

Regional biases in operational SST retrieval

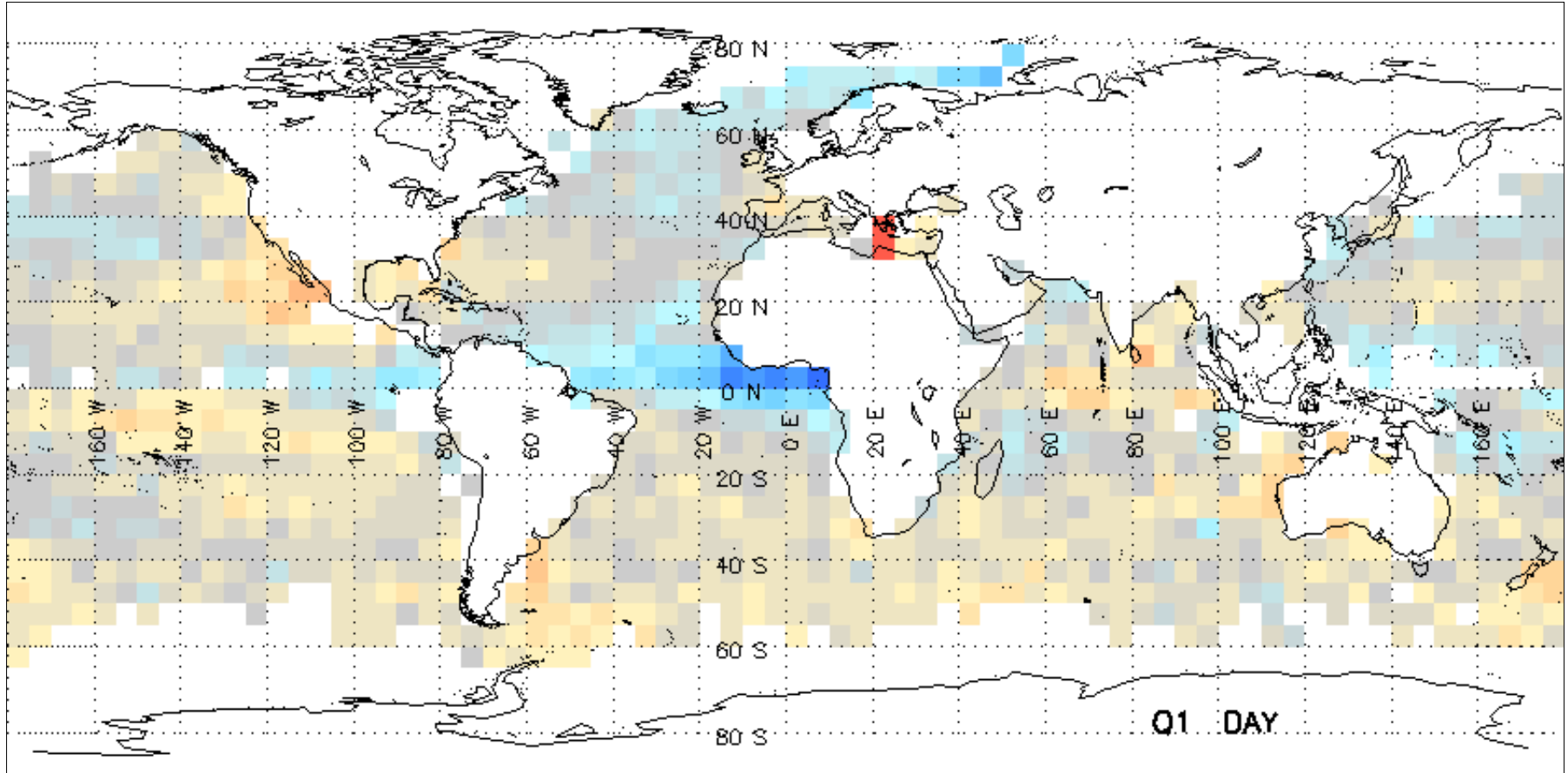
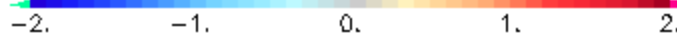
Pierre Le Borgne, Gérard Legendre, Anne Marsouin, Sonia Péré, Hervé Roquet, Stéphane Saux-Picart
MF/Centre de Météorologie Spatiale , Lannion

Plan

- Motivation + method
- Geos (MSG, GOES-E): operational results
- Leos (METOP, NPP): proto and first operational implementation examples
- BT simulation adjustment
- Conclusion



Operational Regional biases



METOP-A mean error from January to March 2008_2013

(Marsouin et al, submitted)

09/06/2014 CHRSST XV CapeTown, June 2014



METEO FRANCE
Toujours un temps d'avance

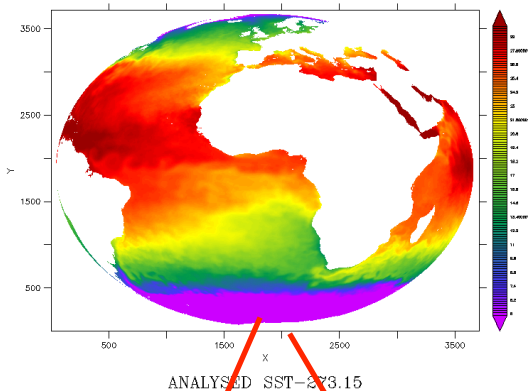
Methods to correct for regional biases

- Multispectral algorithms cannot cope with all types of atmospheres
- Accounting for actual atmospheric absorption is needed
- main (BT simulation based) approaches:
 - OE (Merchant et al 2008,2009,2013)
 - Bias correction (LeBorgne et al, 2011, Petrenko et al, 2011)
 - Physical method (Koner, 2013)
- $SST = \text{guess} + \sum a_i (\text{obsBT}_i - \text{simBT}_i)$

Demanding of Simulation accuracy

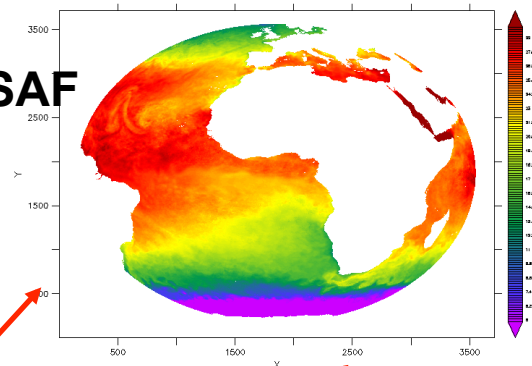
Error simulation

Analyzed SST(OSTIA)



