

Sea surface temperature and sea ice concentration consistency in the Arctic

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1. Introduction

The ESA CCI project has funded several projects in the recent years where climate data records (CDRs) have been generated. The work presented here has been carried out within the ESA SICCI and the C3S_3012b_Lot1 Arctic Reanalysis project and analyze the consistency between the ESA CCI Sea Surface Temperature (SST) and Sea Ice Concentration (SIC) CDRs in the Arctic region, in order to improve the products themselves and to facilitate the integration into atmospheric and ocean-sea ice models. To aid the analysis, the SST level 4 product from the Canadian Meteorological Center (CMC) and SIC from the EUMETSAT OSI-SAF reanalysis have also been included. The study presented here covers the SST and SIC consistency in the Greenland waters, but the final analysis will be extended to the Arctic and Antarctic regions.

2. Climate data records

- **Sea Surface Temperature:**
 - ESA SST CCI Global SST and SIC (Spat. Res.: 0.05 deg.)
 - CMC: Global SST and SIC, Canadian Meteorological Center (Spat. Res.: 0.2 deg.)
- **Sea Ice**
 - ESA SICCI: Global reprocessed SIC from AMSR, ESA CCI SI (Spat. res.: 25 km)
 - OSISAF v1: Global reprocessed SIC from SSMI(S), OSI-SAF Version 1 (Spat. Res.: 10 km)
 - OSISAF v2: Global reprocessed SIC from SSMI(S), OSI-SAF Version 2 (Spat. Res.: 10 km)

All data products have been regridded to the 0.05 deg. grid used for the ESA SST CCI product

