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Using ACSPO VIIRS data in CMC SST analyses

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Introduction

- In 2016 CMC run 2 SST analyses using Suomi-NPP VIIRS retrievals:
  - 0.2° analysis assimilating 3 AVHRR, VIIRS and AMSR2 (v2)
  - 0.1° analysis assimilating 4 AVHRR, VIIRS and AMSR2 (v3)
- Both analyses assimilate in situ observations (ships, drifting buoys and moored buoys) and ice data
- SST analysis refers to a depth temperature (foundation SST) without diurnal variability
- CMC SST analyses were available on PO.DAAC

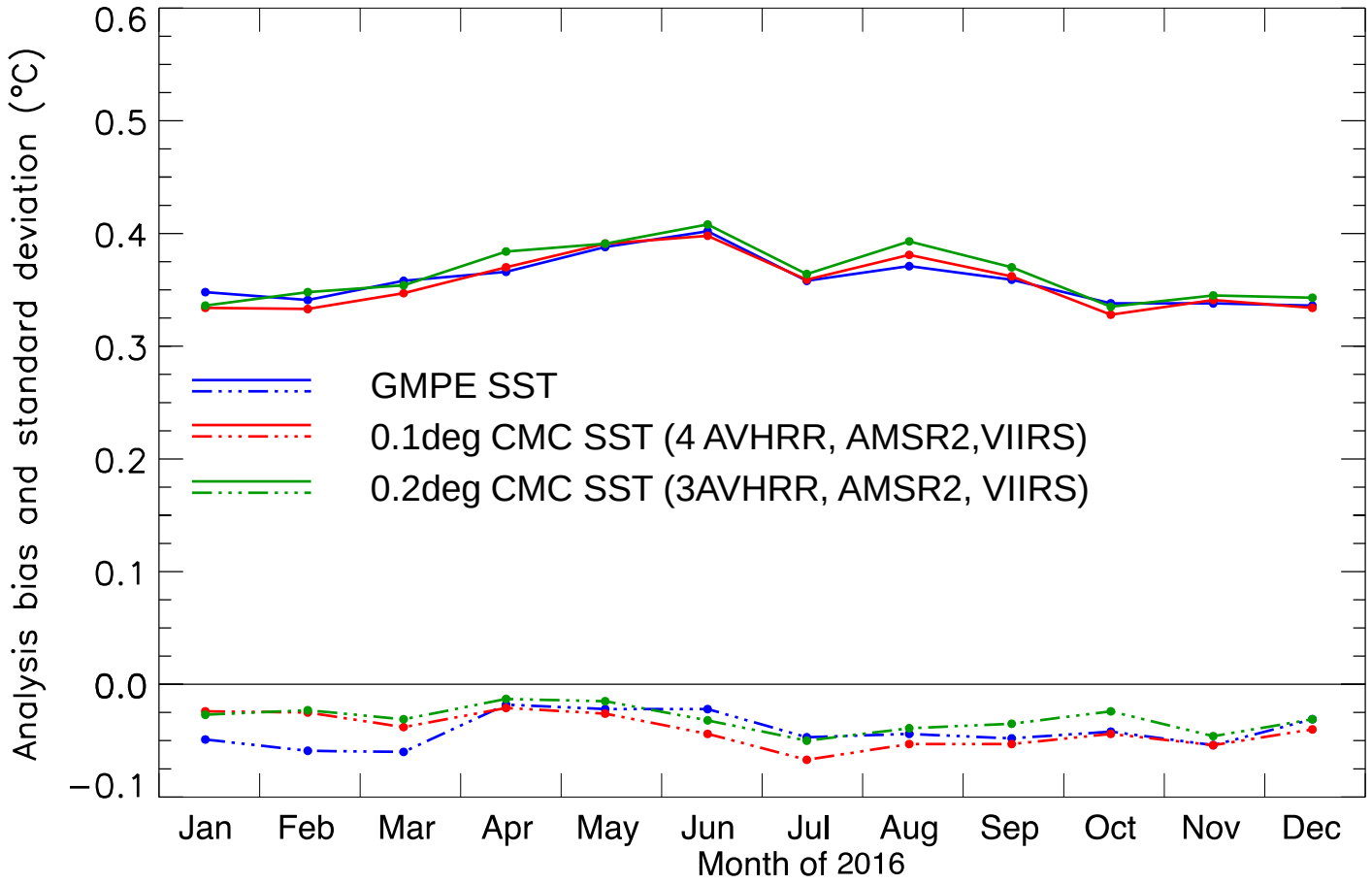
VIIRS SST Product

- VIIRS dataset used in SST products is produced by NOAA/NESDIS using Advanced Clear-Sky Processor for Oceans - ACSPO (Petrenko et al. 2014)
- ACSPO VIIRS retrievals: L2P format – 21G/day – until October 2016 and L3U data (~2.4 G/day) afterwards
- No SSES bias and standard deviation from ACSPO VIIRS are used, the analysis has his own satellite bias correction algorithm.

Evaluation of CMC SST for 2016

- All verifications are done against independent measures from Argo floats
- Observations are used only if they are between 3 m and 5 m and within four standard deviations of the climatology