Operational in OSI-SAF
since August 2011

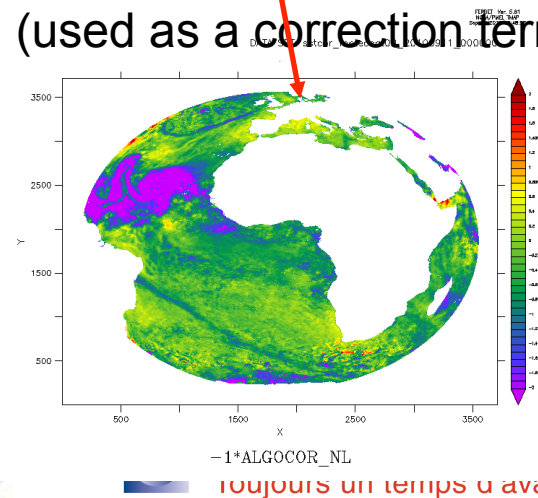
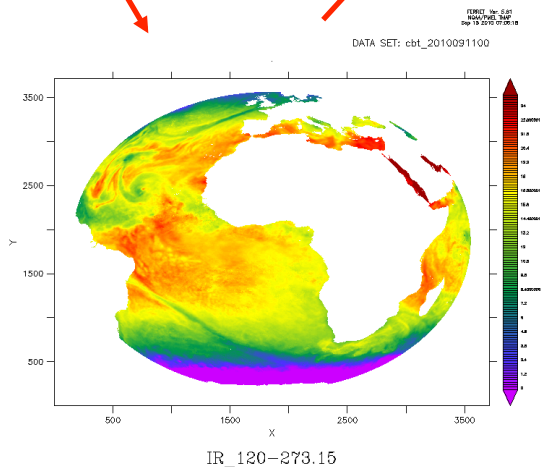
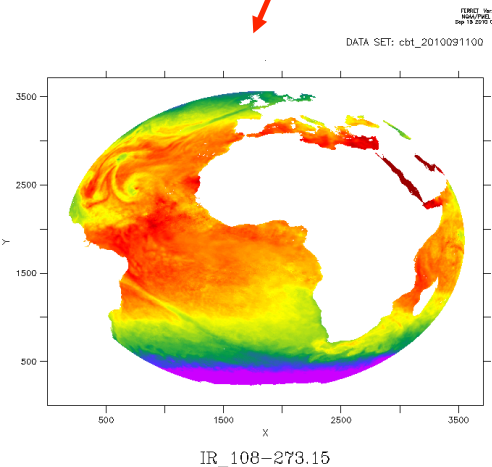
Retrieved SST



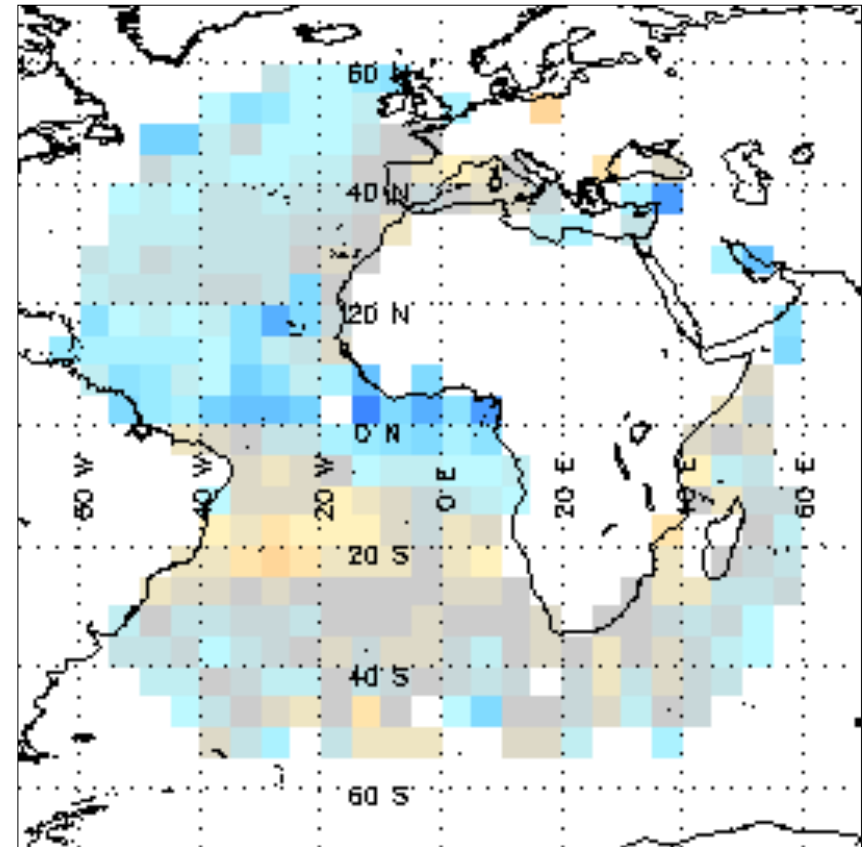
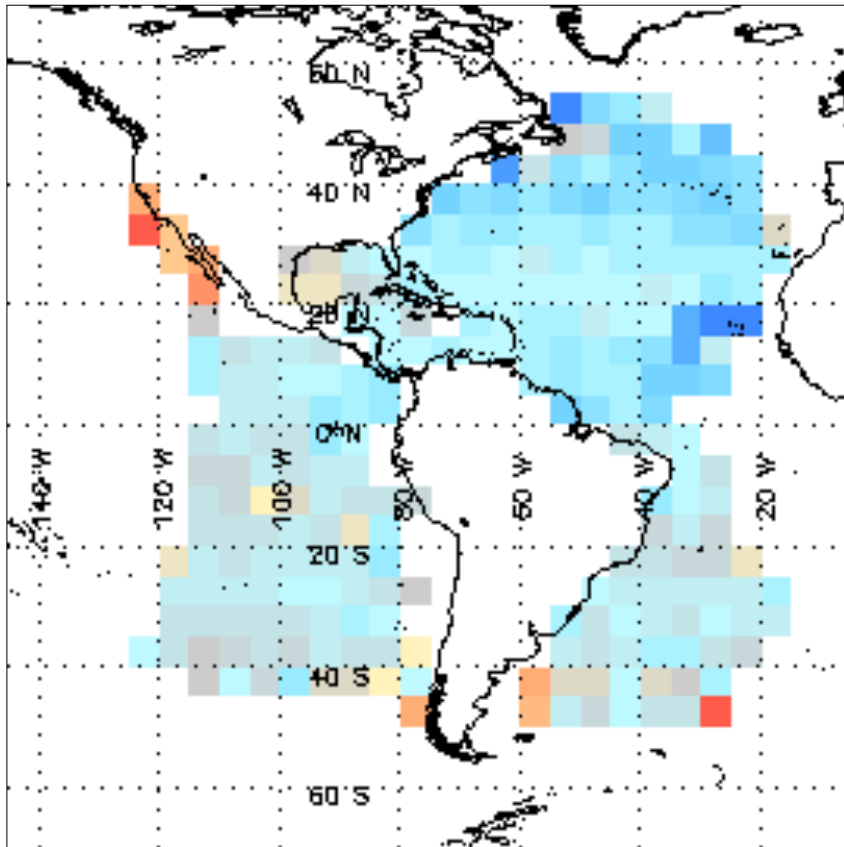
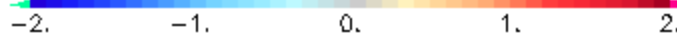
ECMWF profiles
+ RTTOV
Simulated BTs

Operational algorithm
Applied on simulations

Retrieved – analyzed SST =
Predicted algorithm error
(used as a correction term)