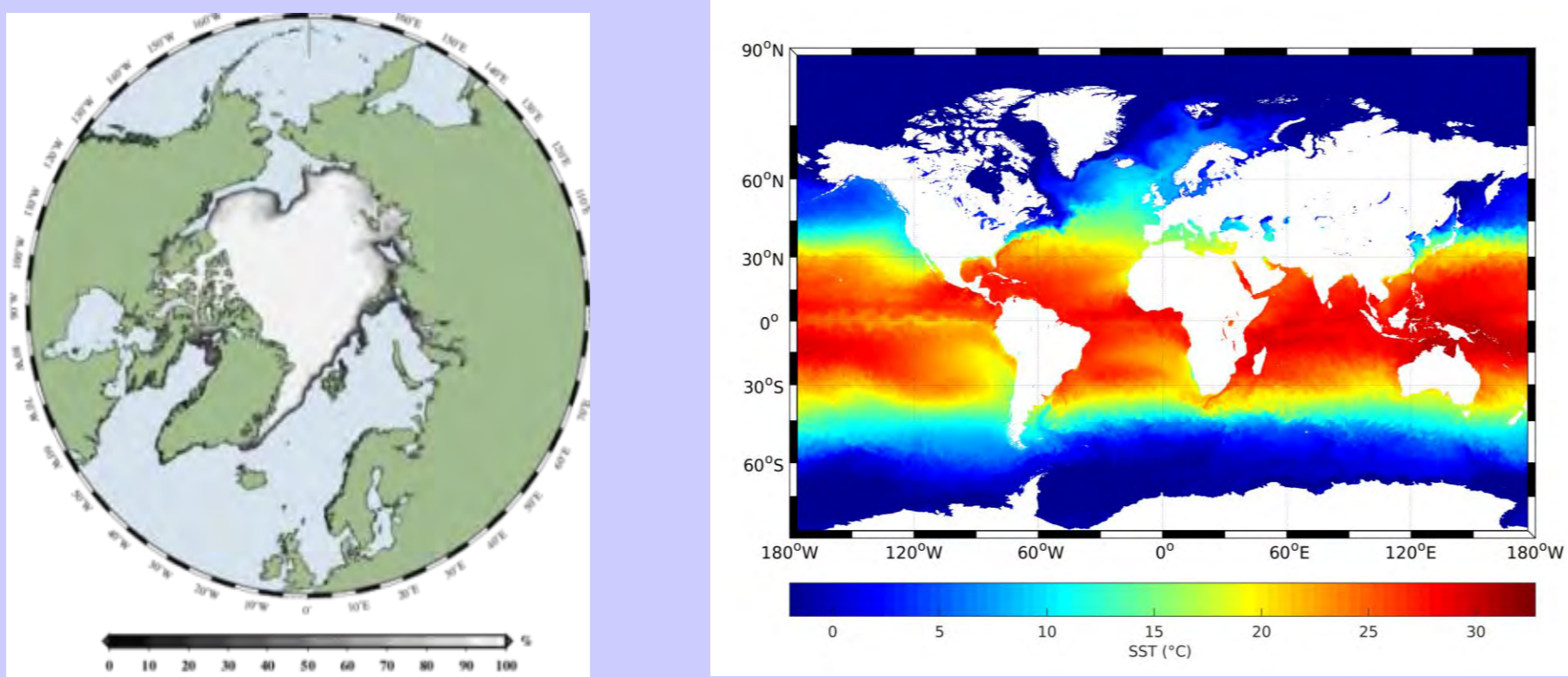


Figure 1: Example of SIC (left) and SST (right) products

3. Sea Ice Concentration inter-comparison

The different satellite products are based on different satellite observations, where the ESA SICCI has a better spatial resolution.

Figure 2: Monthly mean OSISAFv2 SIC and ESA SICCI for 2002-2016

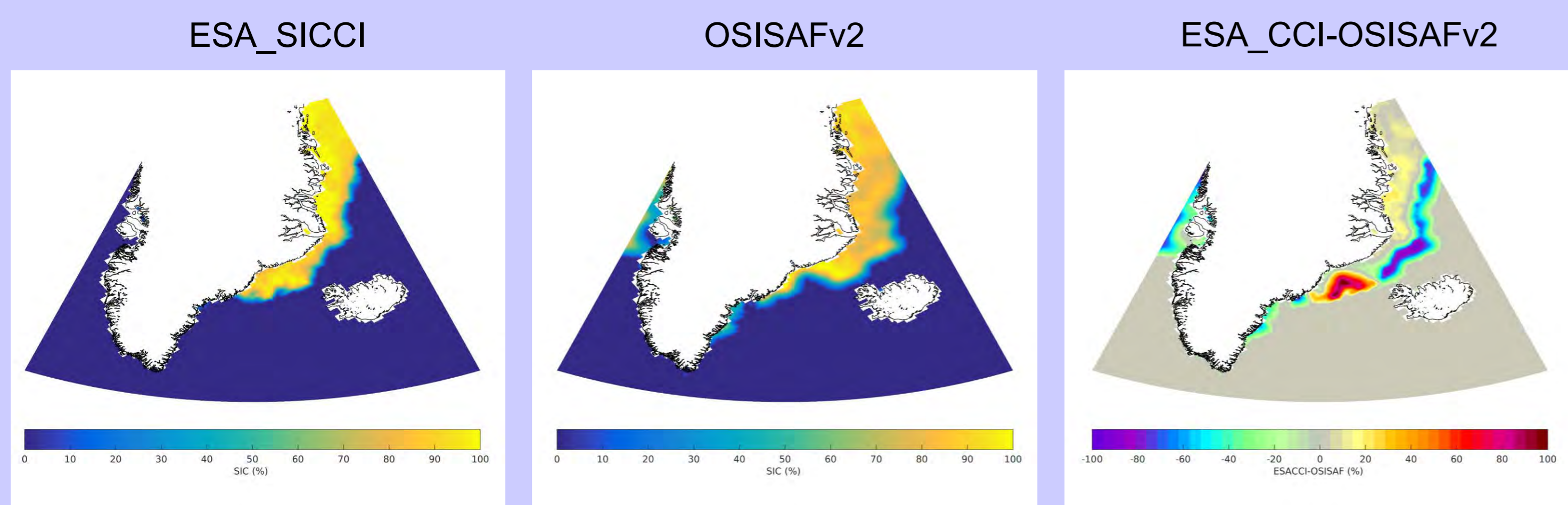
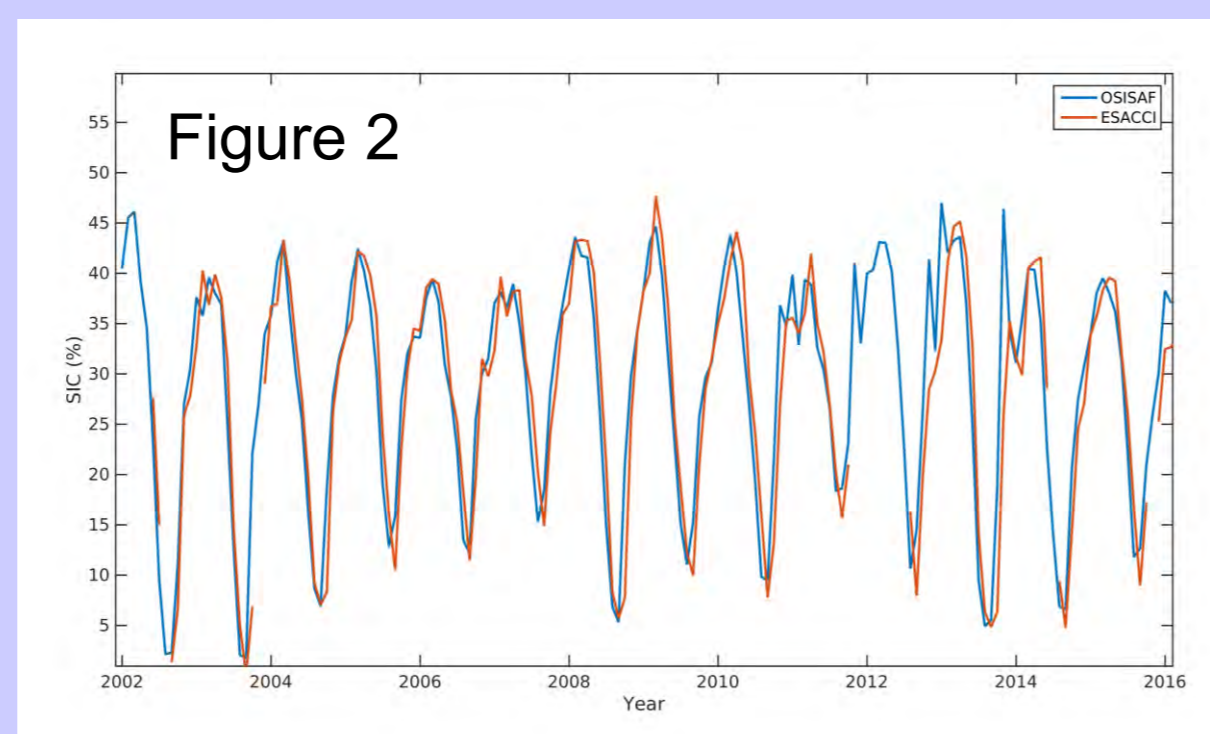