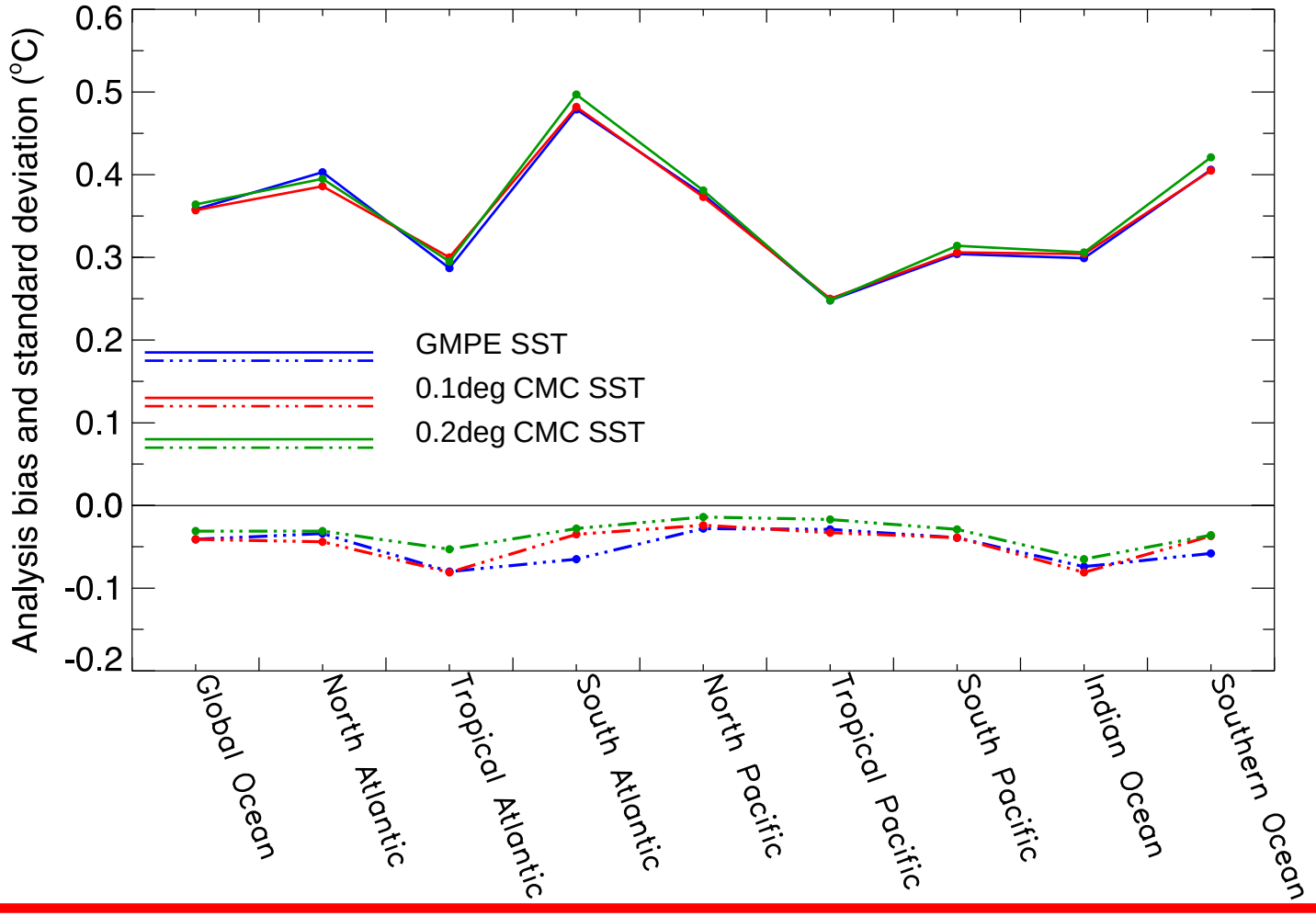
Performance of CMC SST



The 0.1deg analysis performed better than 0.2 deg. analysis in 2016.

GMPE product improved in April 2016 (VIIRS used in OSTIA?)