Geos operational error before correction

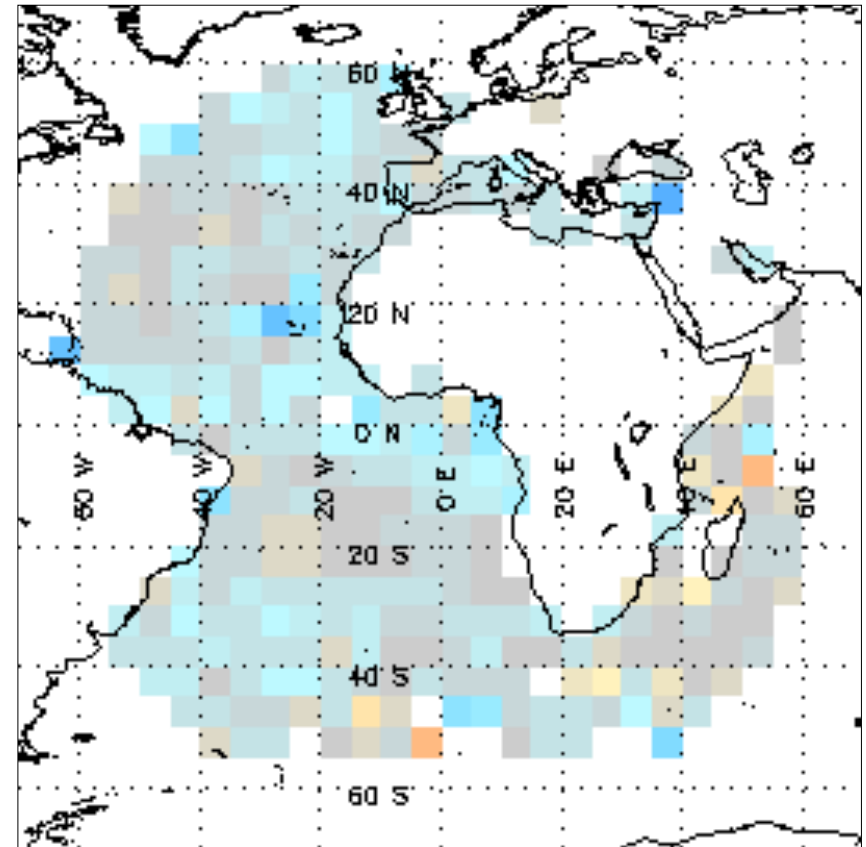
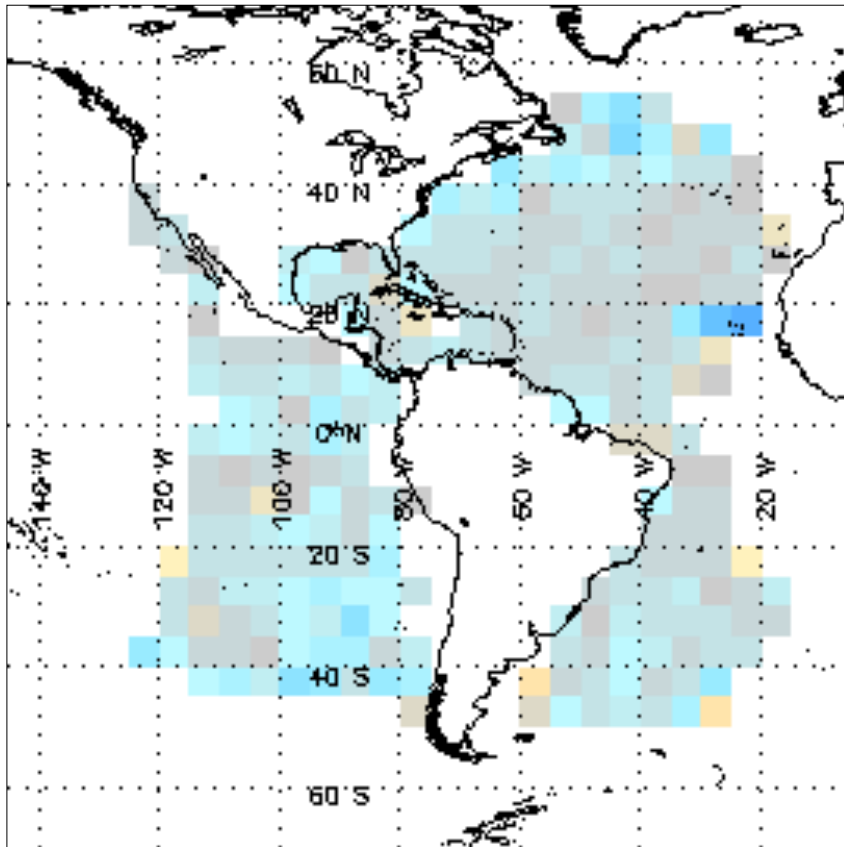
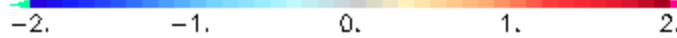


Geos mean error from January to March 2011_2013

(Marsouin et al, submitted)

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Geos operational error after correction



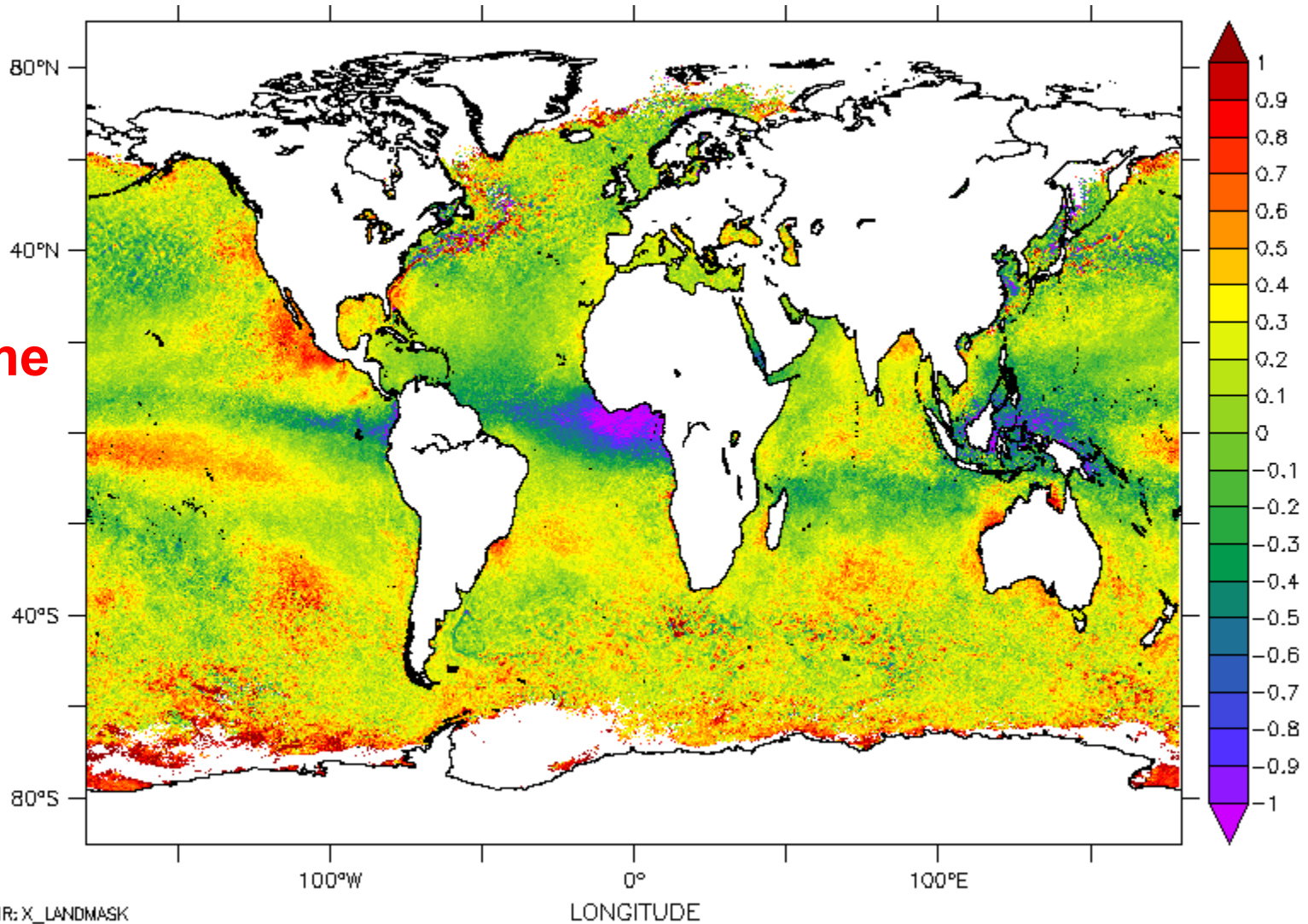
Geos mean error from January to March 2011_2013