Figure 3: Monthly mean SIC January 2011 for (a) ESA_SICCI (b) OSISAFv2 and the SIC difference (c).

6. Conclusions

- Two SST and SIC CDRs have been analyzed here.
- The ESA SICCI (from AMSR) show better spatial resolution than the EUMETSAT OSI-SAF SIC CDR.
- ESA SST CCI monthly averages are colder during winter and warmer during summer, compared to CMC.
- Largest SST and SIC discrepancies are found in the marginal ice zone.
- The SICCI product has the lowest number of coinciding grid points with SIC > 15 % and SST > 3°C, both when compared against ESA SST CCI and CMC SSTs.

4. Sea surface temperature inter-comparison

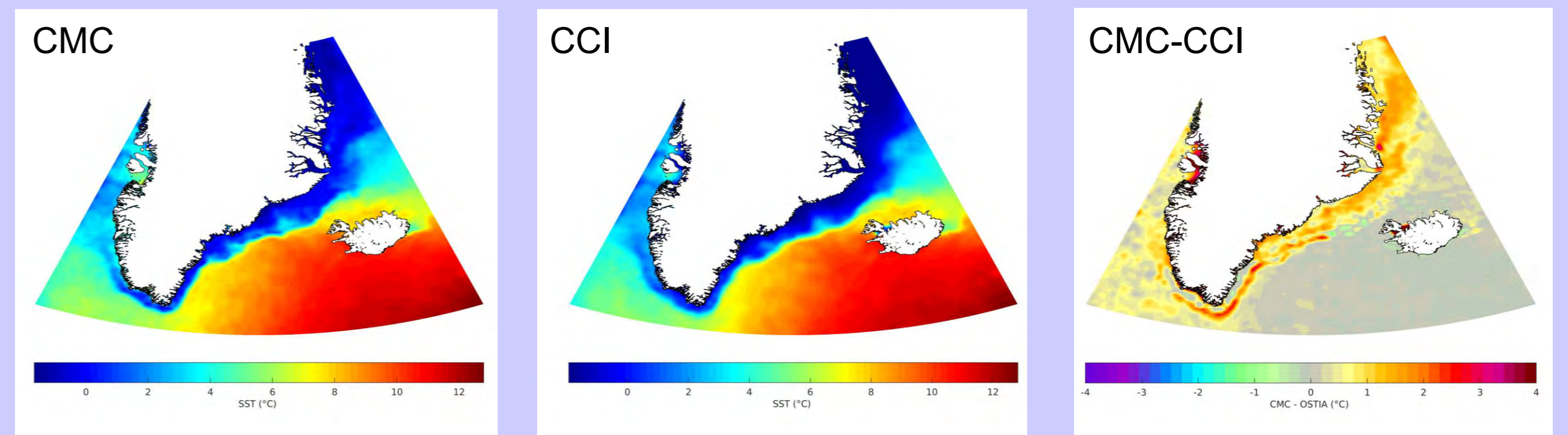


Figure 4: Monthly mean SST June 2008 from (a) CMC (b) CCI and the SST difference (c).