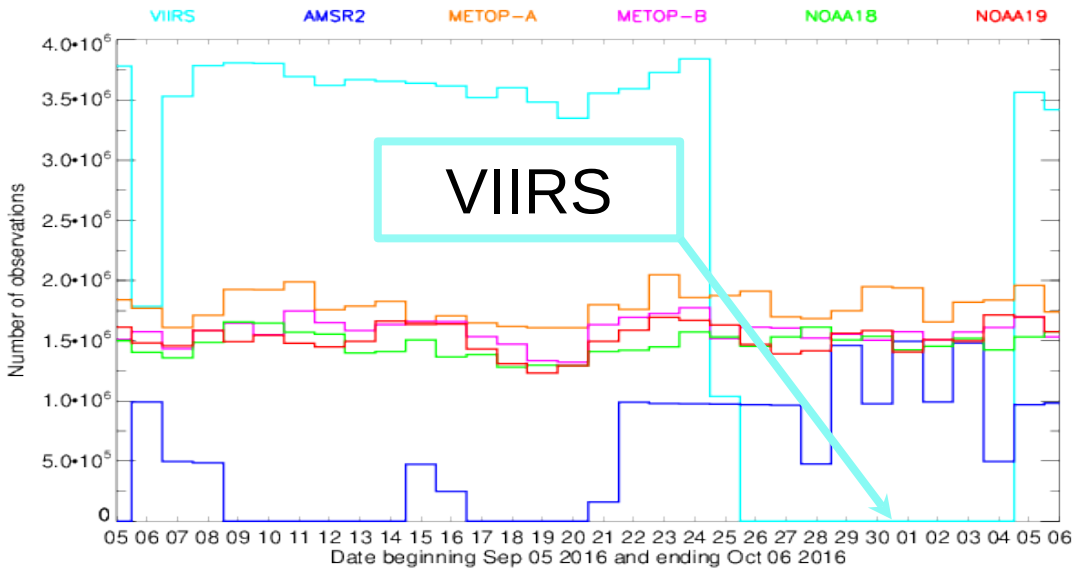
Performance of CMC SST



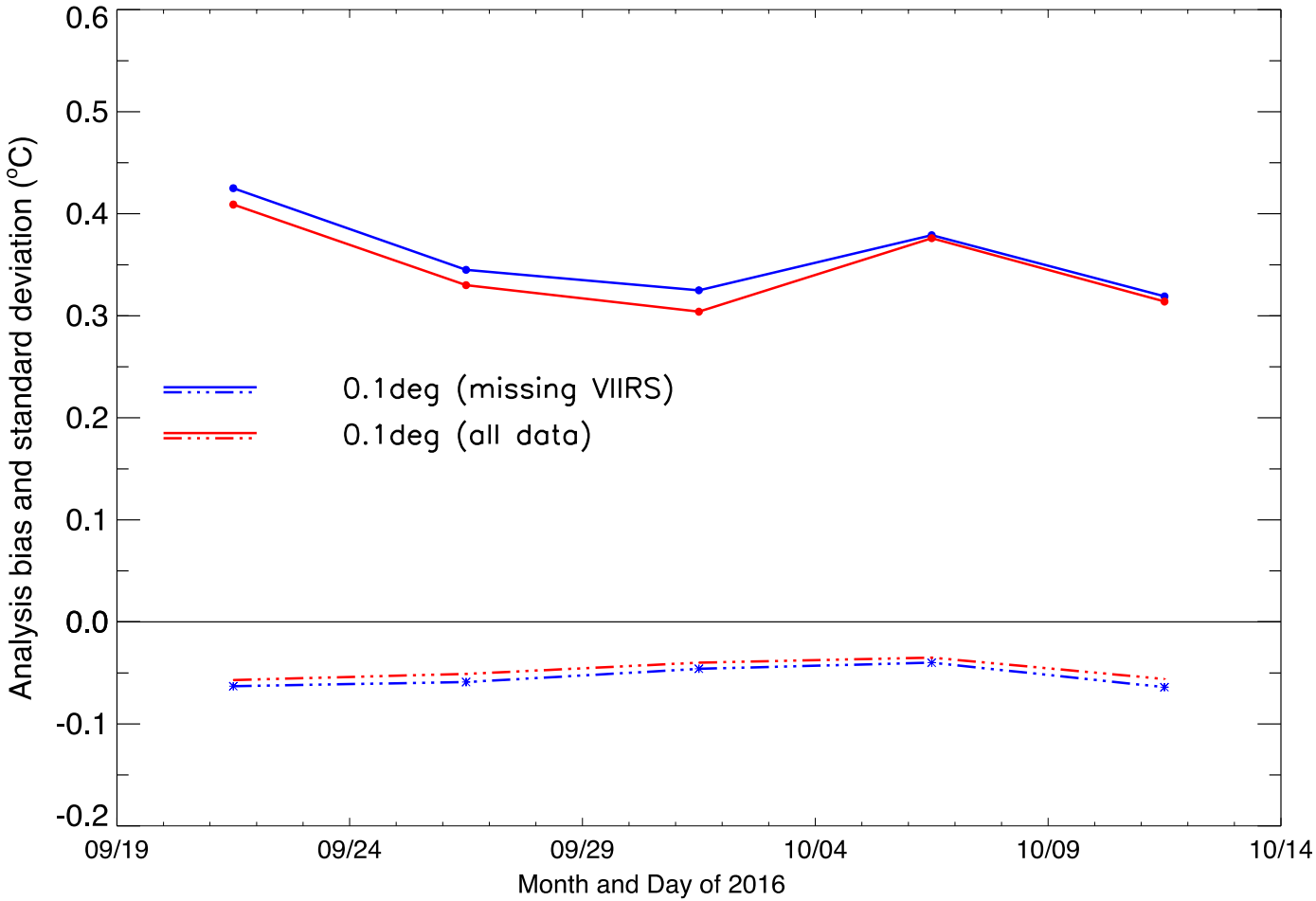
In 2016 GMPE product used 0.2deg CMC SST but not 0.1deg CMC SST

ACSPO VIIRS from PO.DAAC

- NOAA/NESDIS provided VIIRS 2.40 L2P and L3U format
- CMC SST analyses had used ACSPO VIIRS in L2P format since 2014.
- From 26 Sept. to 4 Oct. 2016 data feed for ACSPO VIIRS L2P from PO.DAAC had been interrupted