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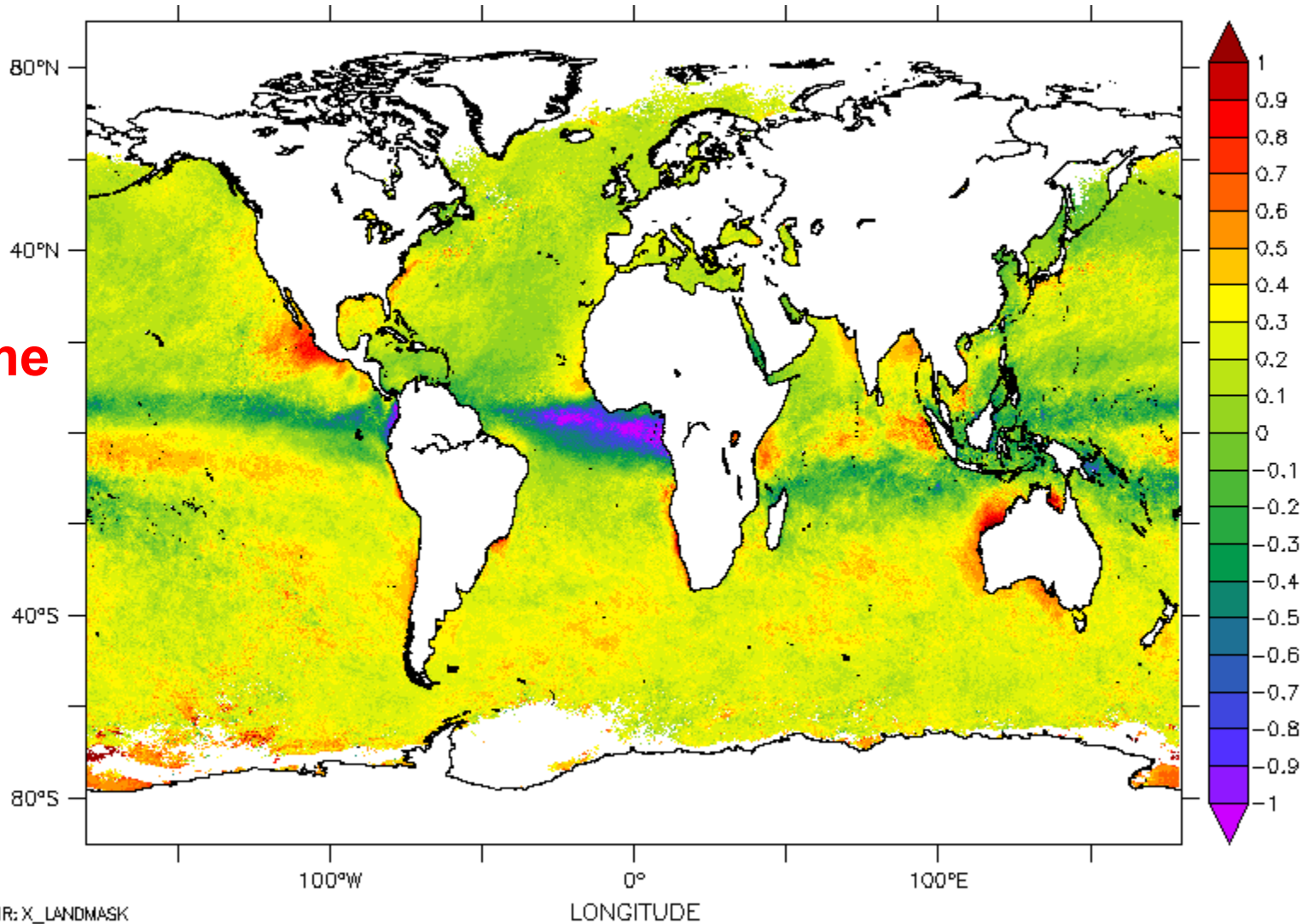
AVHRR PROTOTYPE: METOP A

