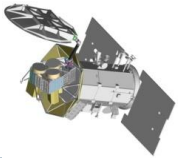

THE EFFECT OF LAND CONTAMINATION AND RADIOFREQUENCY INTERFERENCE ON THE AQUARIUS COASTAL SALINITY: THE EAST CHINA SEA

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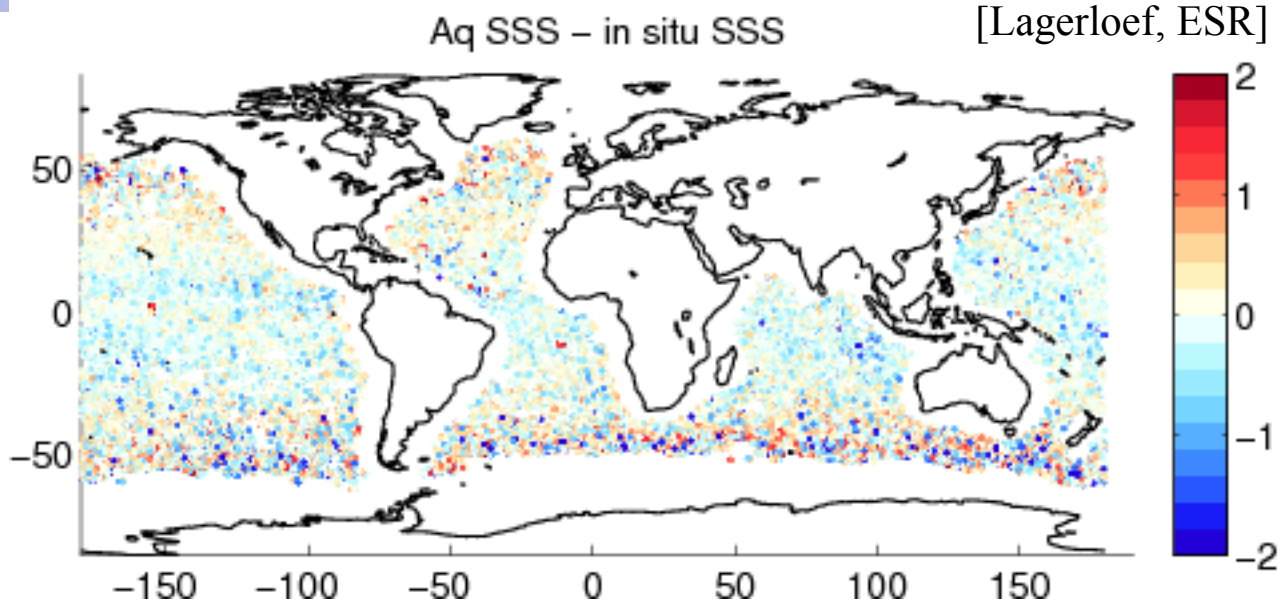
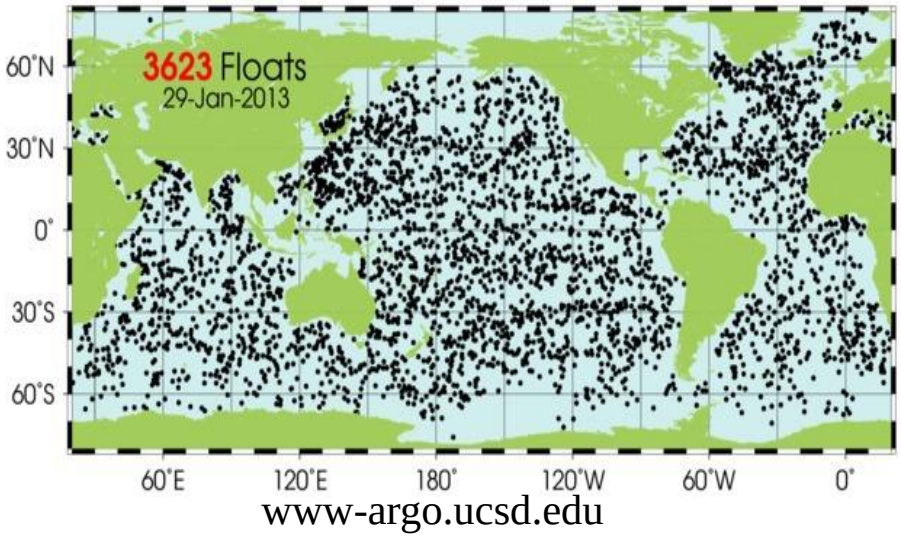
Outstanding issues with coastal salinity

- Land contamination, RFI, and/or no buoys
- Lack of routine monitoring of SSS over the East China Sea

[Lagerloef, ESR]





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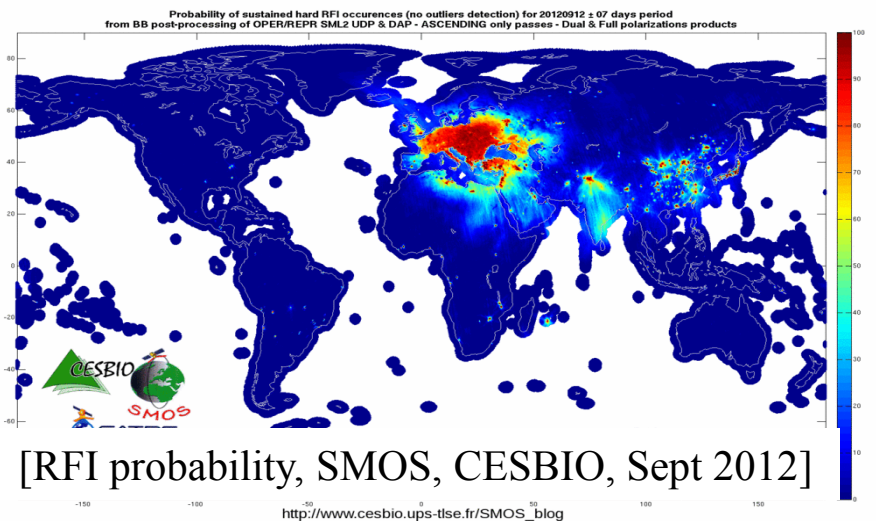