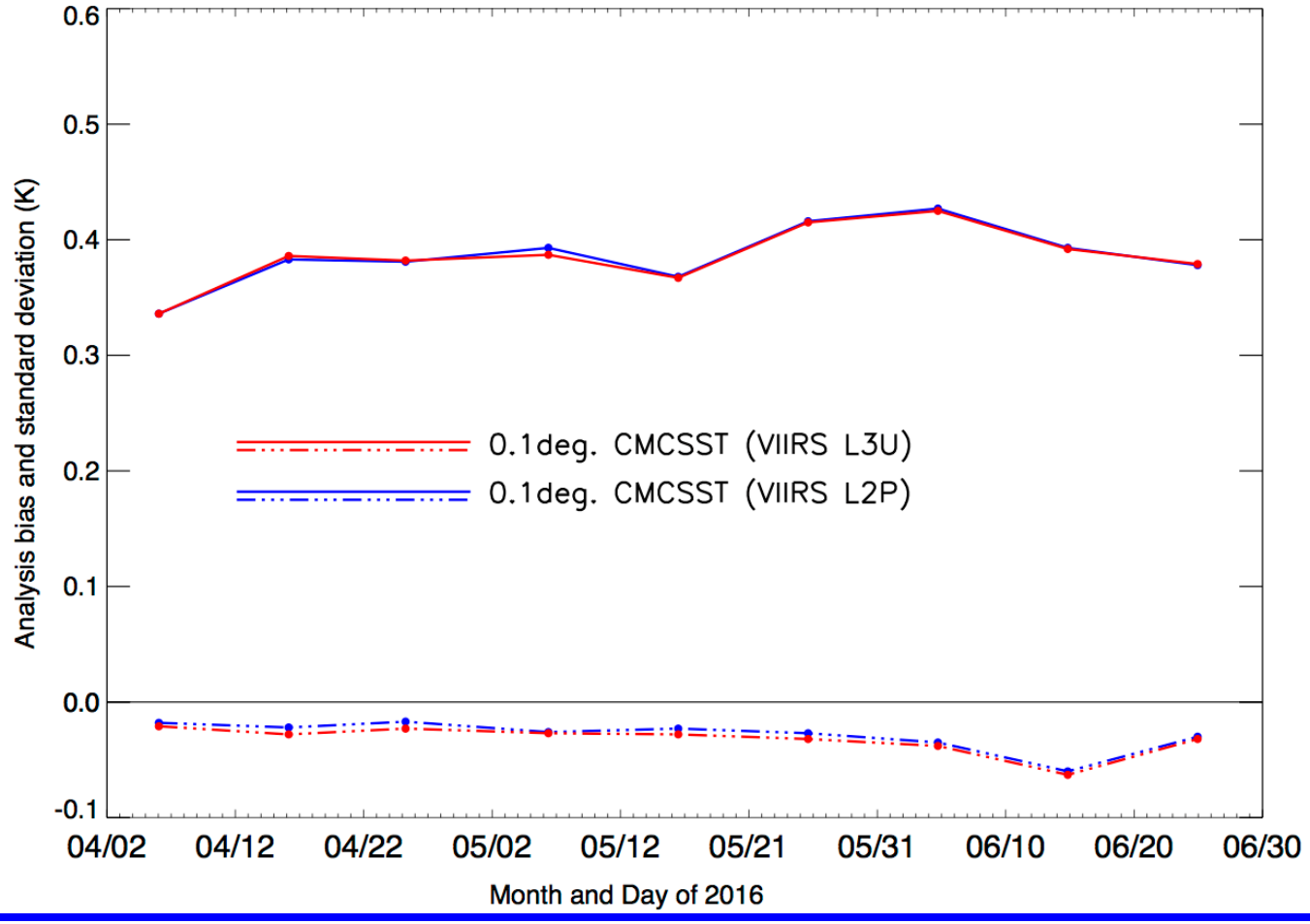


ACSPO VIIRS from PO.DAAC



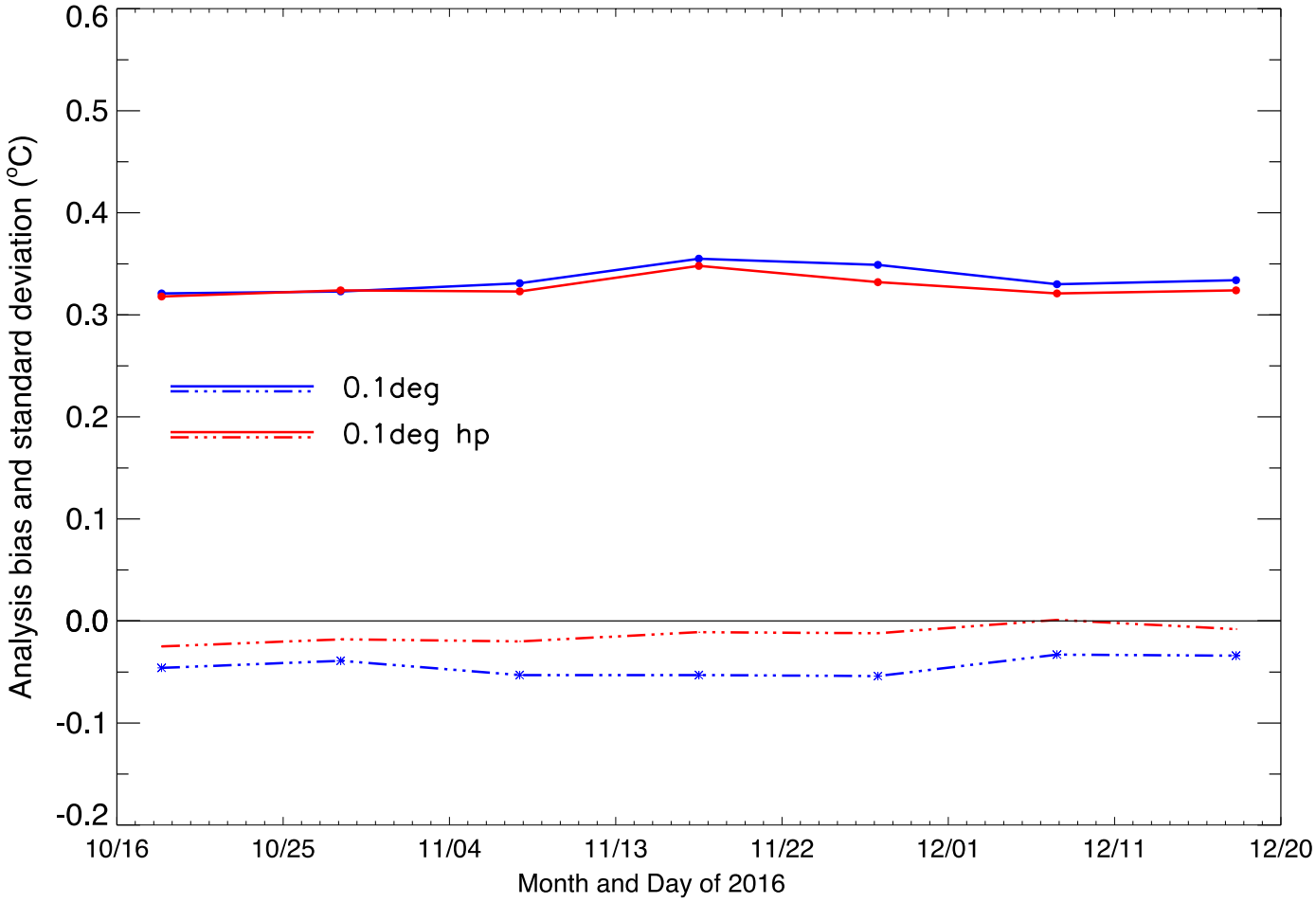
Without VIIRS data CMC SST has larger standard deviation compared to ARGO; VIIRS L3U have been used after Oct.4

