8th Aquarius/SAC-D
Science Team Meeting
(November 13th, 2013)

# Evaluation of sea surface salinity observed by Aquarius

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# Objective of this study(1/1)

Validate SSS observed by Aquarius using various salinity data including Argo observation.

# Data (1/2) - Level 2 -

Satellite salinity

Aquarius SSS (beam1, 2, 3)

1) V2.3.1 : NASA/JPL PO.DAAC

2) CAP V2.3.1 : NASA/JPL, Dr. Simon Yueh

3) RSS V3 : Remote Sensing Systems

In situ salinity

1) Argo salinity : Global Data Assembly Center, real-time mode data

2) TAO/TRITON, PIRATA, RAMA buoys

# Data (2/2) - Level 3 -

Satellite salinity

Aquarius Level 3 SSS (V1.3, V2.2, V2.3.1, CAP V2.3.1)

NASA/JPL PO.DAAC

Salinity data

1) JAMSTEC Argo optimal interpolation system : MOAA/GPV

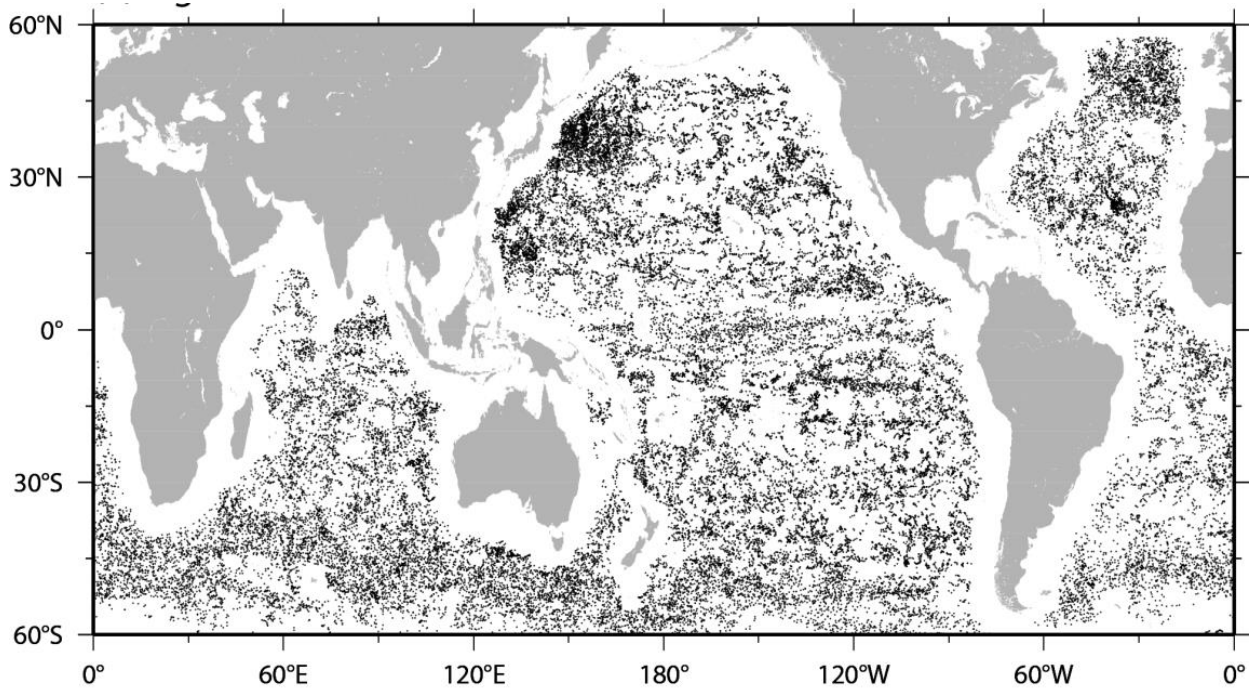
(Argo salinities are interpolated based on World Ocean Atlas 2001)

2) JMA data assimilation system : MOVE/MRI.COM

(In-situ and satellite altimeter data are assimilated into it)

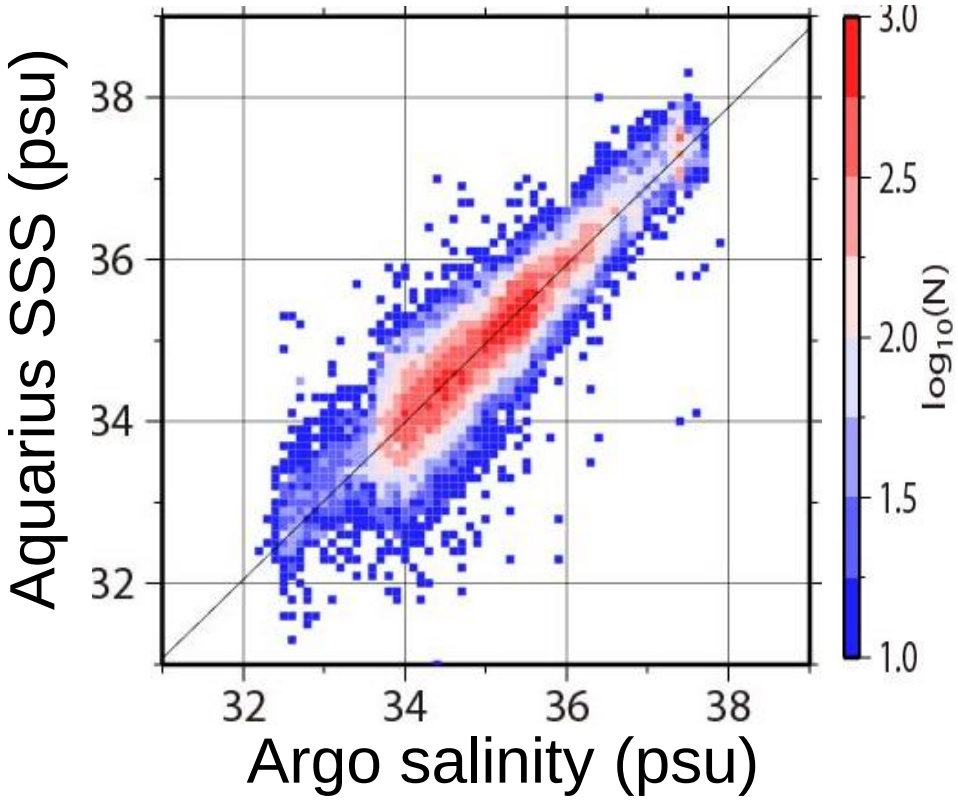
# Comparison with in situ data (1/3)

Aquarius (Level2) v.s. Argo float



# Comparison with in situ data (1/3)

V2.3.1, beam1




Period : 25 Aug 2011 – 31 Oct 2013
Matchup condition : 200 km, 12 h

1) wind speed < 15m/s
2) Argo temperature > 5C)
3) Argo depth < 12.5 dbar
4) rad_land_frac < 0.0005
5) rad_ice_frac < 0.0005

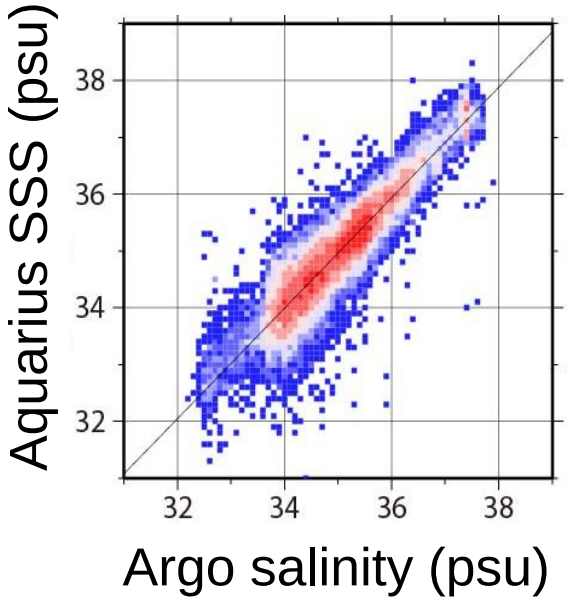
rms difference =

0.44 psu

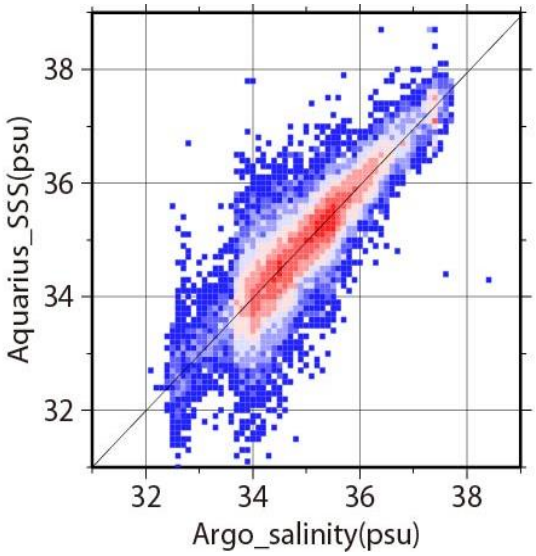
# Comparison with in situ data (2/3)

