summer → galactic noise?
  - Combined is significantly more accurate
- SSS correlations with SST
  - Within current, sss and sst have positive correlation. Outside of current, negative correlation
  - HYCOM shows significantly better correlations between sst and sss than Aquarius with AVHRR
    - Aquarius and AVHRR is poor in Boxes 2 – 4.

# + Annual Mean of Salinity

- Max close to retroflection: 36.51
- As data acquisition continues, can possibly determine annual and seasonal salinity cycle

Box	Salinity
1	34.10 – 34.49
2	34.78 – 34.94
3	35.34 – 35.50
4	35.53 – 35.80