ACSPO VIIRS 2.40 L2P vs L3U



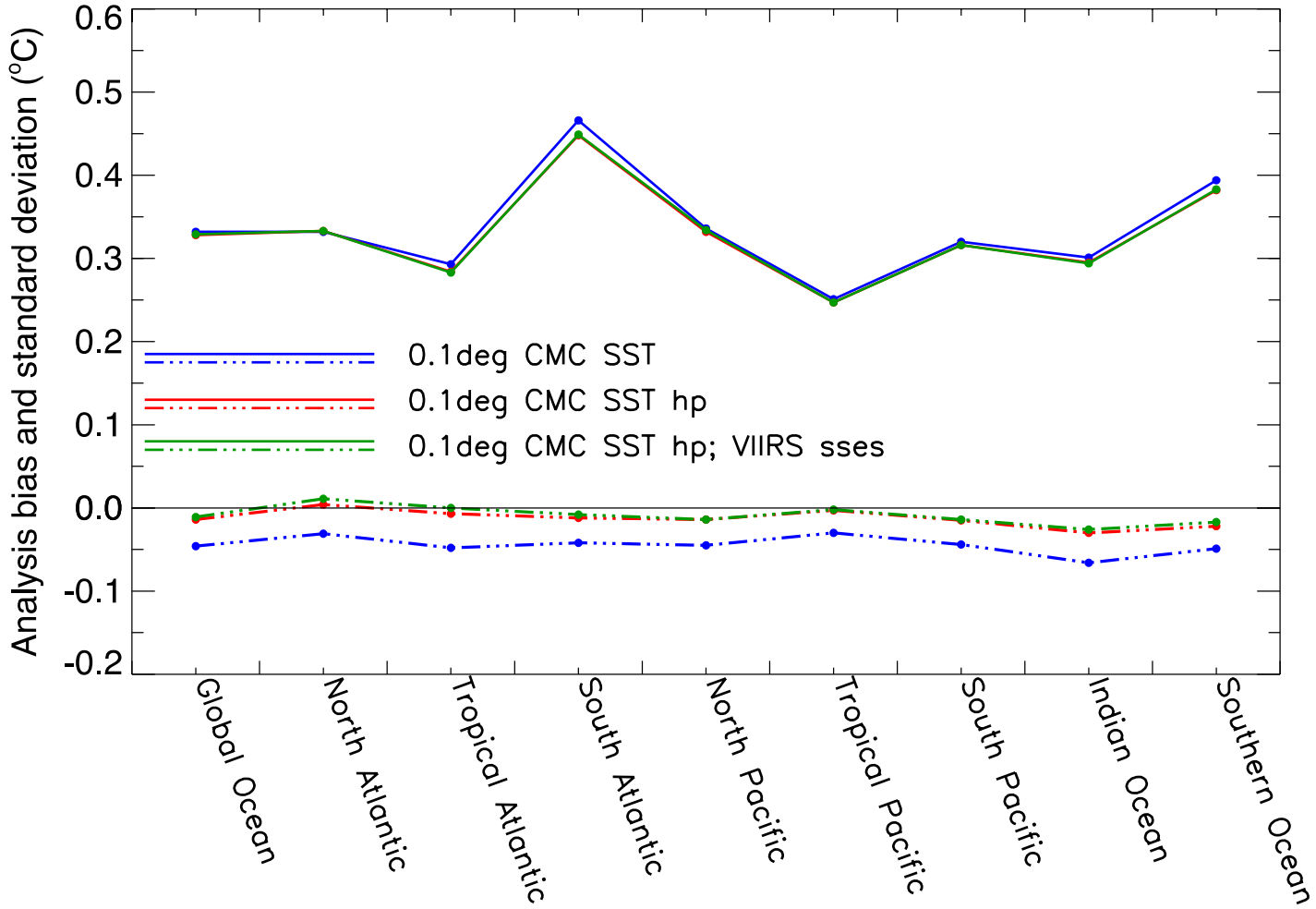
Similar performance for 0.1 deg. CMC SST when VIIRS ACSPO in L3U format are used

Changes in CMC SST in 2016



Smaller bias and standard deviation when using observational data with higher precision (two decimals instead of one decimal)

ACSPO VIIRS 2.40 L3U with SSES



Using SSES only for ACSPO VIIRS L3U has very small impact in the analysis bias

Conclusions and future plans

- CMC SST analyses continue to perform well in 2016
- As 0.1 deg. CMC SST has better performance than 0.2 deg. CMC SST (v2) and is an operational product, 0.2 deg. analysis using VIIRS has been discontinued in March 2017
- At this moment no CMC SST is used in GMPE, 0.1 deg. analysis to be introduced soon
- Using VIIRS L3U data does not affect the quality of the analysis and the data are easier to handle (2.4G/day compare to 21G/day)
- A new version of 0.1 deg. CMC SST using higher precision for the observational data and an improved ice analysis will be implemented early in 2018
- This new version will be reprocessed for the last 5 years (at the beginning) and the data will be made available early in 2018.