beam1

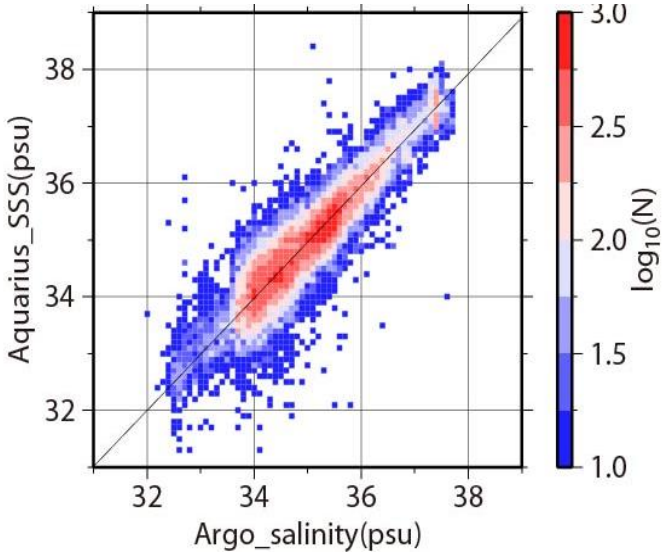
V2.3.1




CAP V2.3.1




RSS V3




Rms difference =

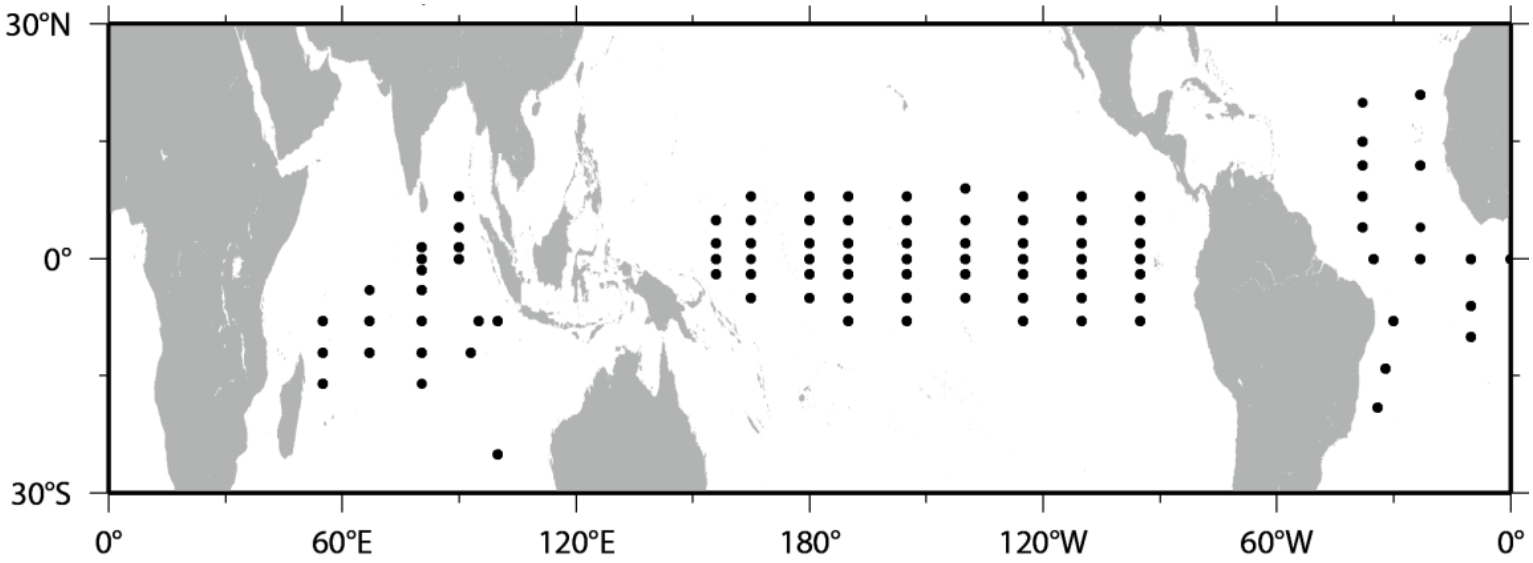
0.44

0.55

0.44

# Comparison with in situ data (3/3)

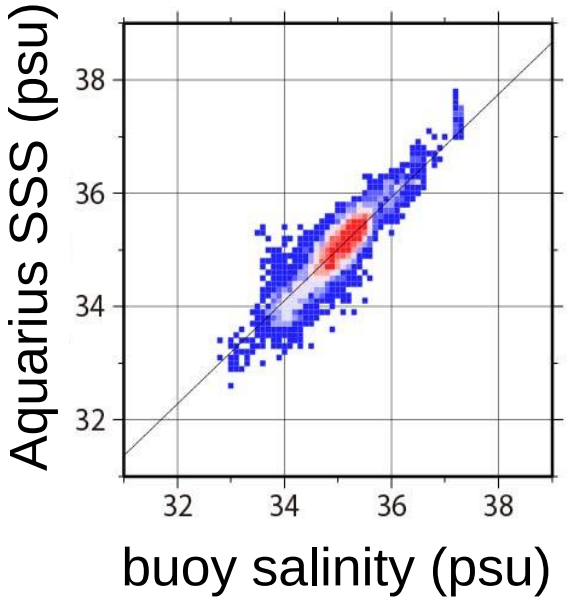
Aquarius (Level2) v.s. moored buoys



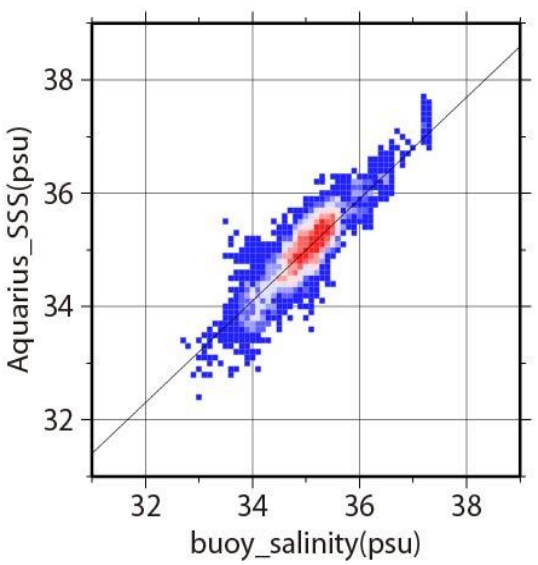
# Comparison with in situ data (3/3)