**Daytime
winter
errors**



AVHRR PROTOTYPE: METOP A

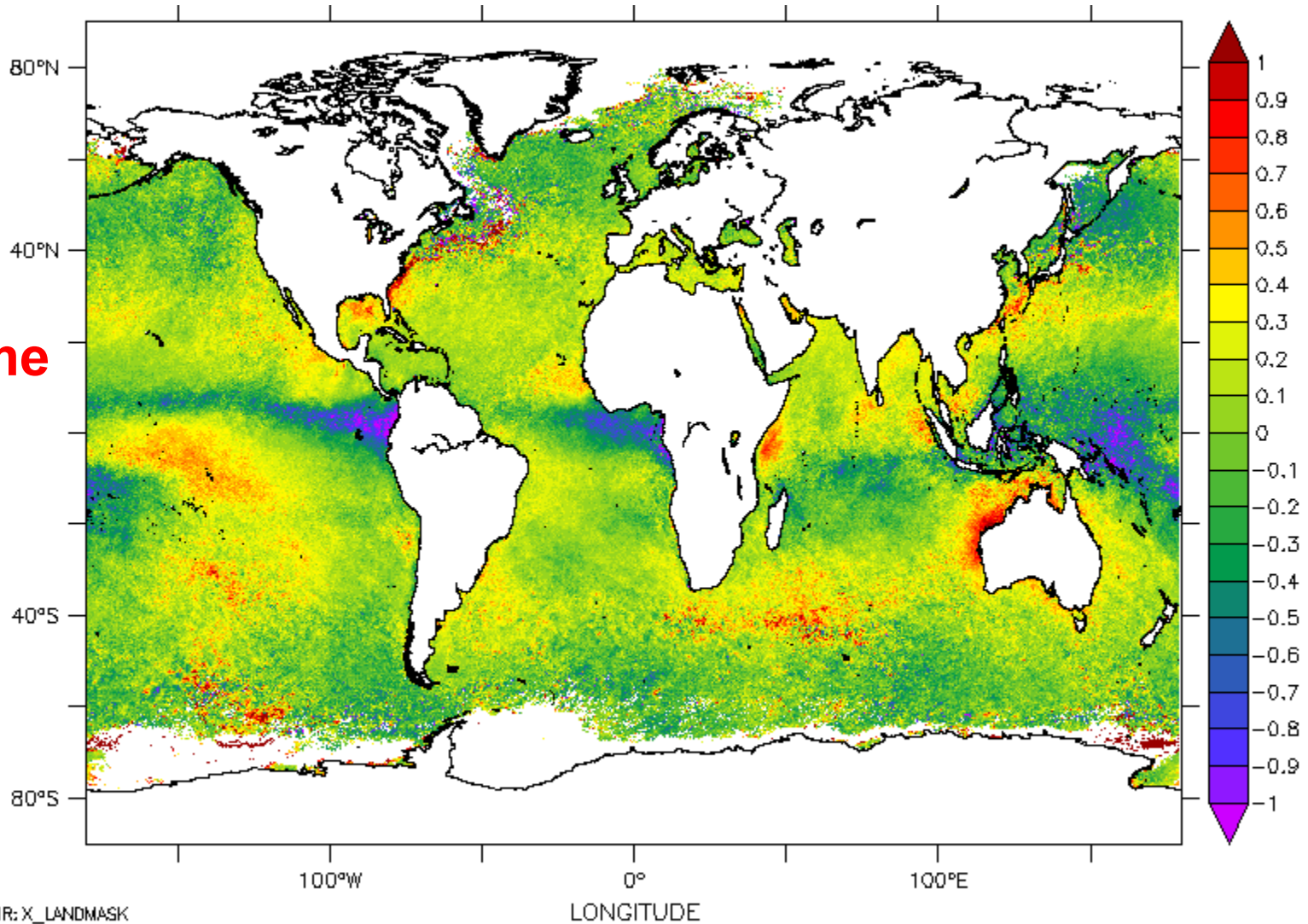
**Daytime
winter
errors**



DIFFERENCE TO OSTIA: SIMULATED

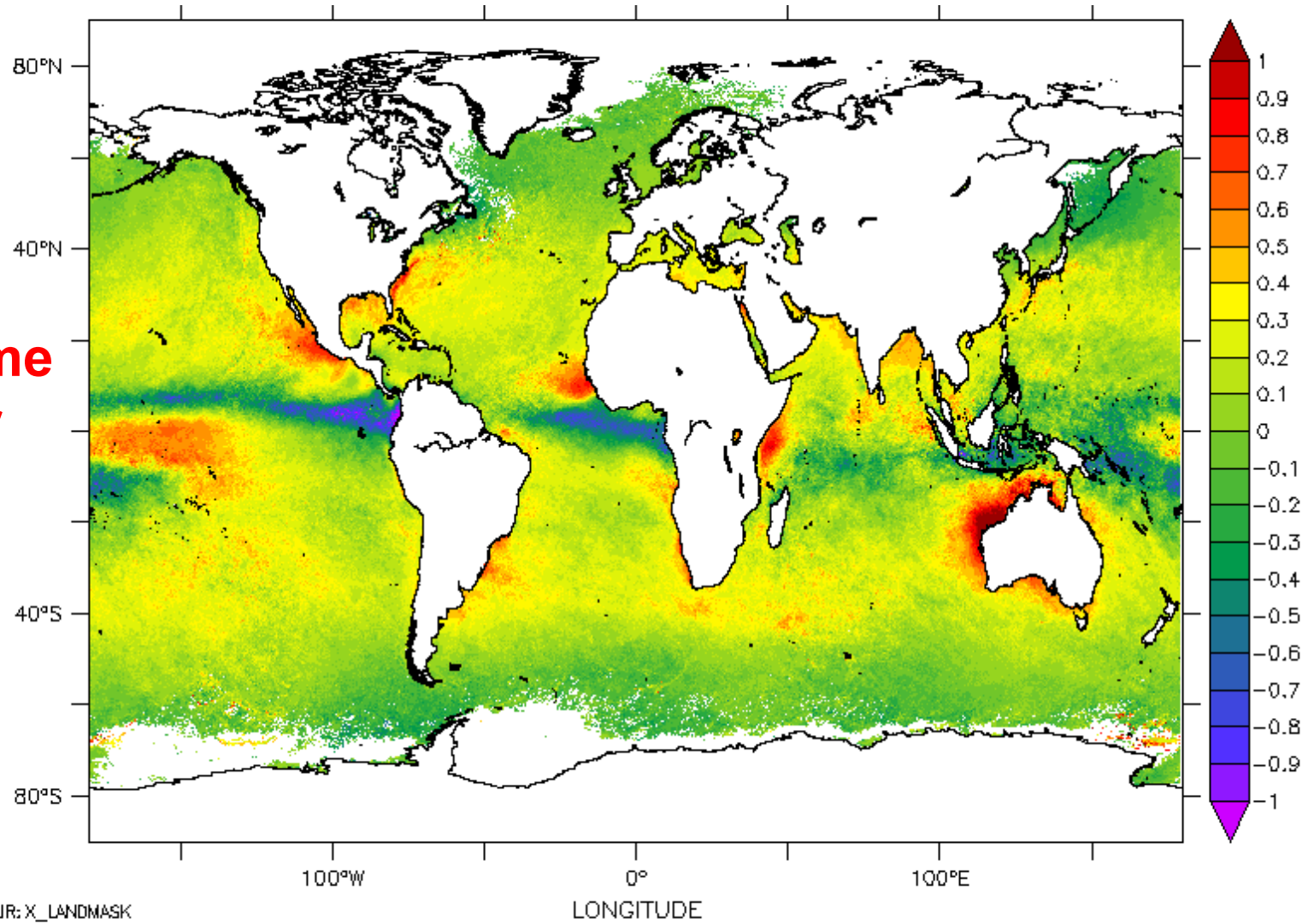
AVHRR PROTOTYPE: METOP B

**Daytime
winter
errors**



AVHRR PROTOTYPE: METOP B

**Daytime
winter
errors**



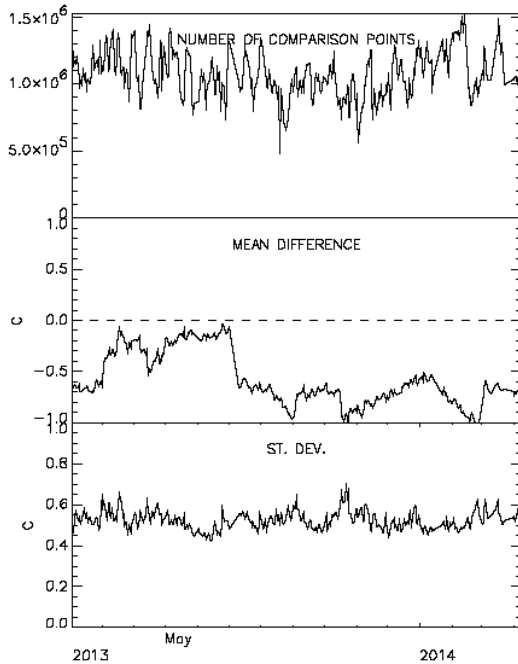
DIFFERENCE TO OSTIA: SIMULATED

BT adjustment ?? METEOSAT 10

3.9 μm

diff_t39

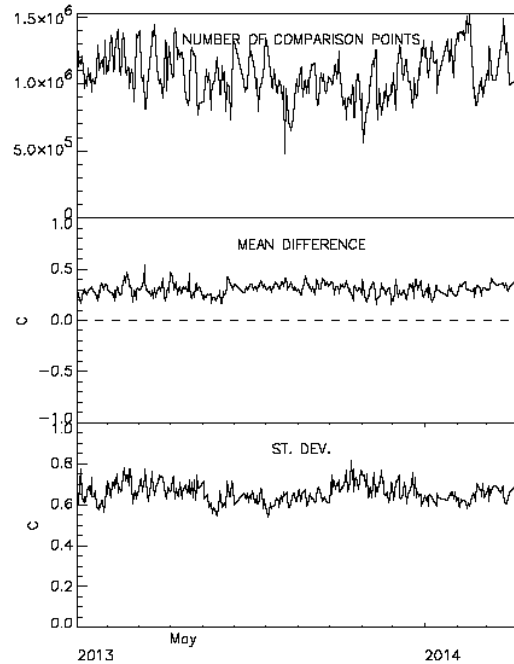
Overall mean T39 sim-obs= -0.57 C



10.8 μm

diff_t108