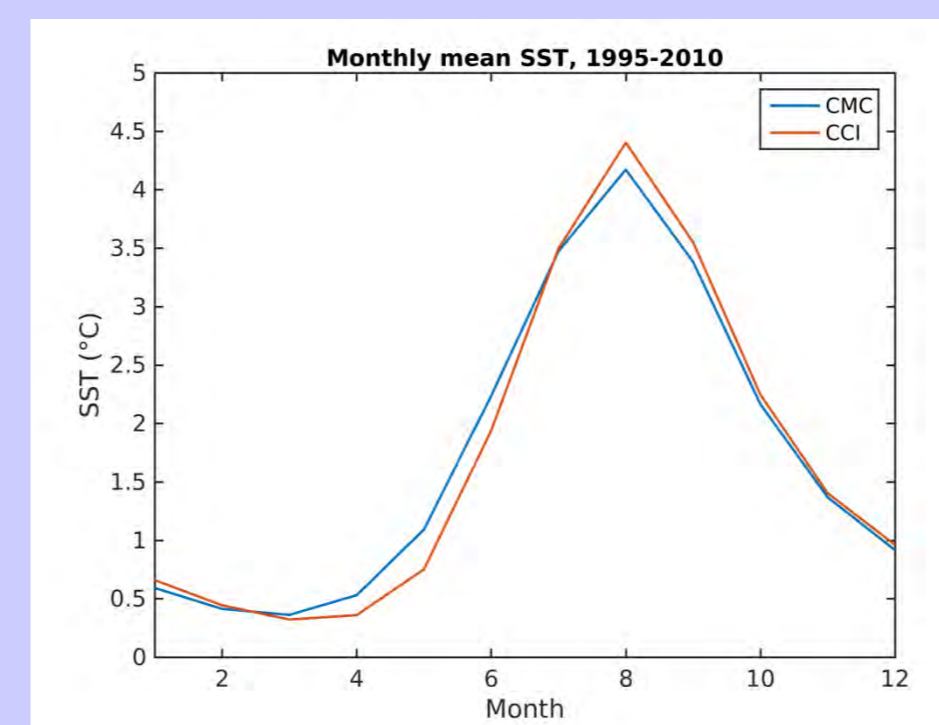


Figure 5: Monthly mean SST from CMC and CCI averaged for years 1995-2010.

5. SST and SIC consistency

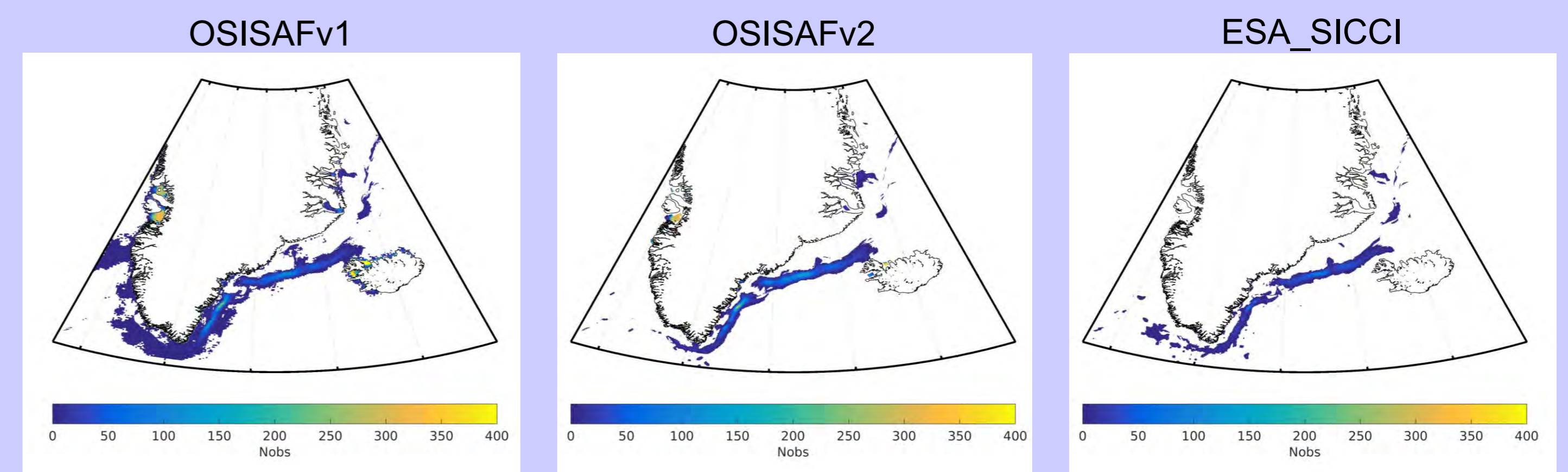


Figure 6: Number of observations with coincident CCI SST > 3°C and SIC > 15 % for (a) OSISAFv1, (b) OSISAFv2 (c) SICCI in the period 2007-2009.