beam1

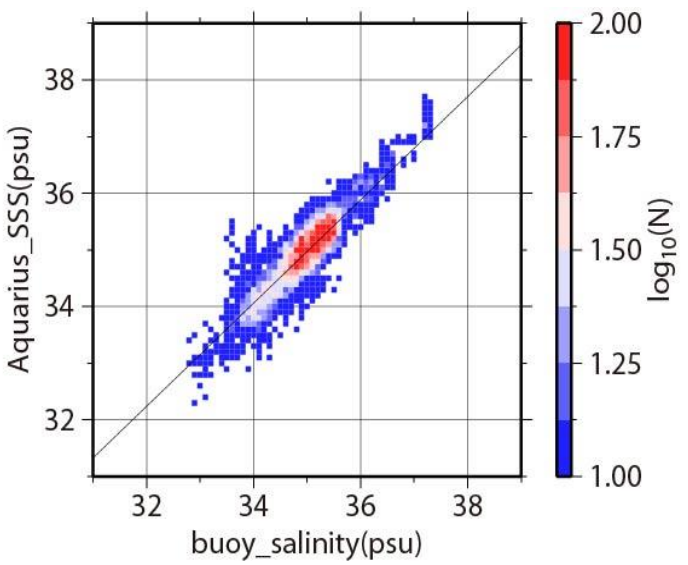
V2.3.1




CAP V2.3.1



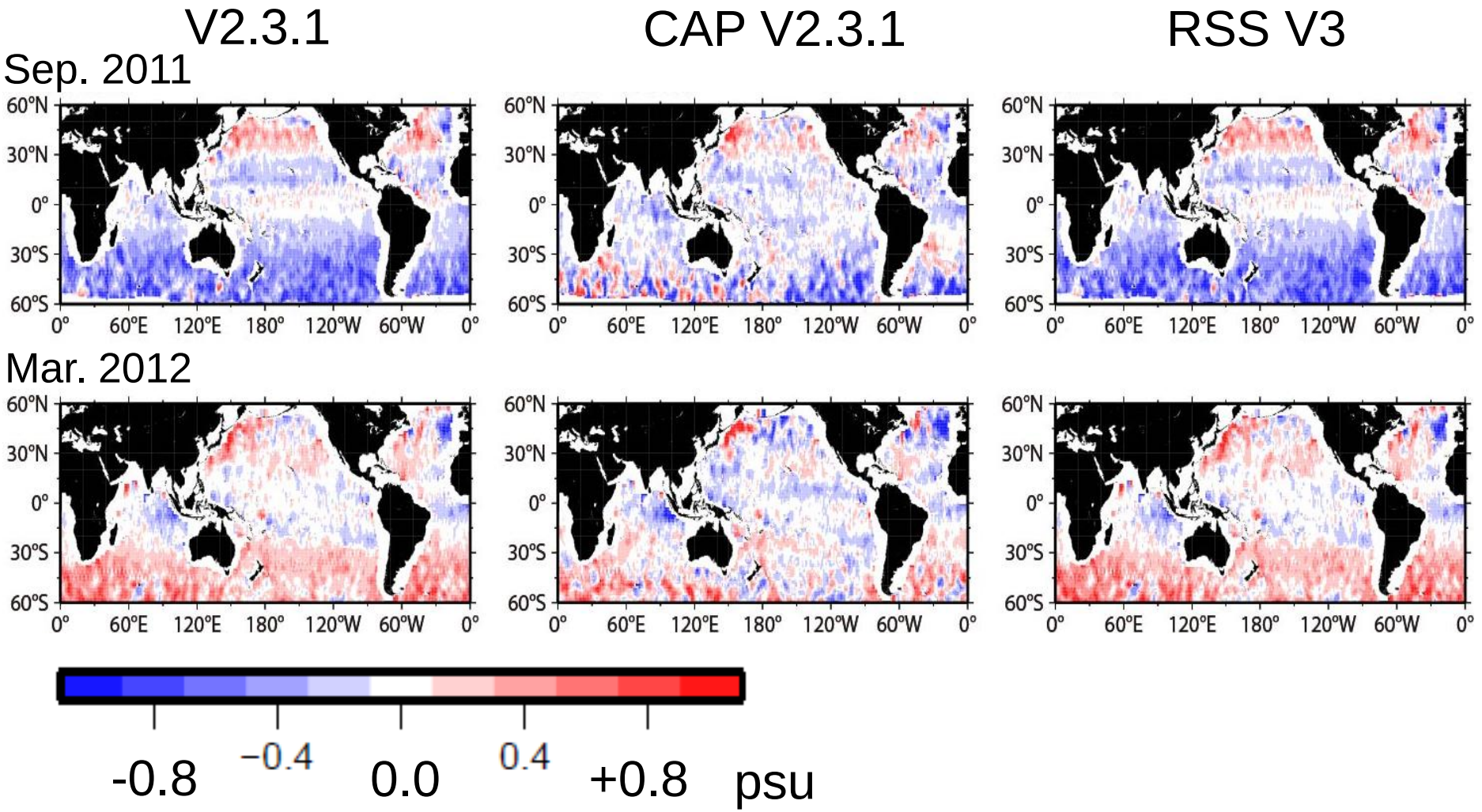

RSS V3




Rms difference =

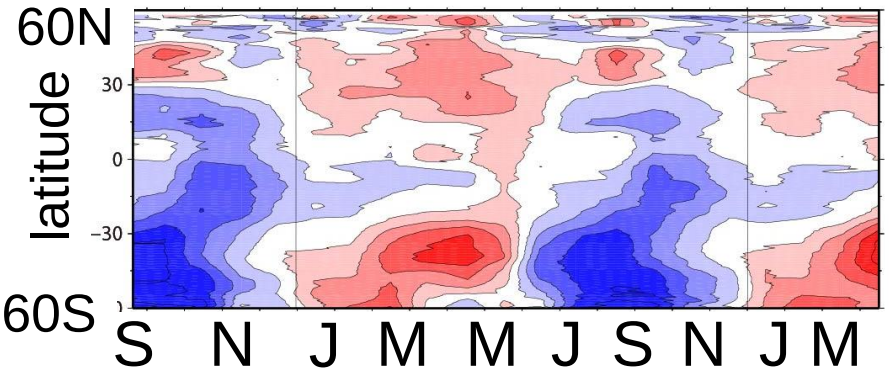
0.43 0.49 0.47

# Ascending minus descending seasonality (1/2)

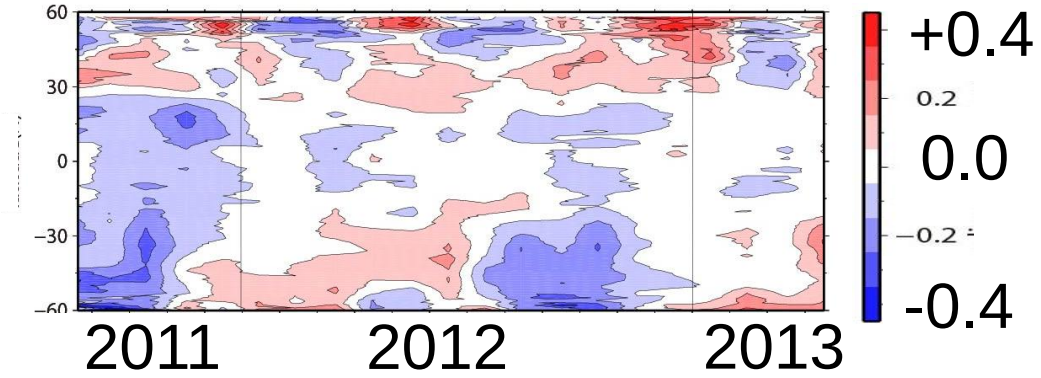


# Ascending minus descending seasonality (2/2)

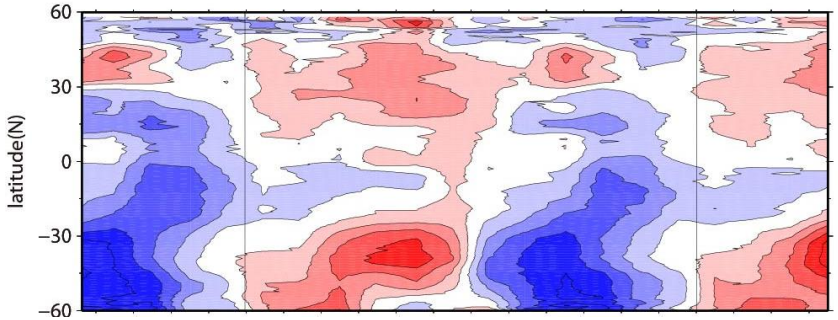
V2.3.1




CAP V2.3.1




RSS V3



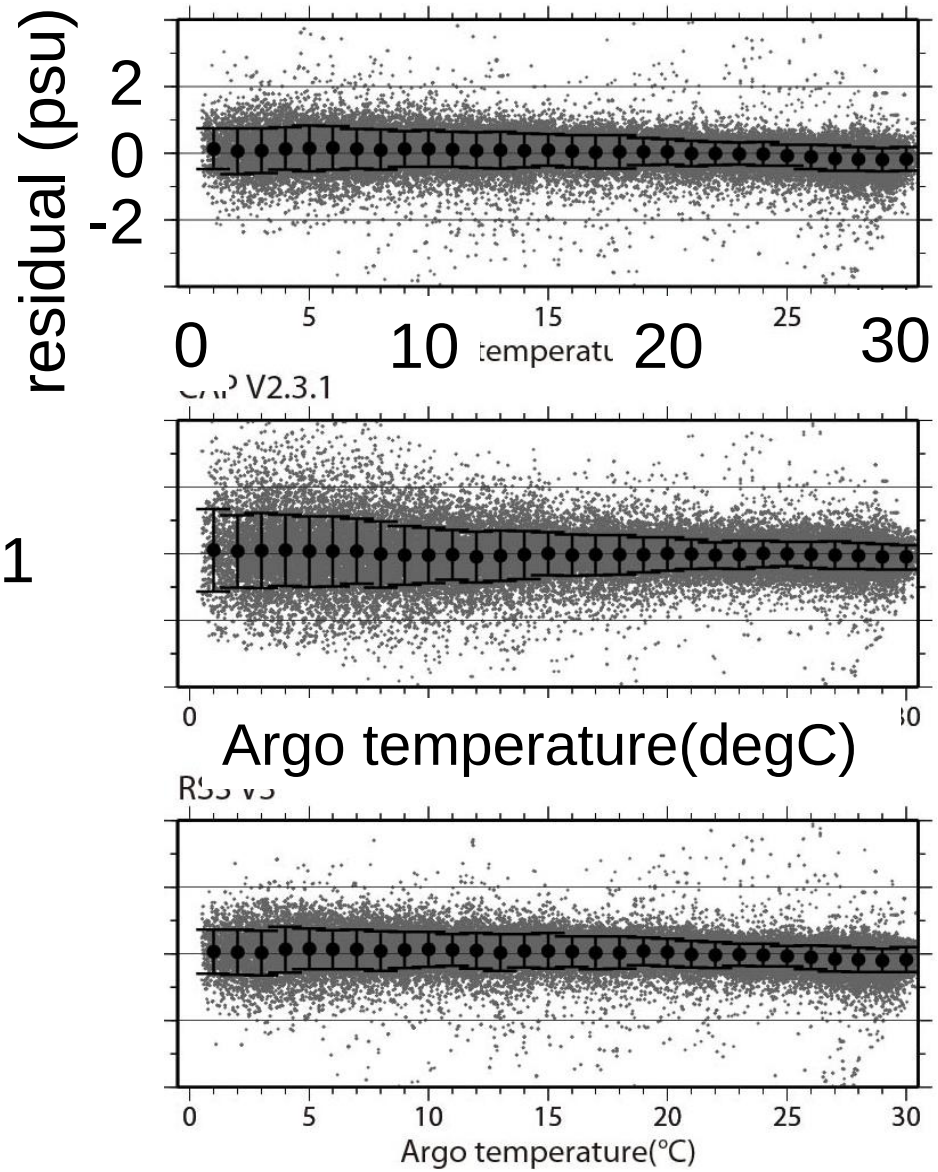

The bias is small for the CAP product.