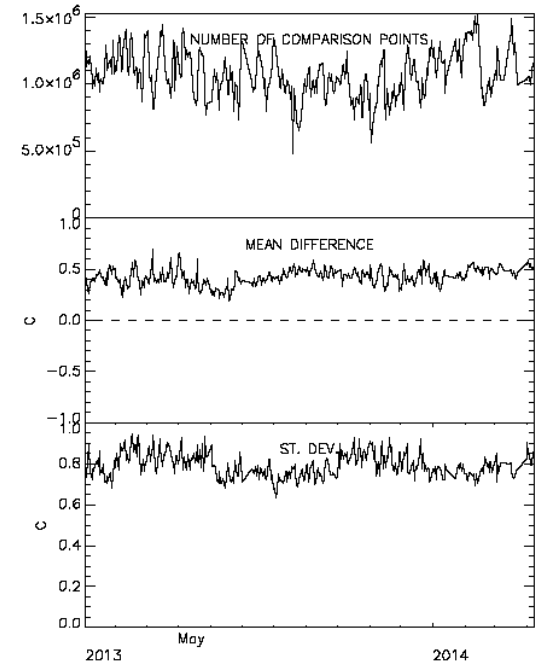
Overall mean T108 sim - obs= 0.30 C



12.0 μm

diff_t120

Overall mean T120 sim - obs= 0.43 C

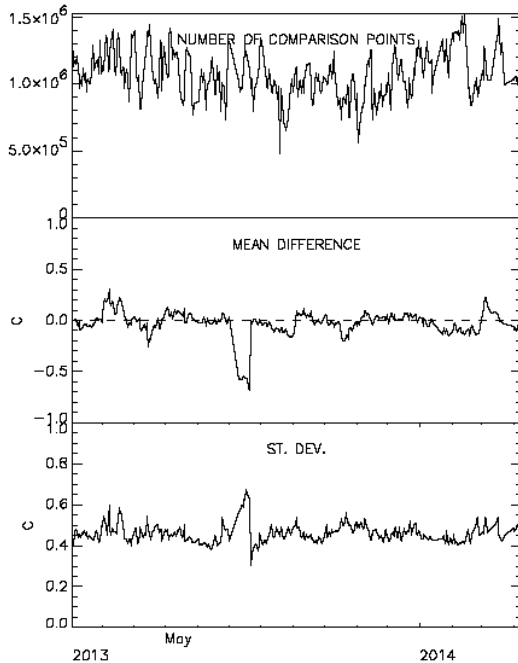


BT adjustment ?? METEOSAT 10

3.9 μm

diff_cort39

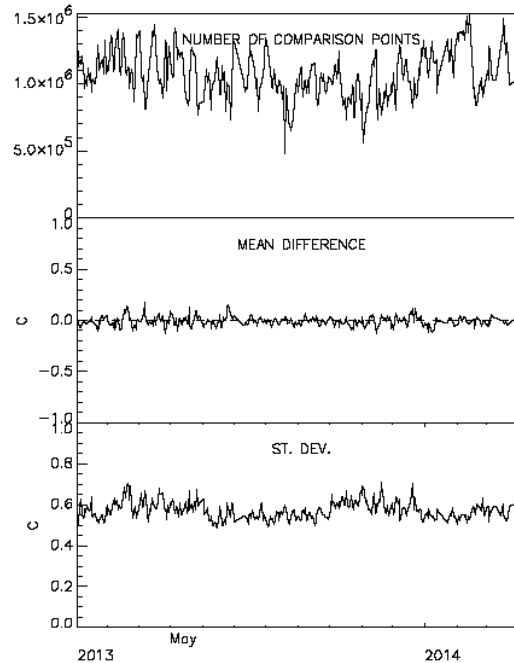
Overall mean T39 cor sim - obs = -0.02 C



10.8 μm

diff_cort108

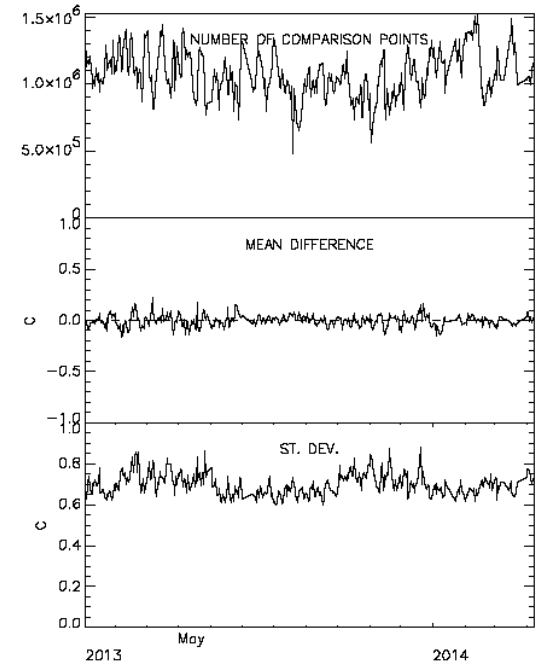
Overall mean T108 cor sim - obs = -0.01 C



12.0 μm

diff_cort120

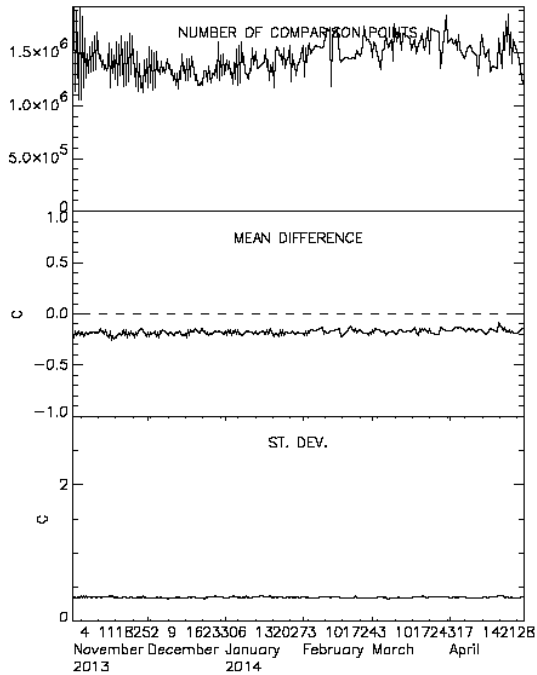
Overall mean T120 cor sim - obs = -0.00 C