[RFI probability, SMOS, CESBIO, Sept 2012]

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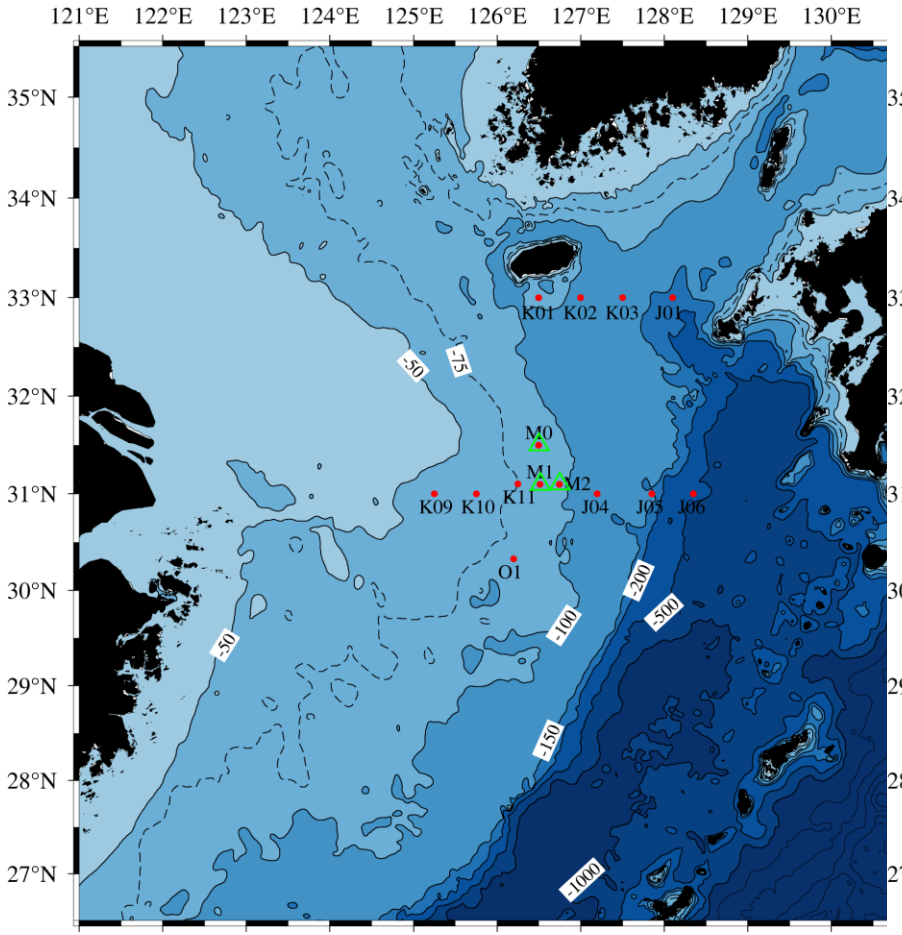
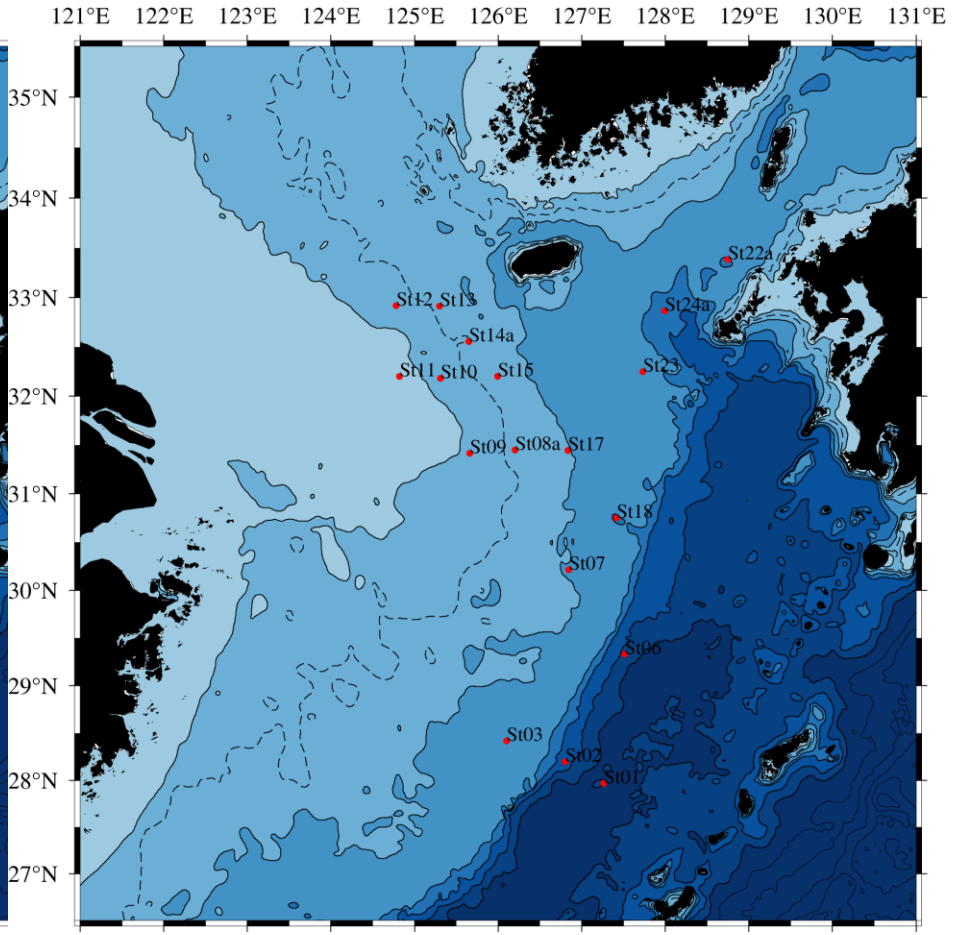
In situ observation