# Residual analysis (1/6) -SST-

V2.3.1

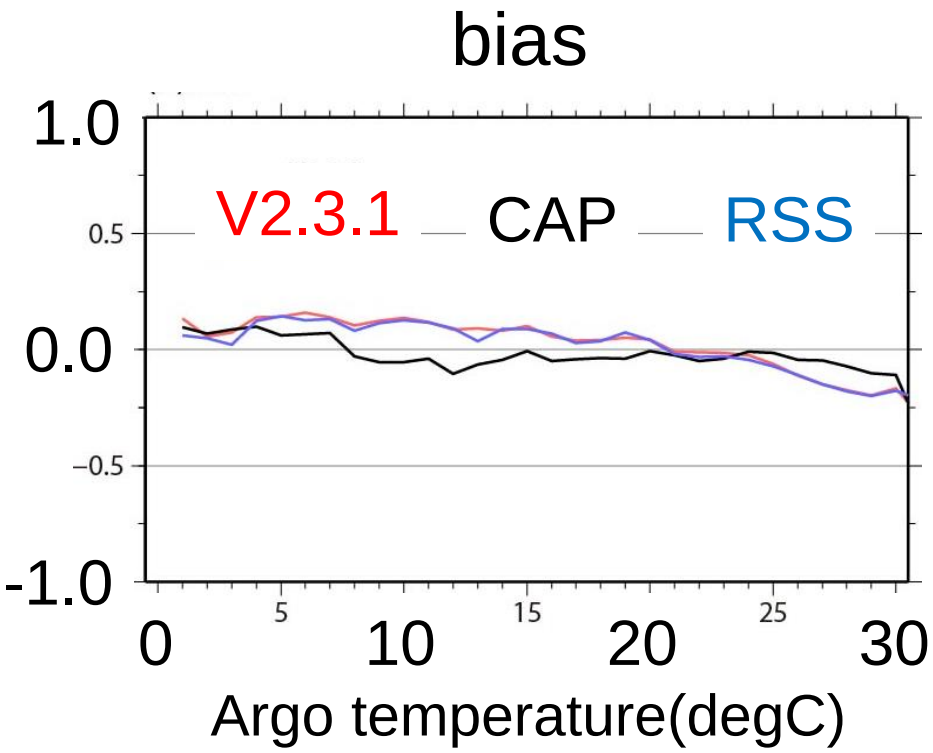
CAP V2.3.1

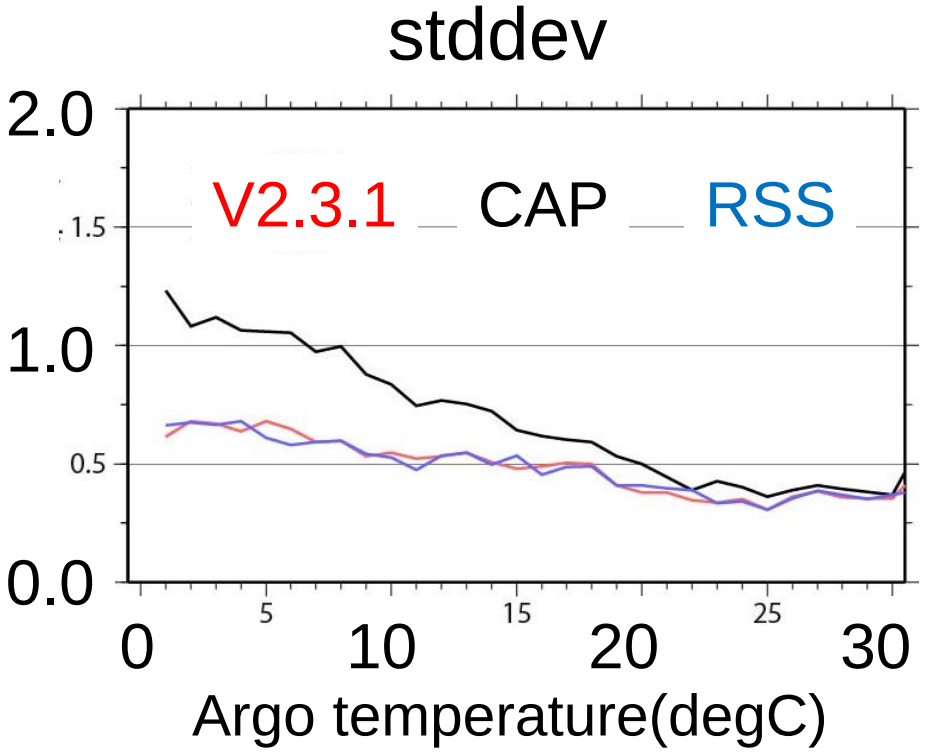
RSS V3




residual = AQ - Argo

# Residual analysis (2/6) -SST-



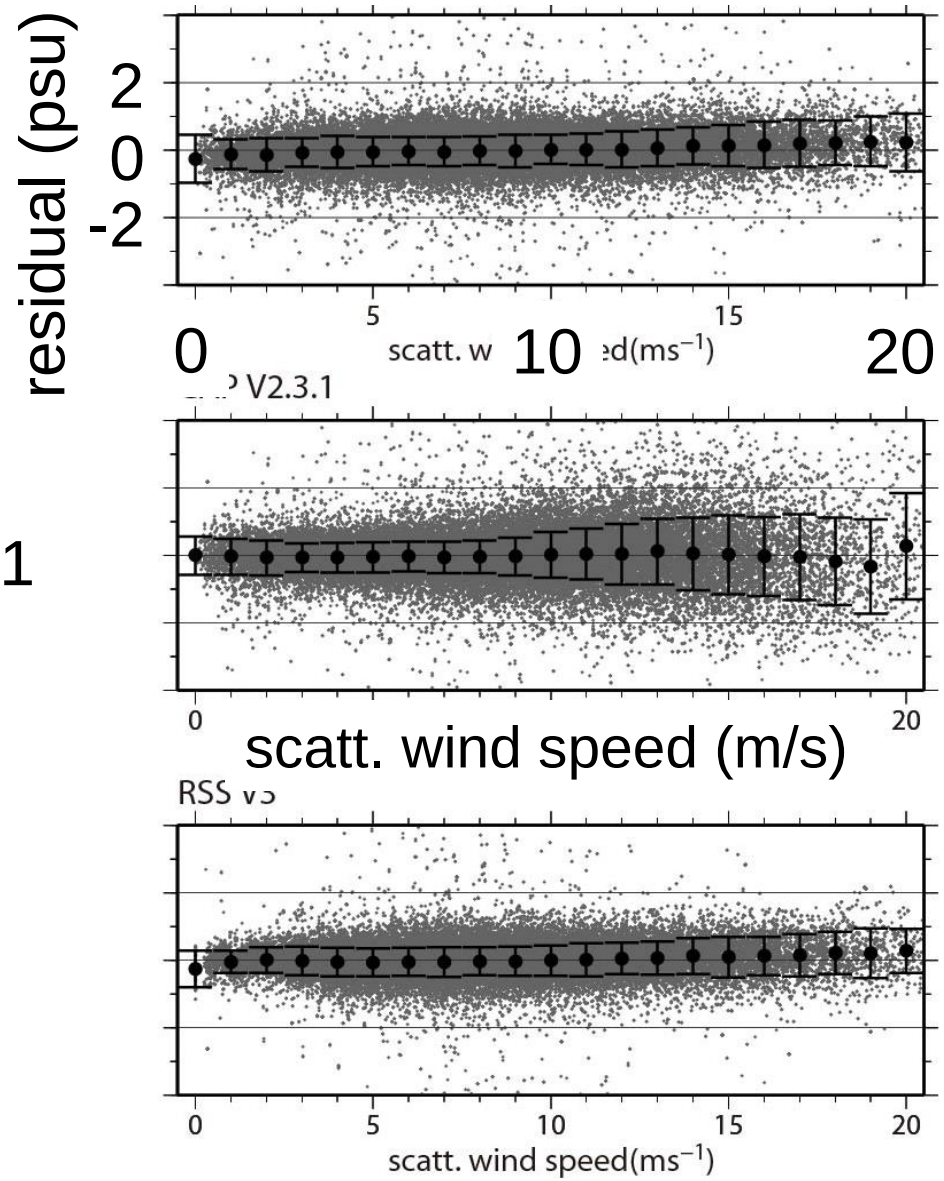

The stddev is large under low SST condition.

# Residual analysis (3/6) -wind speed-

V2.3.1

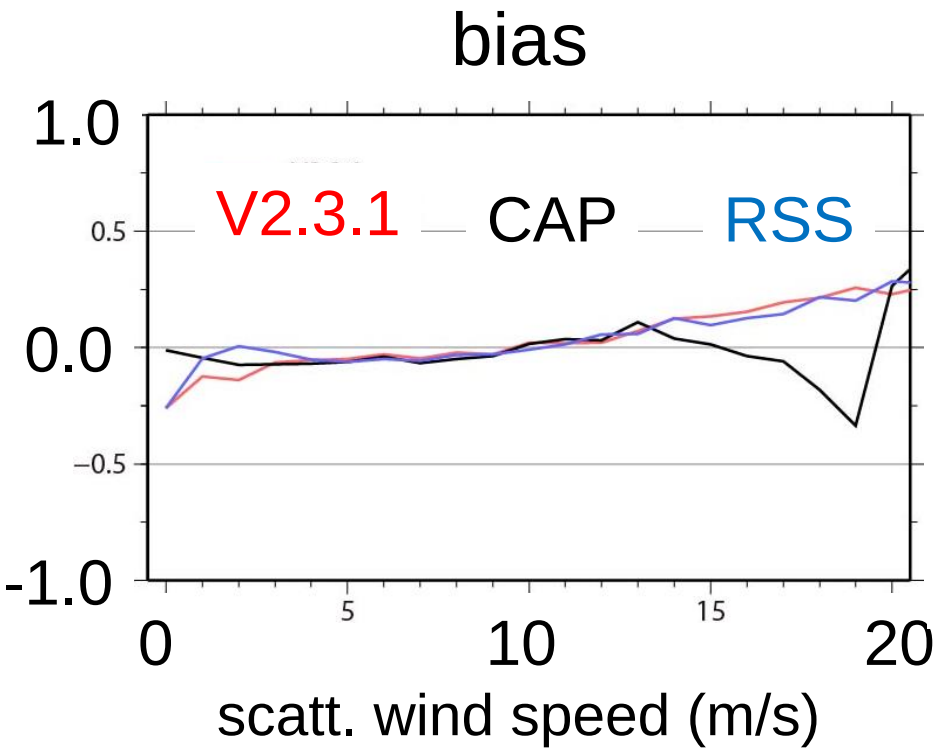
CAP V2.3.1

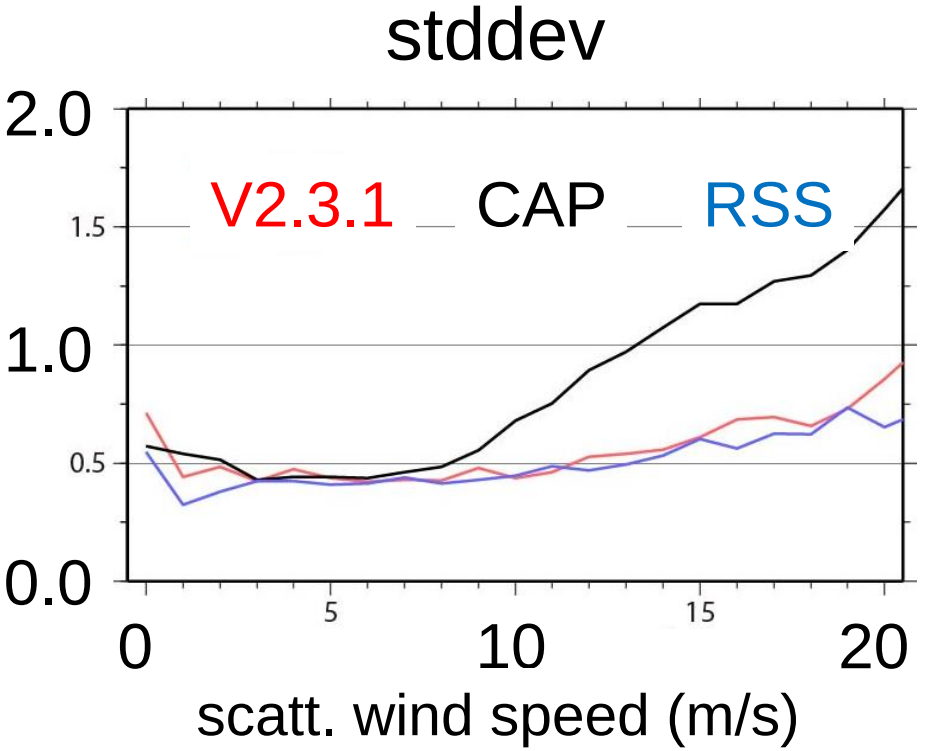
RSS V3




residual = AQ - Argo

# Residual analysis (3/6) -wind speed-



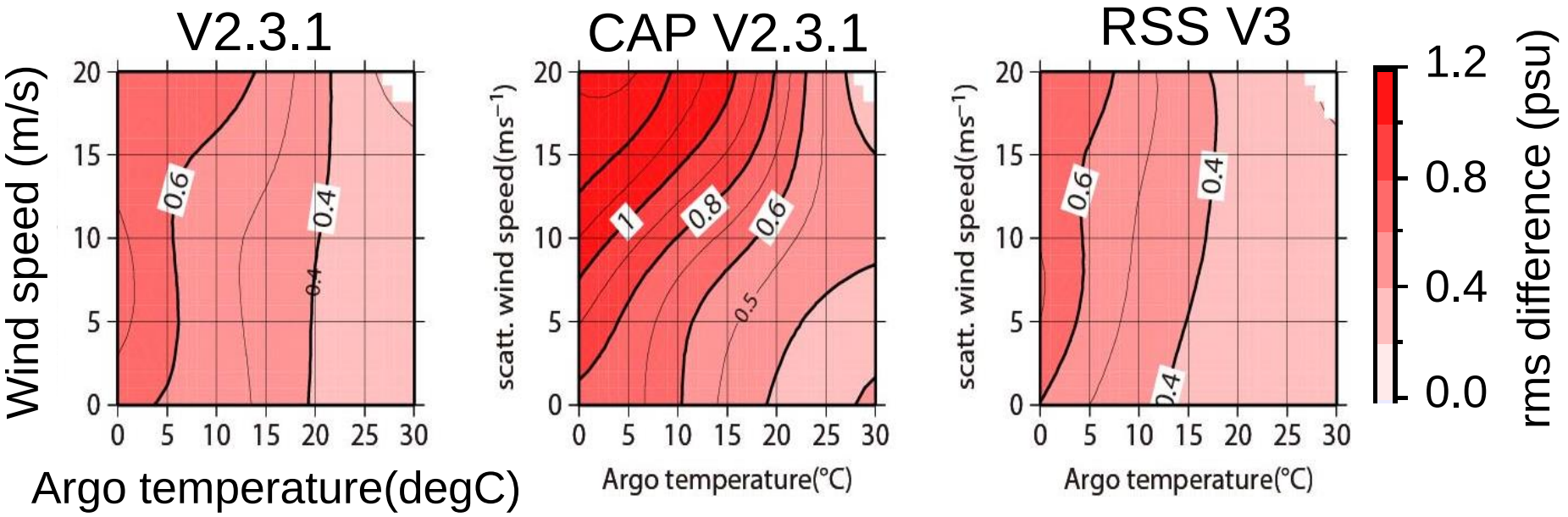




The stddev is large under strong wind condition.