BT adjustment ?? METOP-B

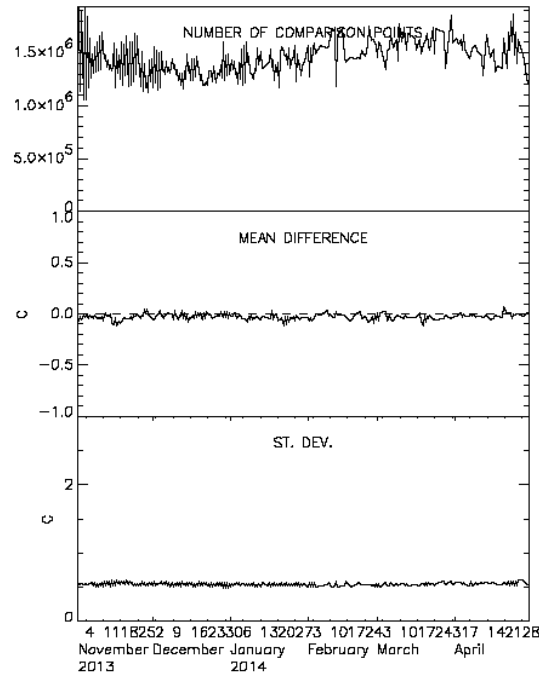
3.7 μm

t37: simulations-observations
Overall mean T37 difference= -0.18 C



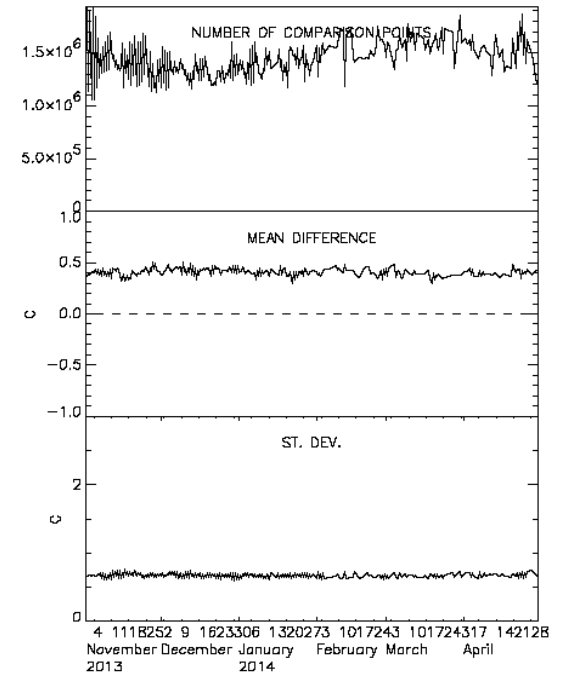
10.8 μm

t108: simulations-observations
Overall mean T108 difference= -0.03 C



12.0 μm

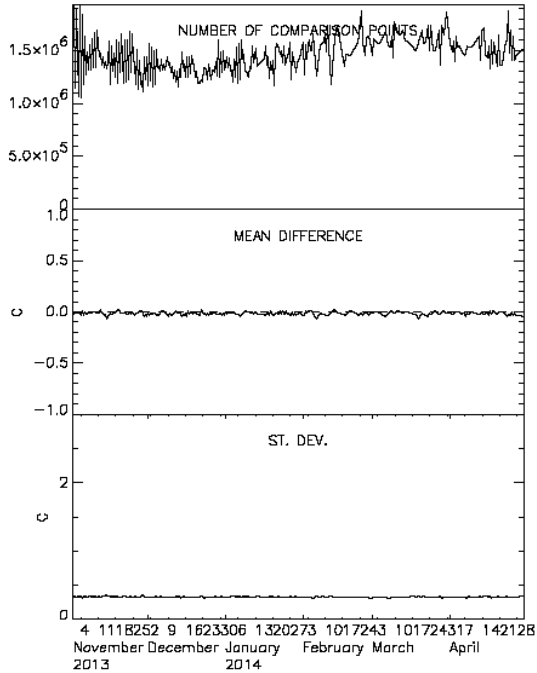
t120: simulations-observations
Overall mean T120 difference= 0.41 C