- By Korea Ocean Research Dev. Inst and/or Japanese collaborators
- CTD salinity record at 0. 5m depth (2011); 2-5m (2012; three are 7-10m)
- Dates early October 2011; late September 2012 (weak solar insolation)

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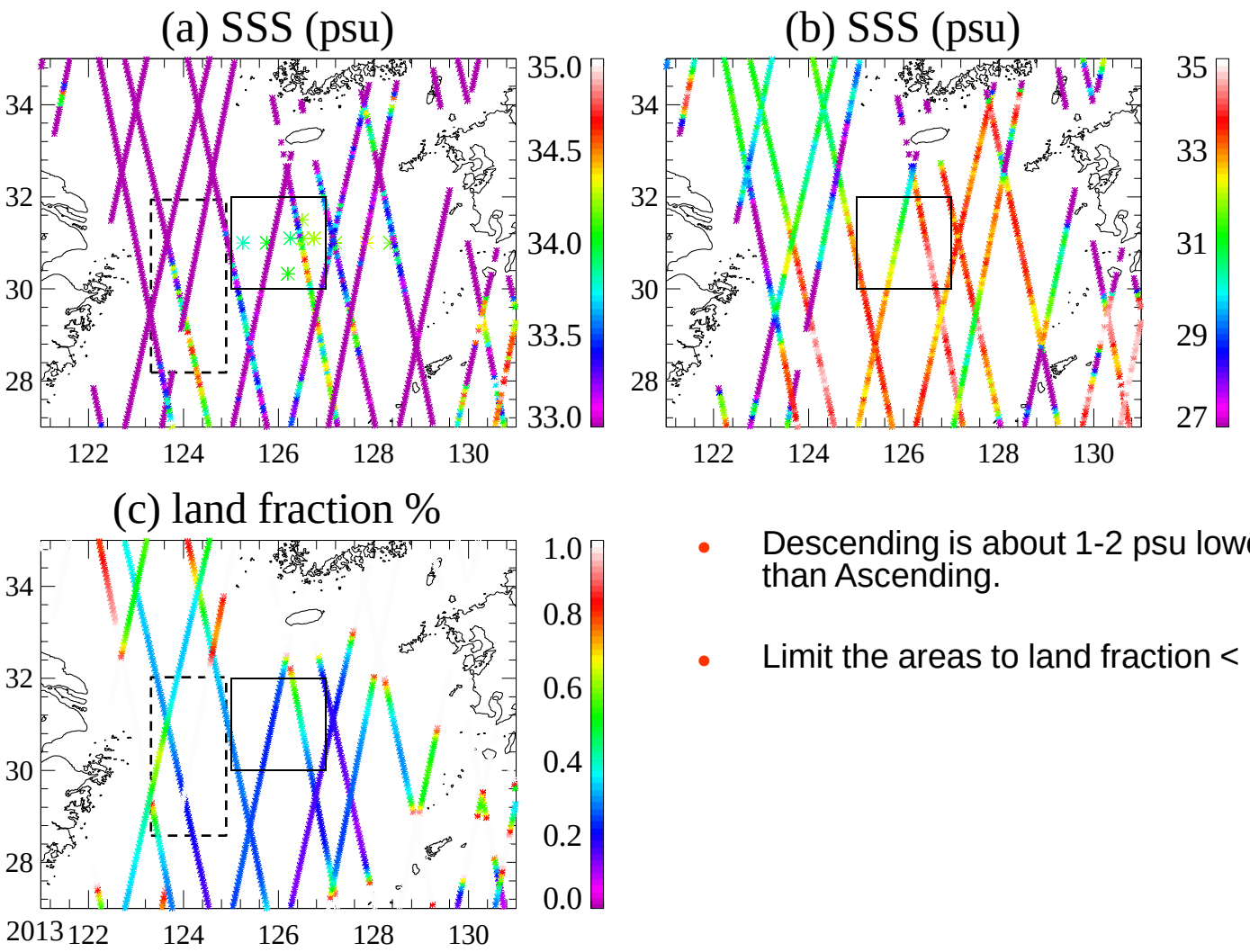
Aquarius salinity (Oct. 2011)

Science analysis

SSS validation



- Descending is about 1-2 psu lower than Ascending.
- Limit the areas to land fraction < 1%.