# Residual analysis (5/6) -SST and wind speed-

rms difference

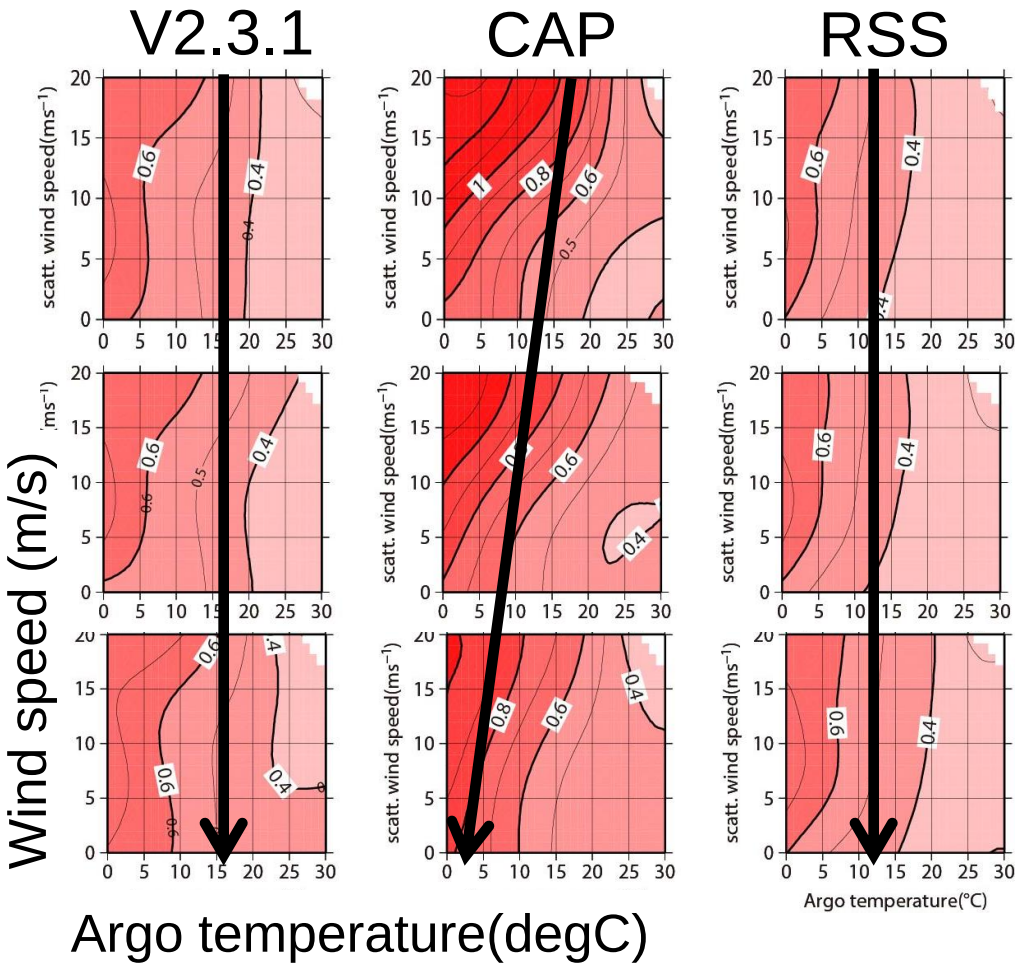
beam1




Rms difference is large under low SST and strong wind conditions.

The CAP product is sensitive to SST and wind speed.

# Residual analysis (6/6) -SST and wind speed-

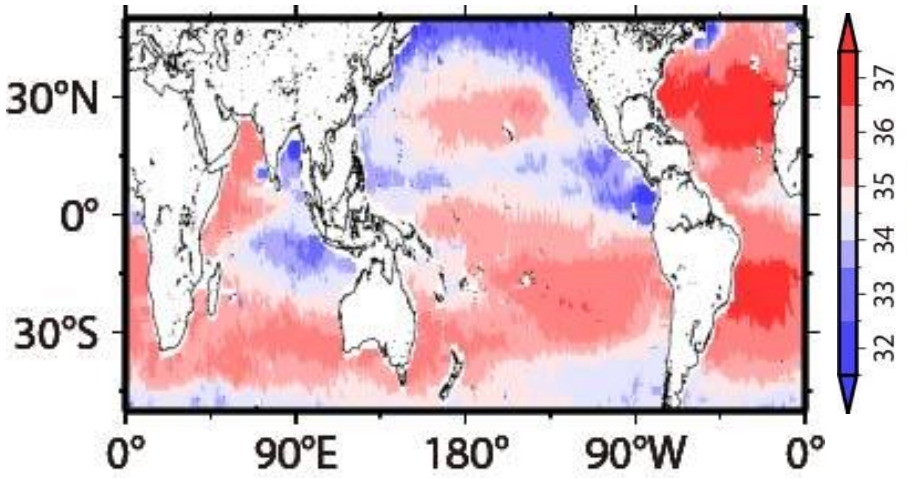



Rms difference depends on  beam for the CAP product.

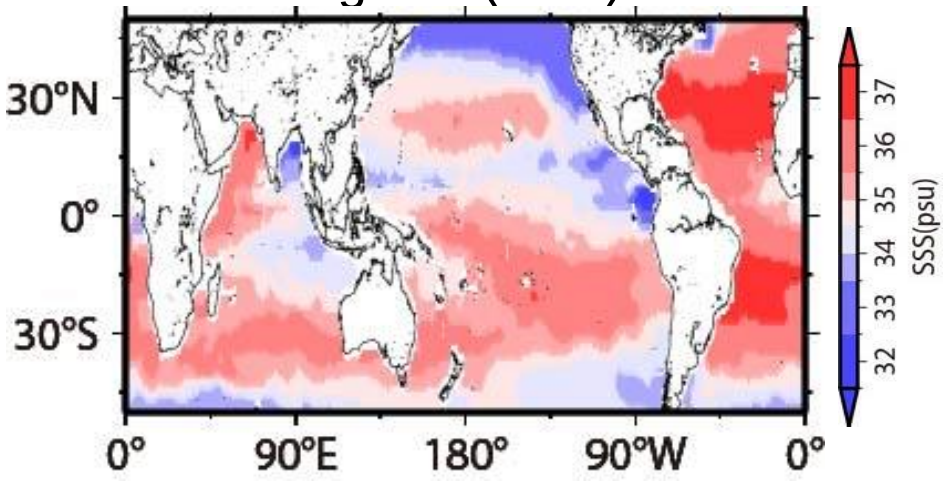
# Comparison with JAMSTEC Argo OI (1/3)

Jan. 2012

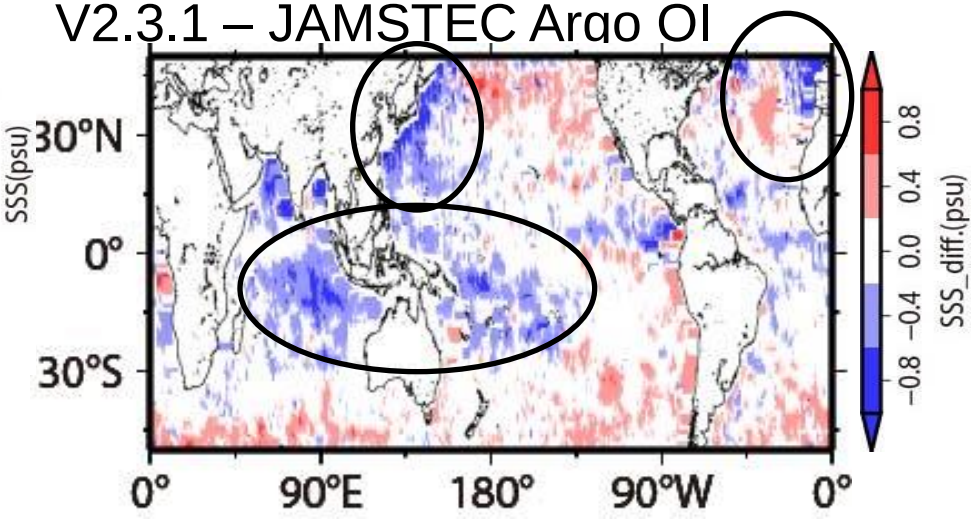
V2.3.1




JAMSTEC Argo OI (10m)




V2.3.1 – JAMSTEC Argo OI



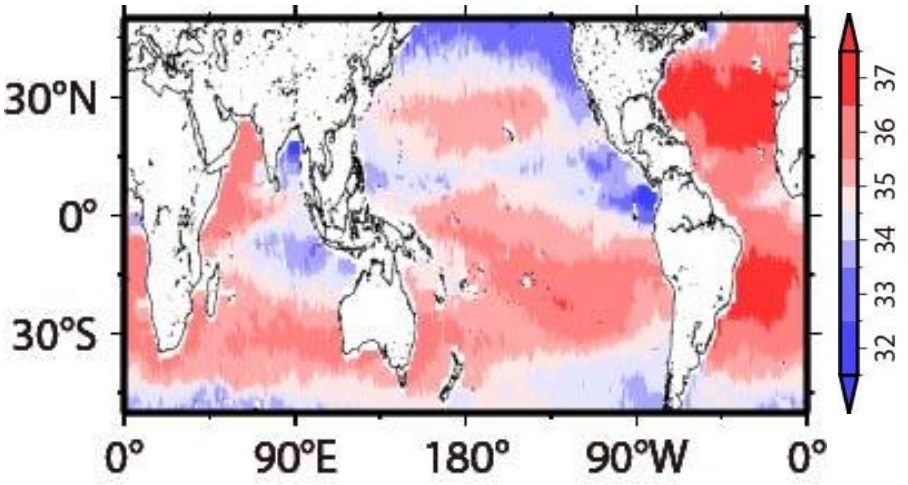

rms is 0.25 psu (>0.2 psu)

Residual SSS is negative in low and mid latitudes

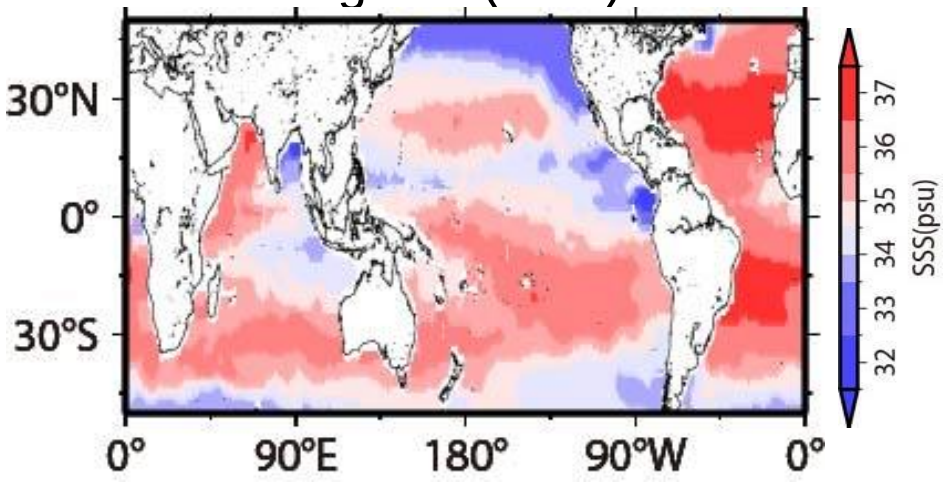
# Comparison with JAMSTEC Argo OI (2/3)