BT adjustment ?? METOP-B

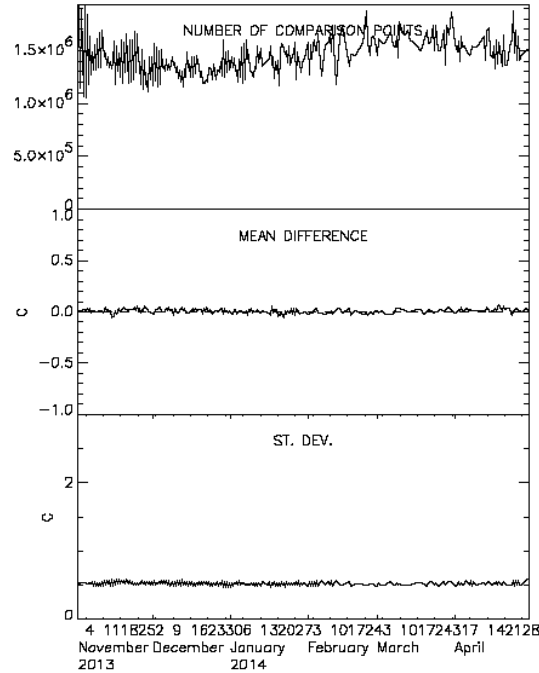
3.7 μm

t37: adj. simulations-observations
Overall mean adj. T37 difference= -0.02 C



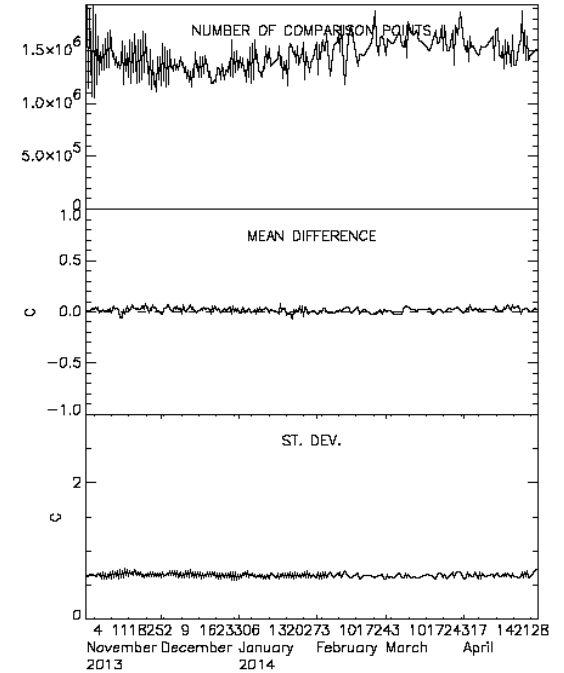
10.8 μm

t108: adj. simulations-observations
Overall mean adj. T108 difference= 0.01 C



12.0 μm

t120: adj. simulations-observations
Overall mean adj. T120 difference= 0.02 C



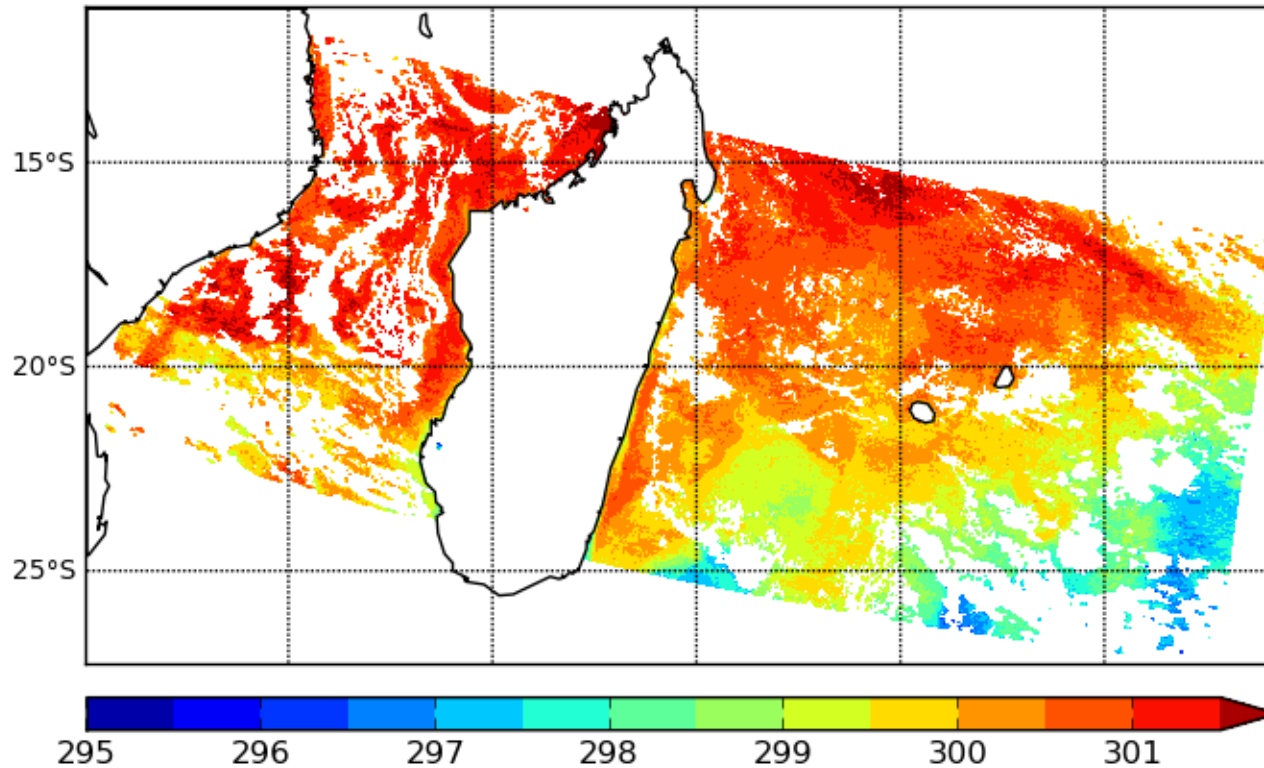
BT adjustment

- The most difficult step
- Present method at CMS is OK (Tomazic et al 2014)
- Still vulnerable to guess SST biases
- Operational implementation now allows to bias correct the guess prior to run simulations



Pre-op METOP full resolution

simmgr_metop02_20140518_055503_39318 : classic sst
nbcas:1029810 min : 285.210 maxi : 305.470 mean : 299.895



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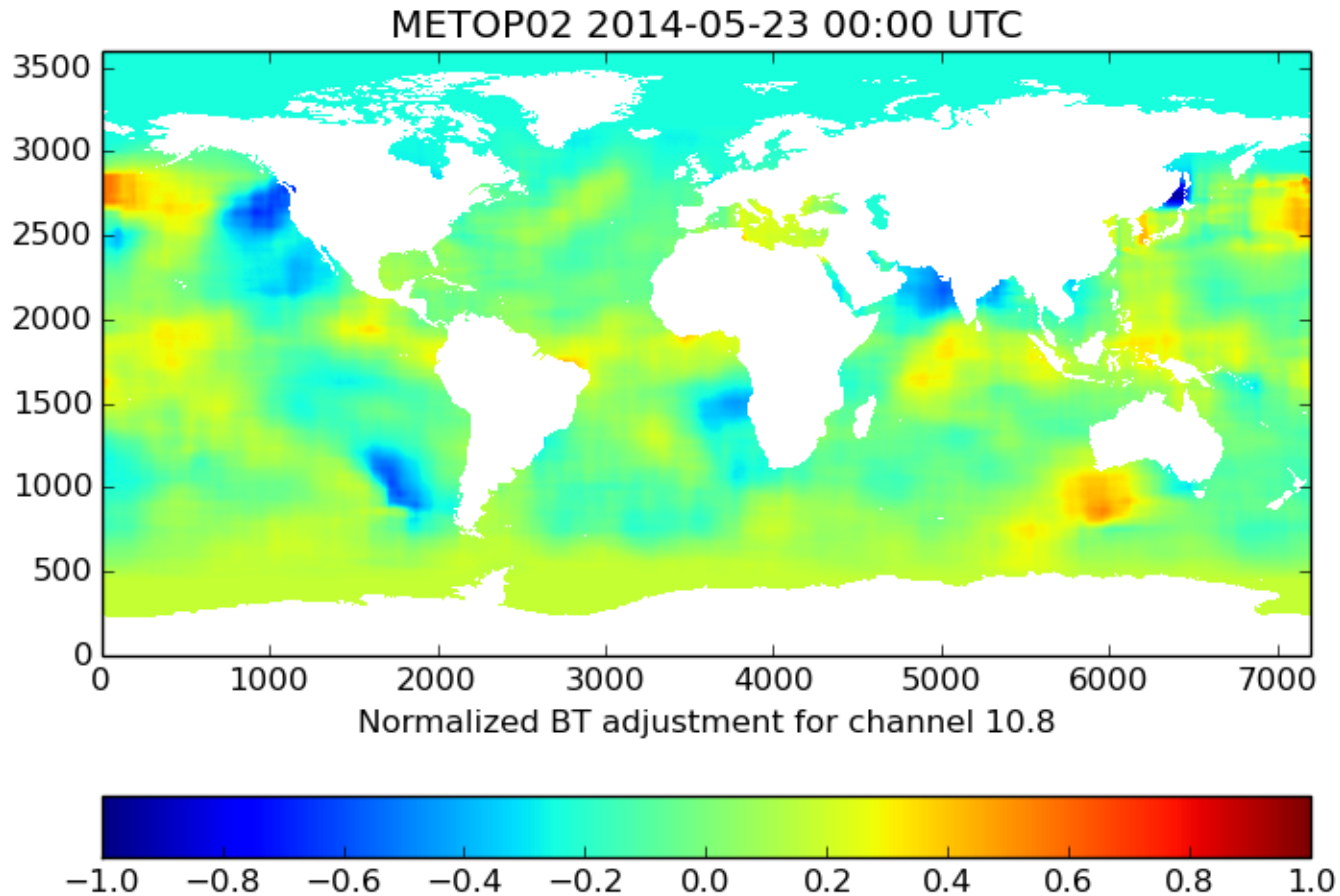
METEO FRANCE
Toujours un temps d'avance

09/06/2014



METEO FRANCE
Toujours un temps d'avance

Pre-op METOP: normalized BT adjustment



Conclusion

- Regional bias correction has been used operationnally for MSG and GOES-E since 2011 with the expected results
- Prototype METOP-A and METOP-B results are OK
- A full resolution AVHRR chain is now running in pre-op mode
- Guess SST potential biases have been taken into account
- Further work: Stephane.sauxpicart@meteo.fr