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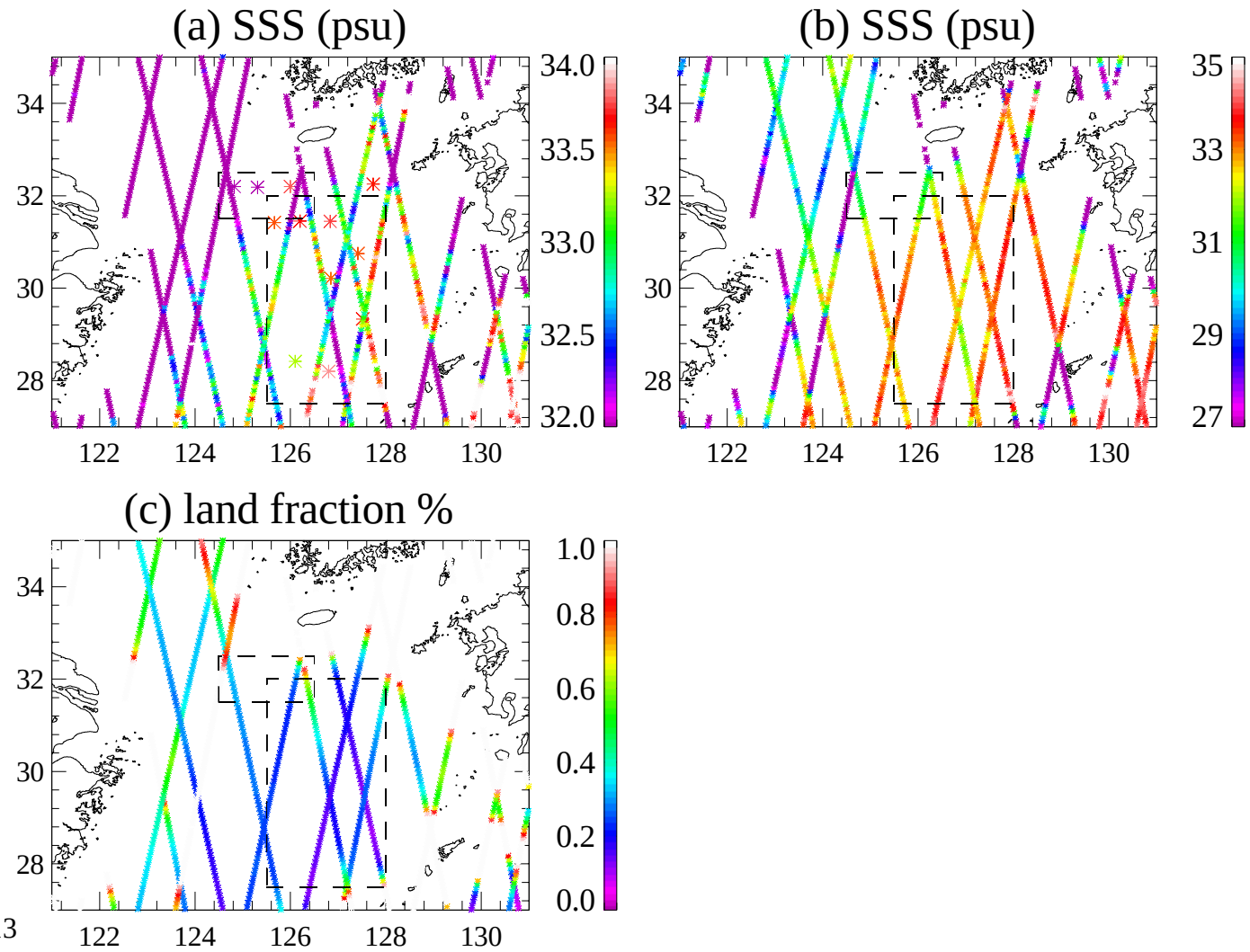
Aquarius salinity (Sept. 2012)