Jan. 2012

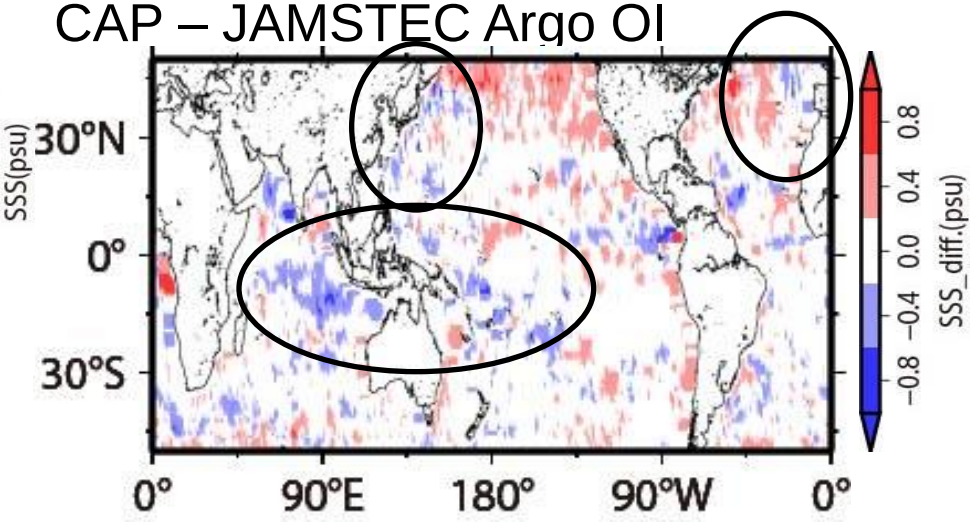
CAP V2.3.1




JAMSTEC Argo OI (10m)



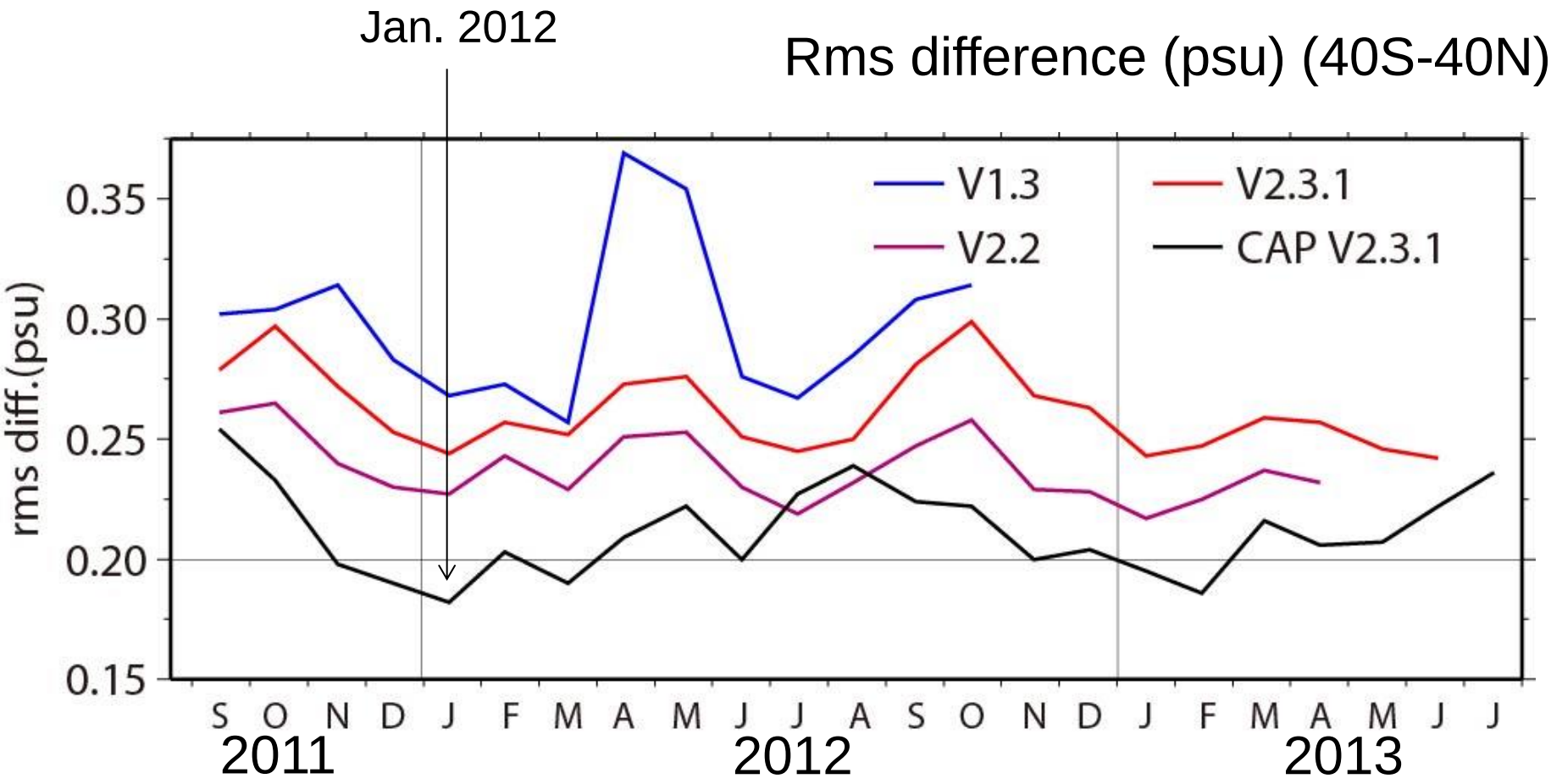

CAP – JAMSTEC Argo OI




rms is 0.18 psu (<0.2 psu)

Negative bias is small for the CAP product.

# Comparison with JAMSTEC Argo OI (3/3)

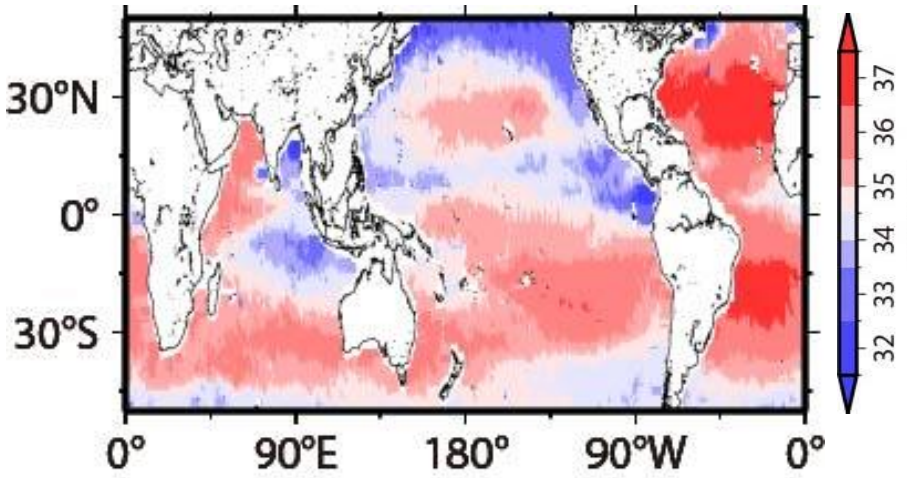



Rms difference is the smallest for the CAP product.

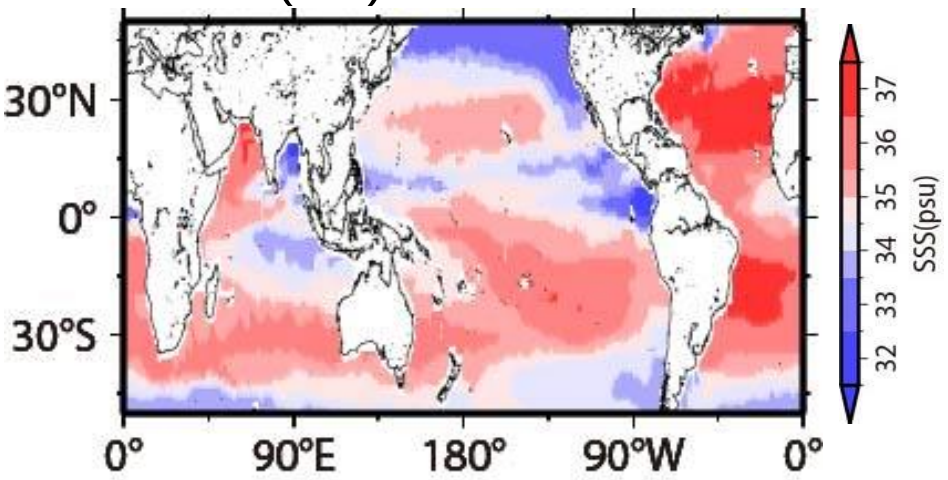
# Comparison with JMA assimilation system (1/3)

Jan. 2012

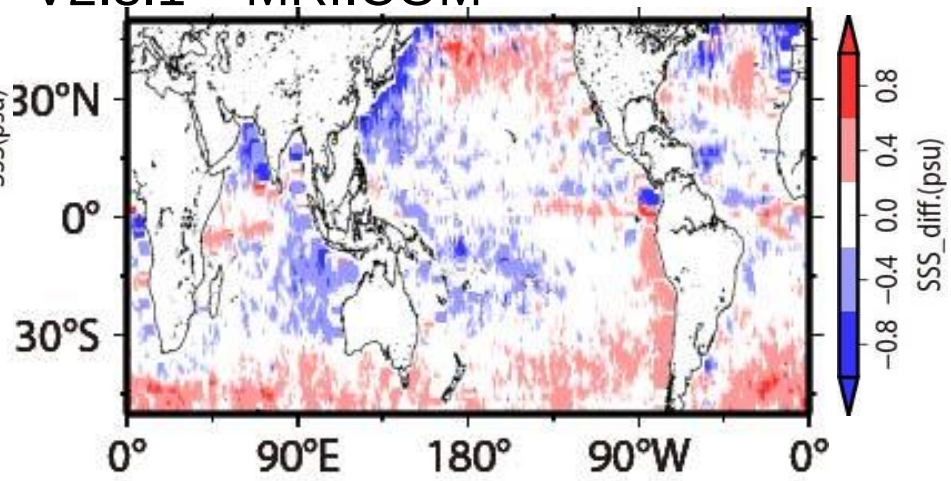
V2.3.1




MRI.COM (1m)




V2.3.1 – MRI.COM



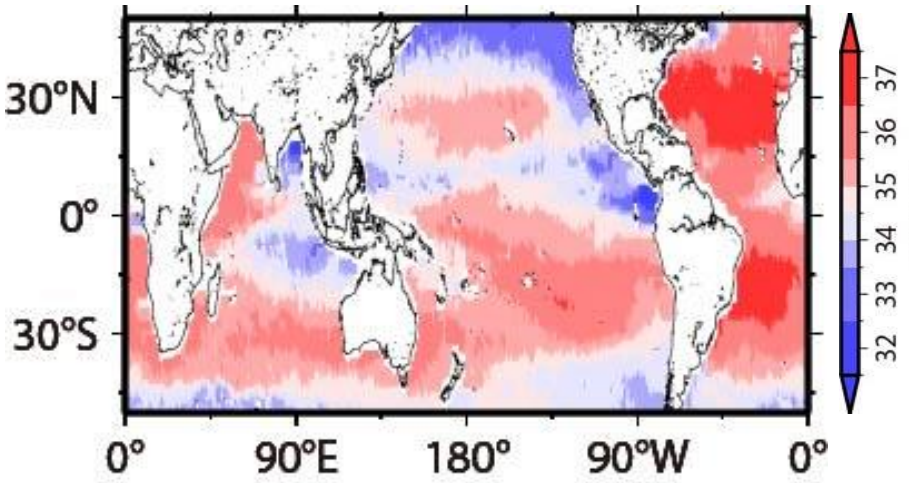

rms is 0.23 psu (>0.2 psu)

Negative bias

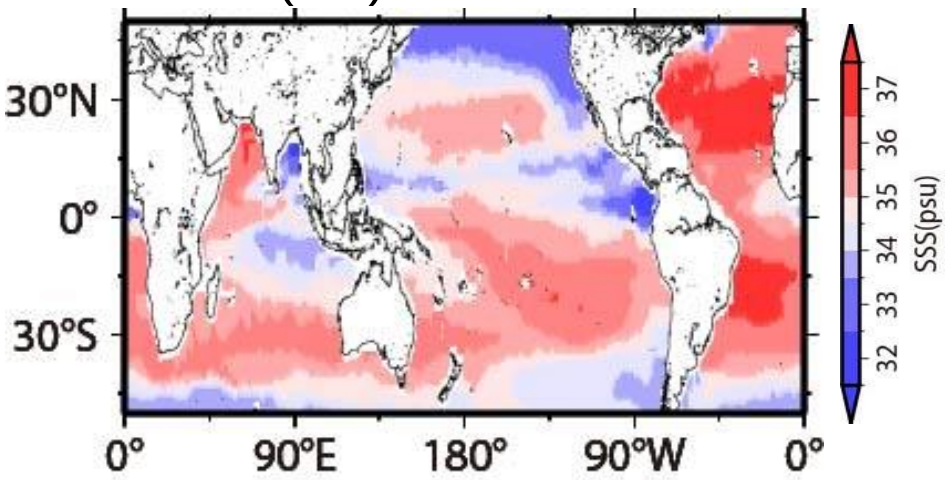
# Comparison with JMA assimilation system (2/3)

Jan. 2012

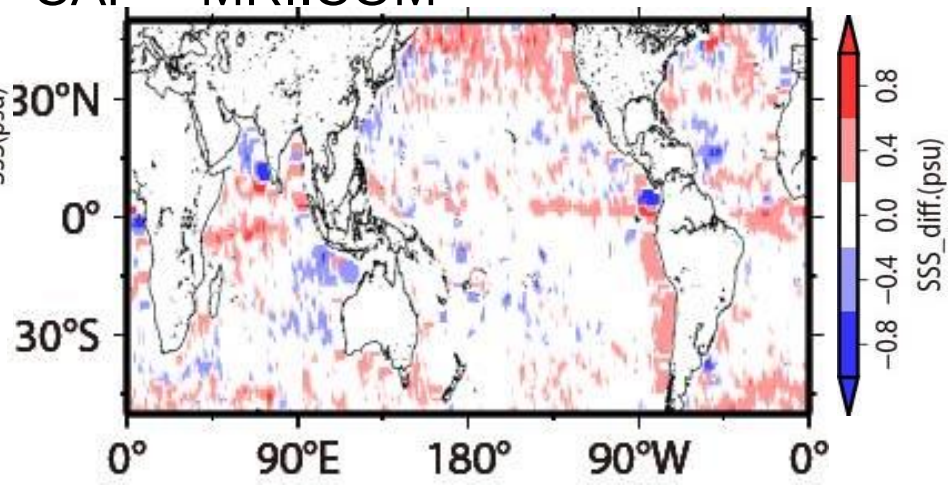
CAP V2.3.1




MRI.COM (1m)



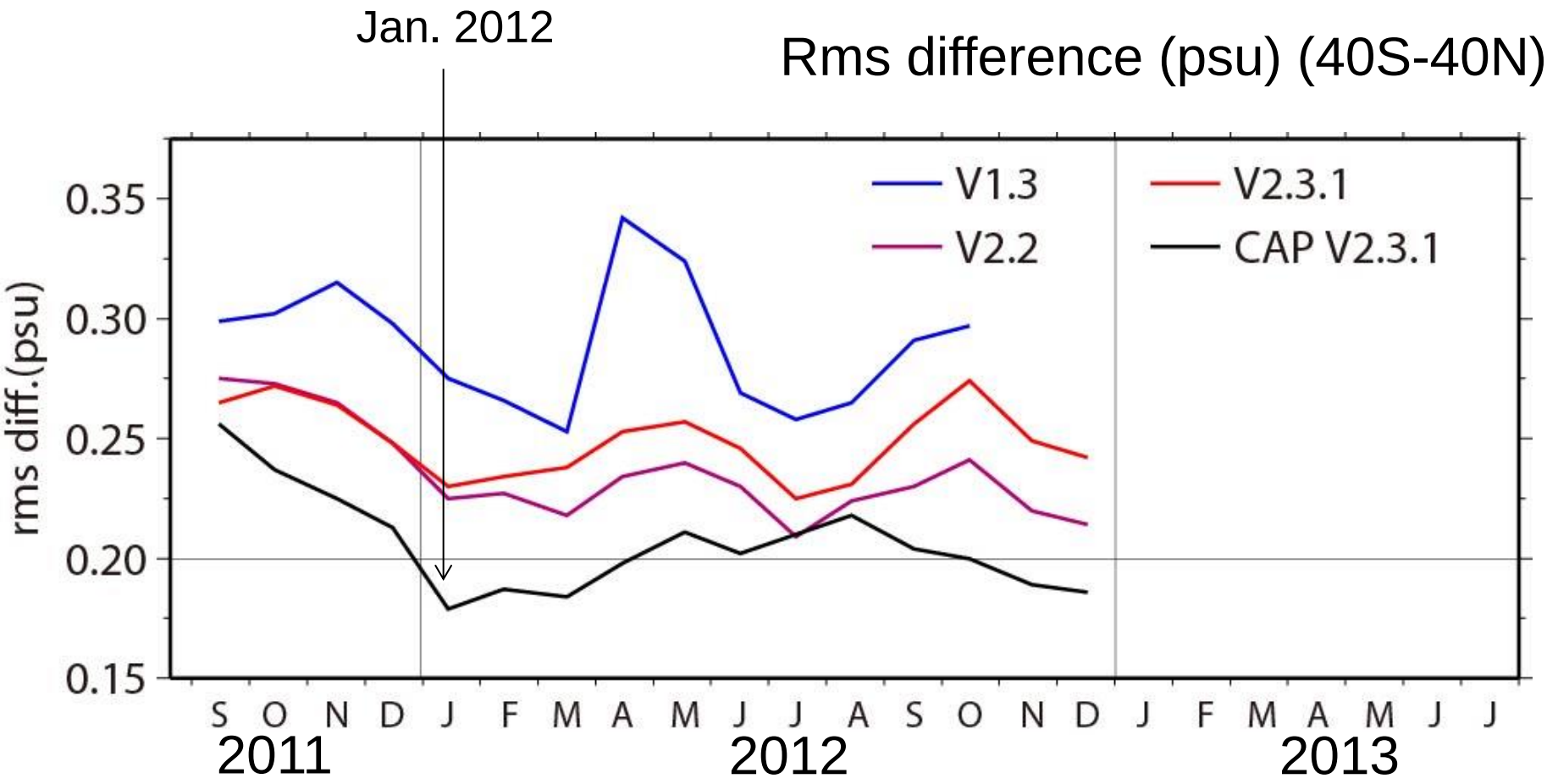

CAP – MRI.COM




rms is 0.18 psu (<0.2 psu)

Less negative bias

# Comparison with JMA assimilation system (3/3)




Rms difference is the smallest for the CAP product.

# Summary (1/1)

Aquarius SSSs, retrieved by recent algorisms, were validated using various salinity data (V2.3.1, CAP V2.3.1, RSS V3).

Level-2 SSS v.s. Argo, moored buoy

- Rms difference was 0.43 – 0.55 psu.
- The ascending – descending bias was small for the CAP product.
- Rms difference depended on beam for the CAP product.

Level-3 SSS v.s. JAMSTEC OI, JMA/MRI.COM

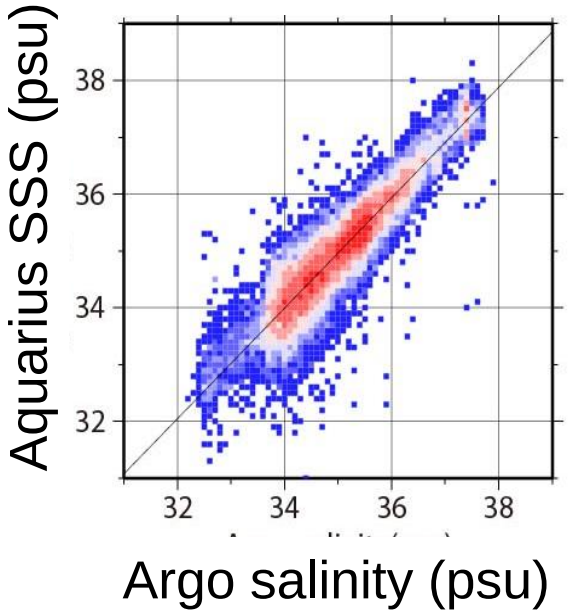
- The negative biases found in the low/mid latitudes were small for the CAP product.
- Rms difference was 0.21 psu (CAP) and 0.23 psu (the others).