SSS validation



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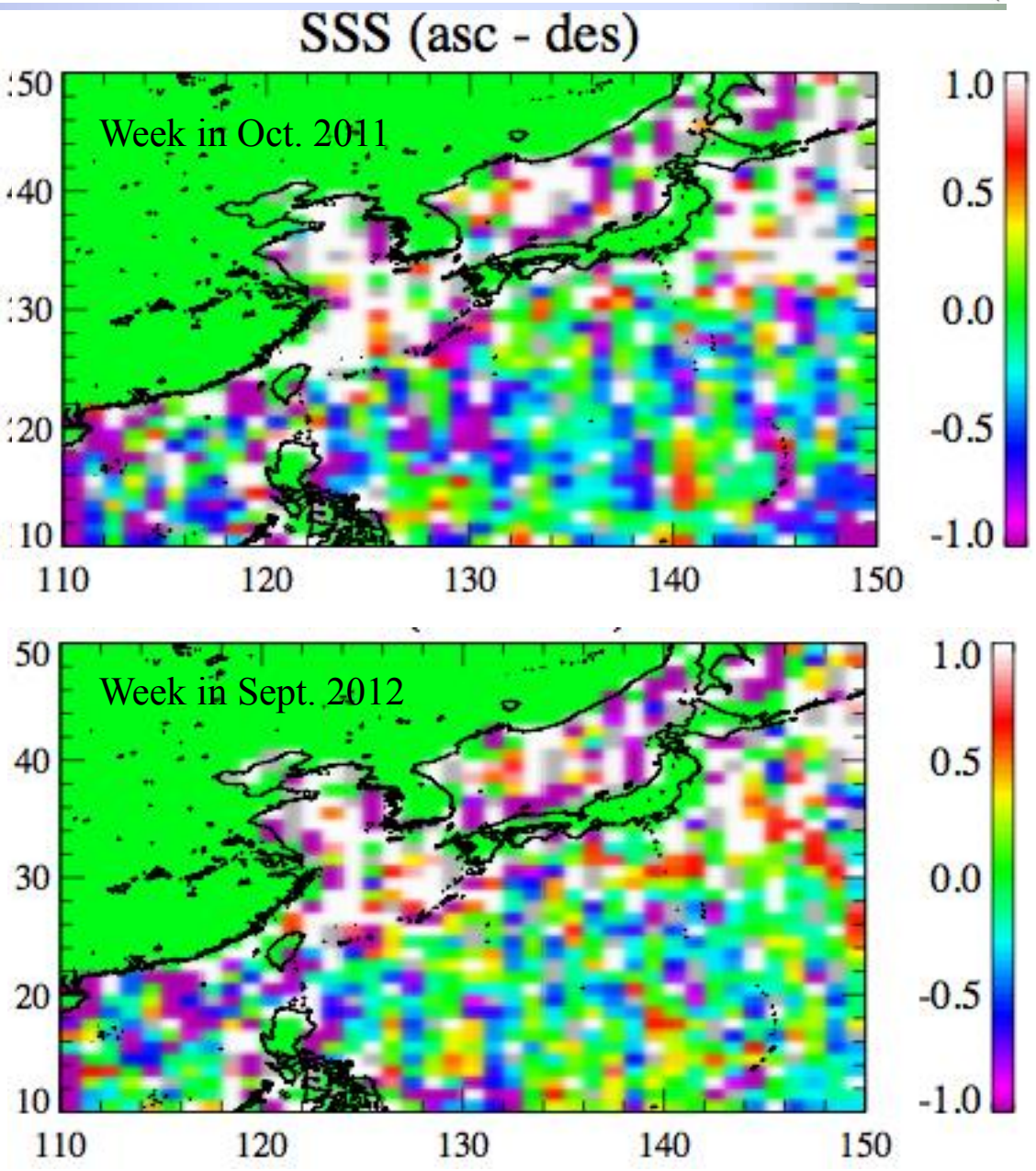
Spatial Extent of Asc-Des

- Widespread bias is found in East China Sea, Japan/East Sea, Kuroshio Extension area
- Less severe in Sept 2012 than in Oct 2011



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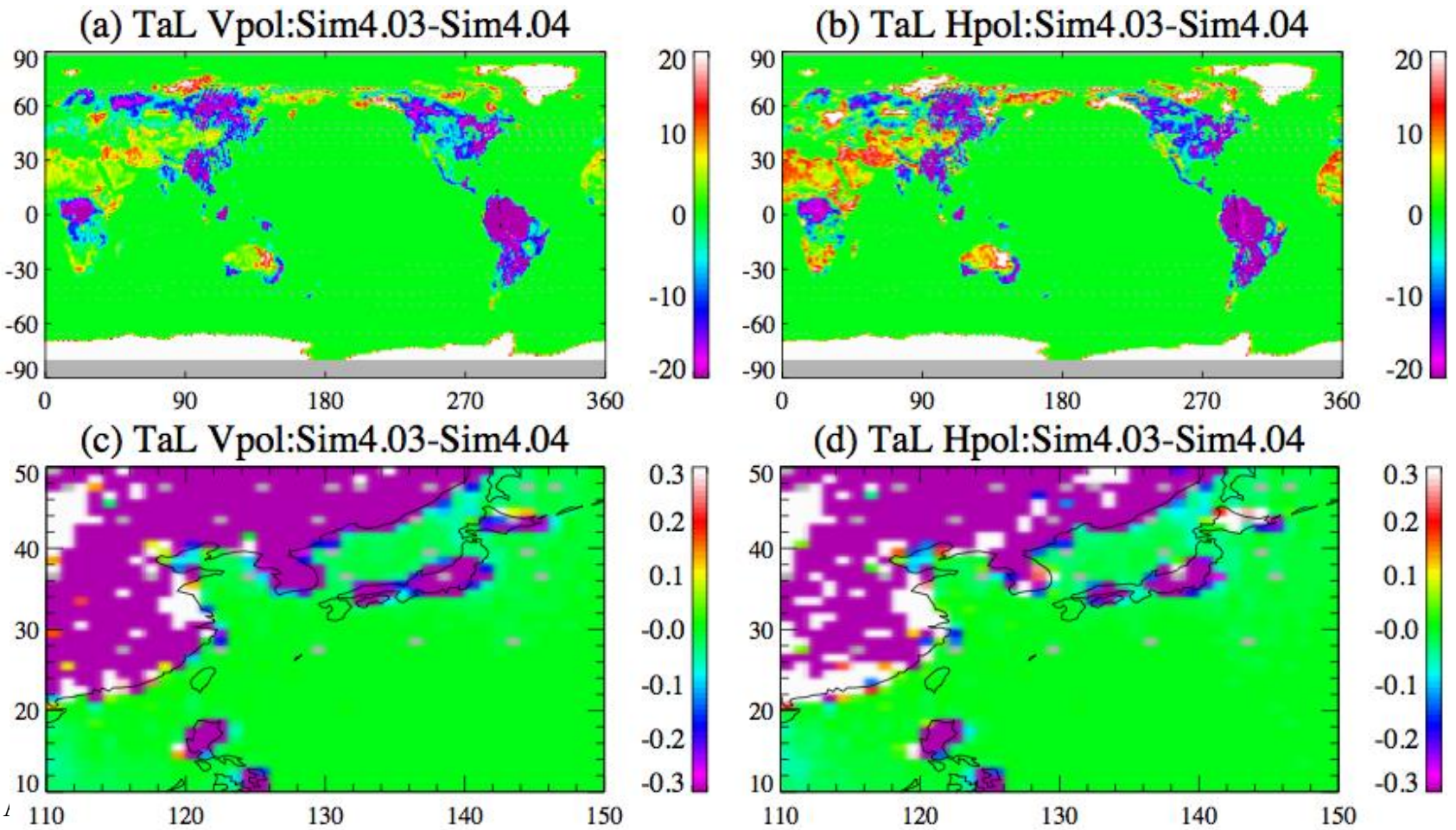
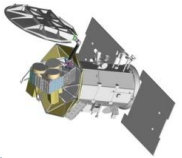
Correction of land contamination