# Backup Slide

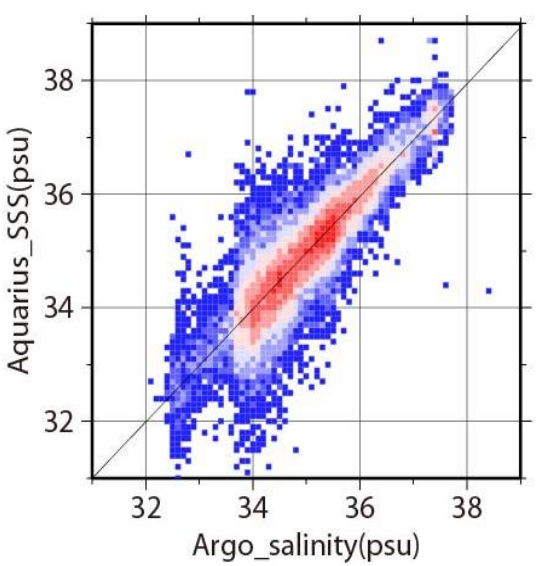
# Comparison with in situ data (1/4)

beam1

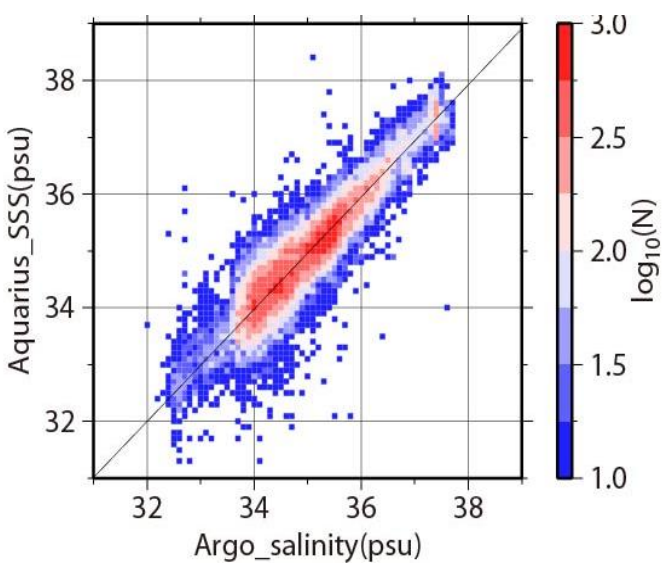
V2.3.1




CAP V2.3.1




RSS V3




Rms difference

0.44

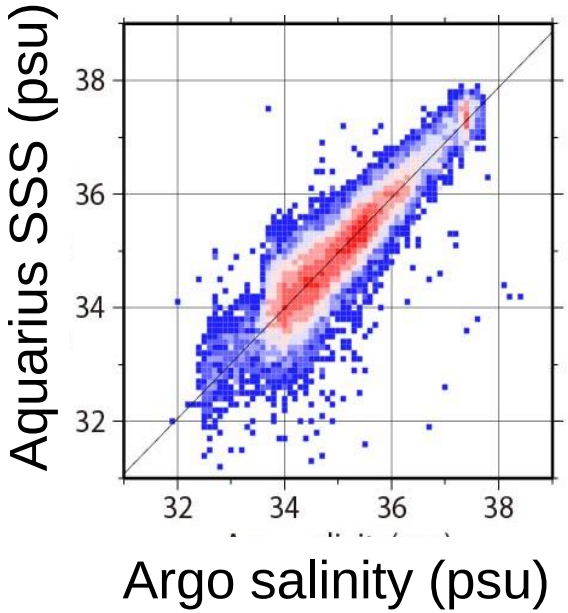
0.55

0.44

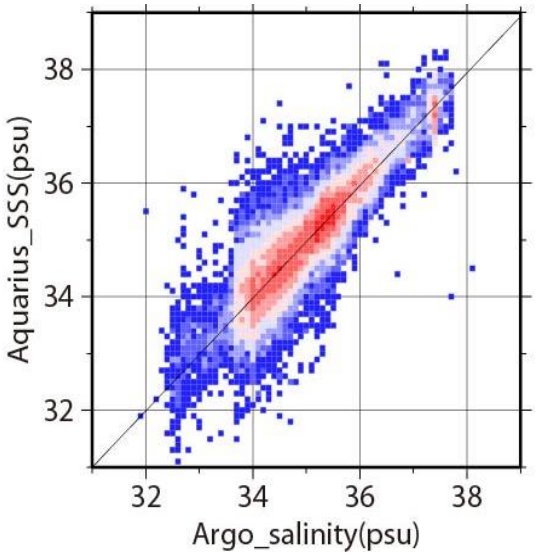
# Comparison with in situ data (2/4)

beam2

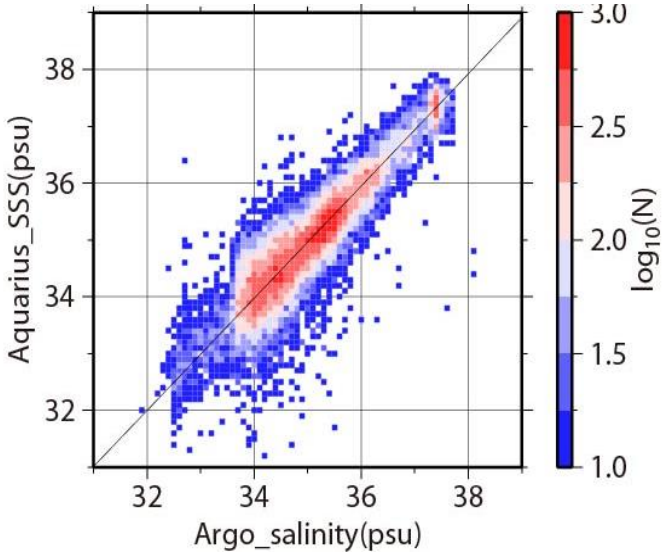
V2.3.1




CAP V2.3.1




RSS V3



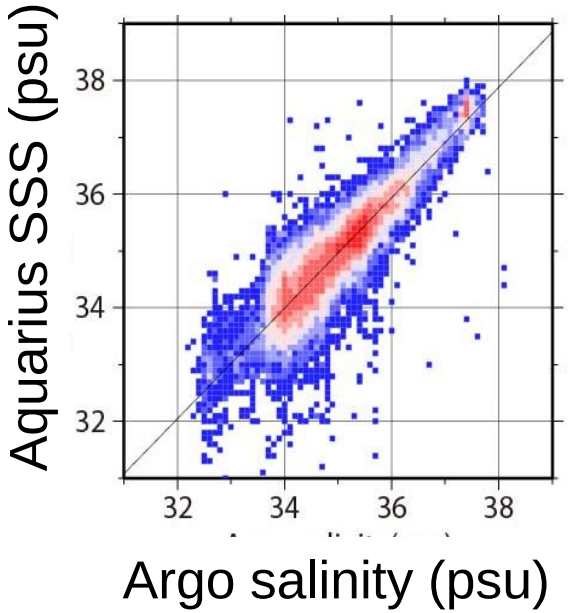

Rms difference

0.46 0.52 0.47

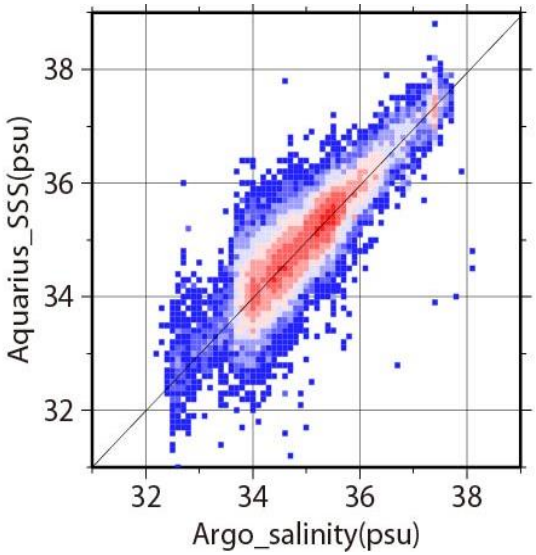
# Comparison with in situ data (3/4)

beam3

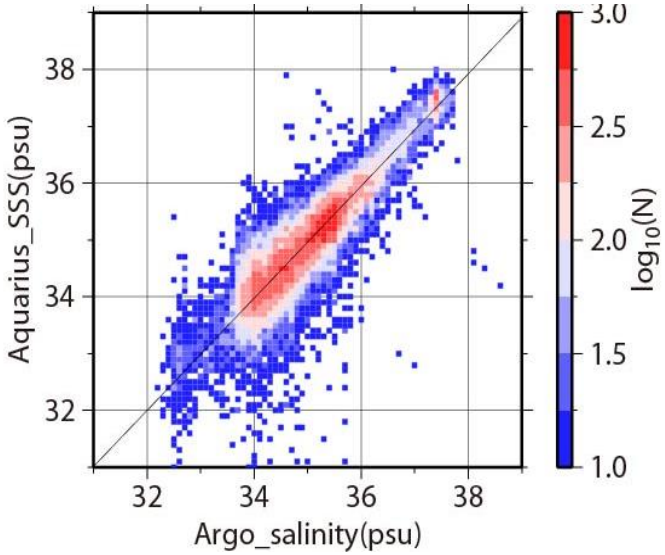
V2.3.1




CAP V2.3.1




RSS V3

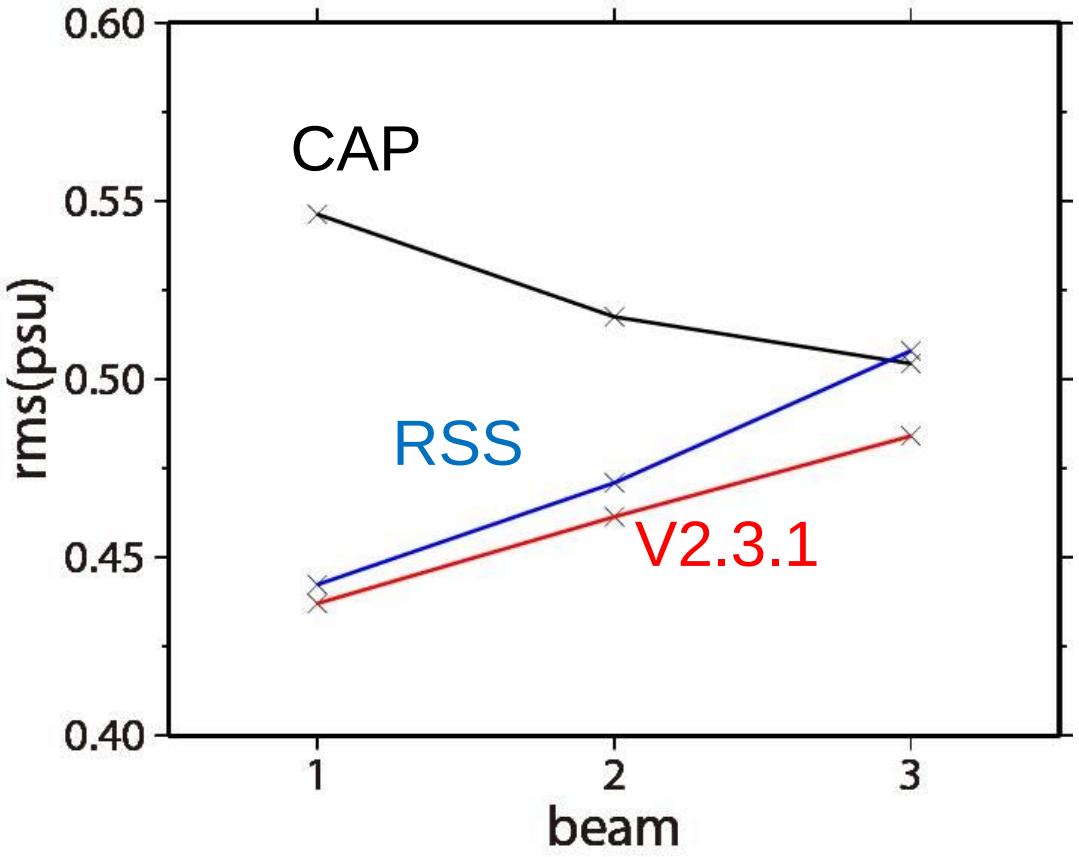



Rms difference

0.48 0.50 0.51

# Comparison with in situ data (4/4)

## Statistical summary




Rms difference is large for the CAP product.

But those are mostly the same in beam3.

# xy-plot of the collocation points (1/1)