- Two different land emission models are evaluated for Oct. 2011. The difference can be +/- 20K for over land.
- However, away from the coast by 1 pixel, the correction amount is fairly insensitive to land emission modeling error.



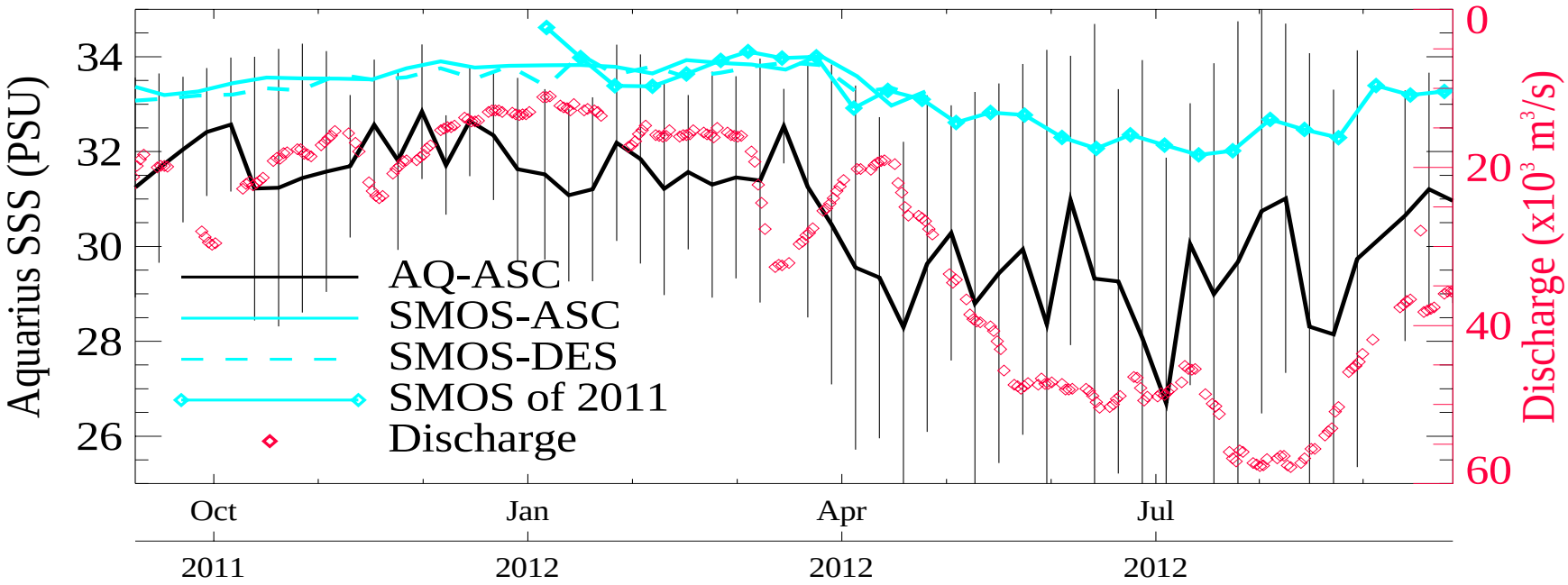
In situ validation



in psu	Aquarius	In situ	AQ - in situ
Oct 2011 (mean)	33.71	34.07	-0.36
(stdev)	0.52	0.17	
Sept 2012			
Area-north (mean)	31.450	31.455	-0.005
Area-north (stdev)	0.79	2.0	
Area-south(mean)	32.89	33.66	-0.77
Area-south(stdev)	0.67	0.25	

- Ascending tracks only

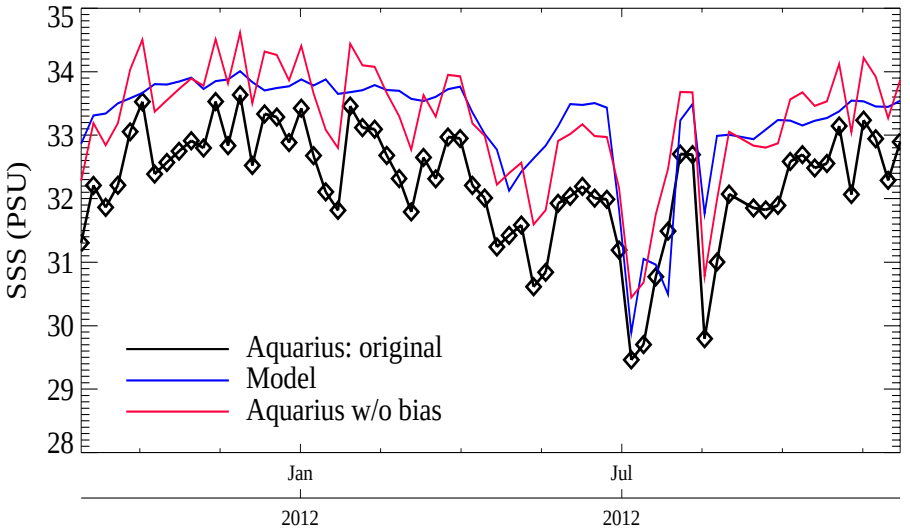
Comparison with river discharge, SMOS

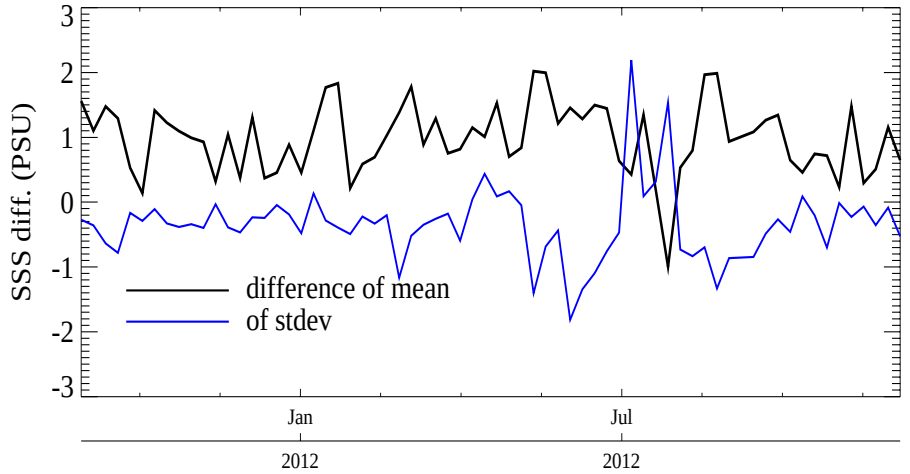


- Comparison with river discharge
  - Correlation is 0.65 with no time lag.
- Comparison with SMOS (CATDS-RE01: less climatology fitting; less RFI removal; A and D separation)
  - SMOS shows little difference between Asc and Des.
  - The dynamic range of SMOS SSS is much smaller than Aquarius (caveat: SMOS data is in 2011 not 2012).
- Large standard deviation during the summer is in agreement with numerical model results (next slide).

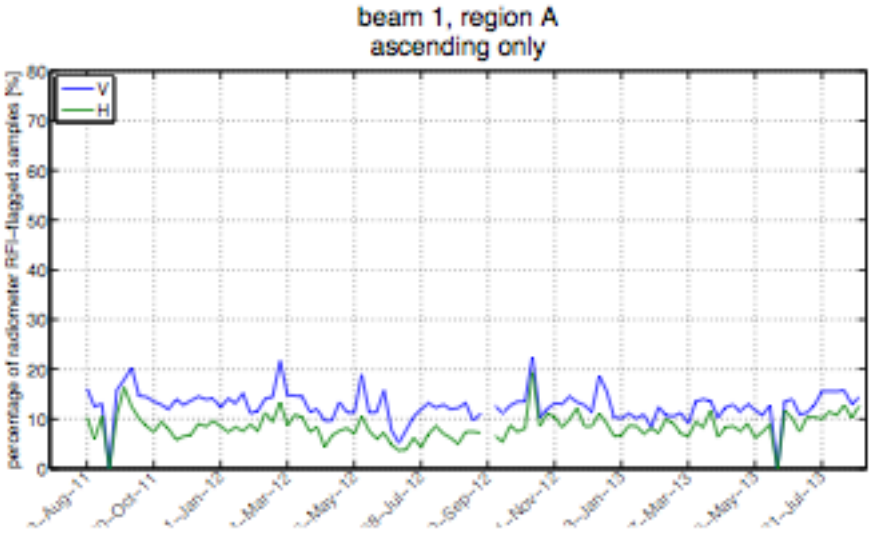
Aquarius and numerical model

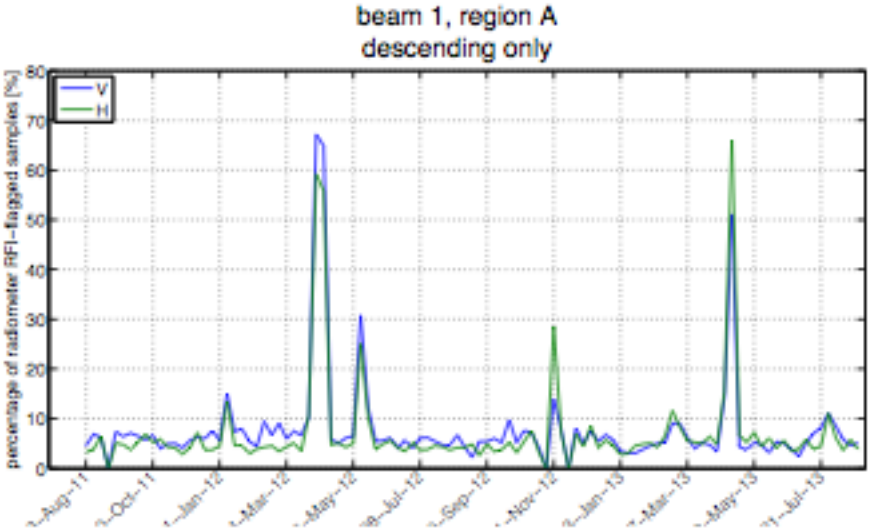
- Model: Regional model (ROMS) by Jeju Unv. Korea. 6 depth (1, 10, 20, 30, 50, 75). 1/12th deg.
- Aquarius (original) is lower than model by 0.98 psu – the bias may be due to unfiltered RFI.
- Once the bias is removed, the two matches with an RMSE of 0.55 psu.
- The spatial SSS variability matches well between model and data (lower panel): within +/- 1 psu.





Is unfiltered RFI adding bias?





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GSFC

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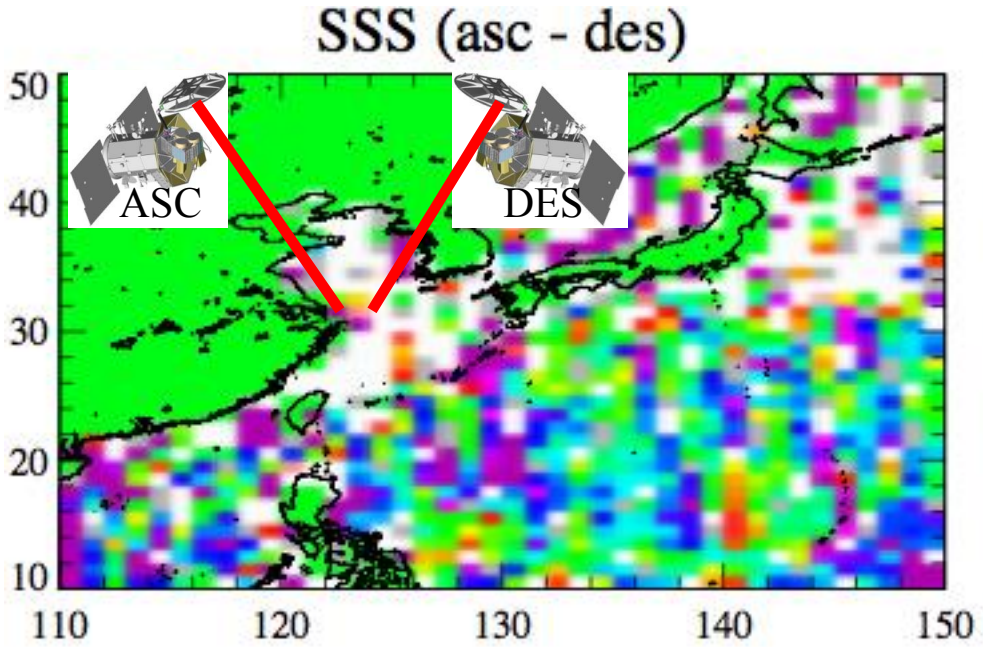
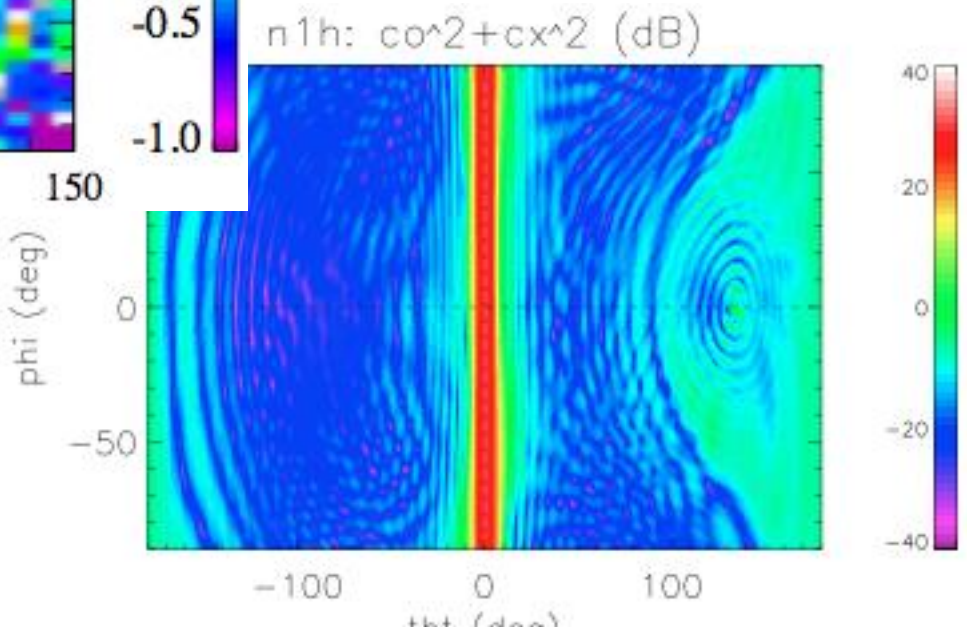
Is unfiltered RFI adding bias?

- Why is % (filtered RFI) higher for ascending pass (away from China) than for descending pass (looking into China)?





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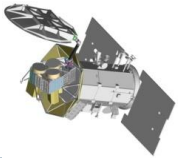
Summary



- Aquarius vs CTD (and model)
  - Aquarius and in situ data agree within 0.3 to 0.8 psu
  - Matches with a model with stdev error of 0.55 psu (but 1 psu bias).
  - SSS variability has strong correlation with river discharge (correlation is 0.65).
- RFI
  - Widespread Asc minus Des bias with peak > 2psu
  - Undetected RFI
    - May explain the difference up to 0.8 psu between in situ and Aquarius
    - May explain 1 psu bias difference between model and Aquarius