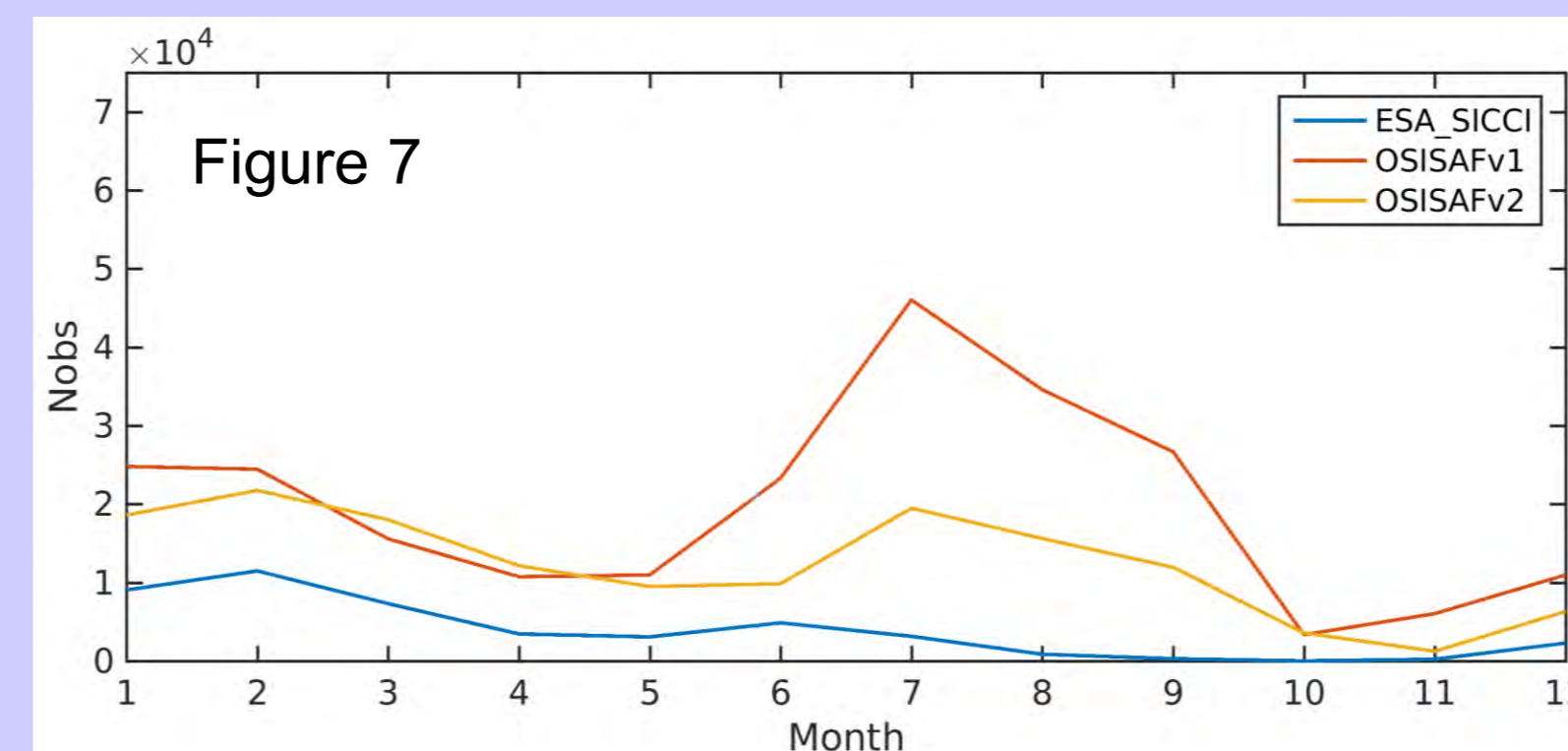


Figure 7: Number of observations with coincident CCI SST > 3°C and SIC > 15 % summed for each month and averaged for the years 2007-2009.

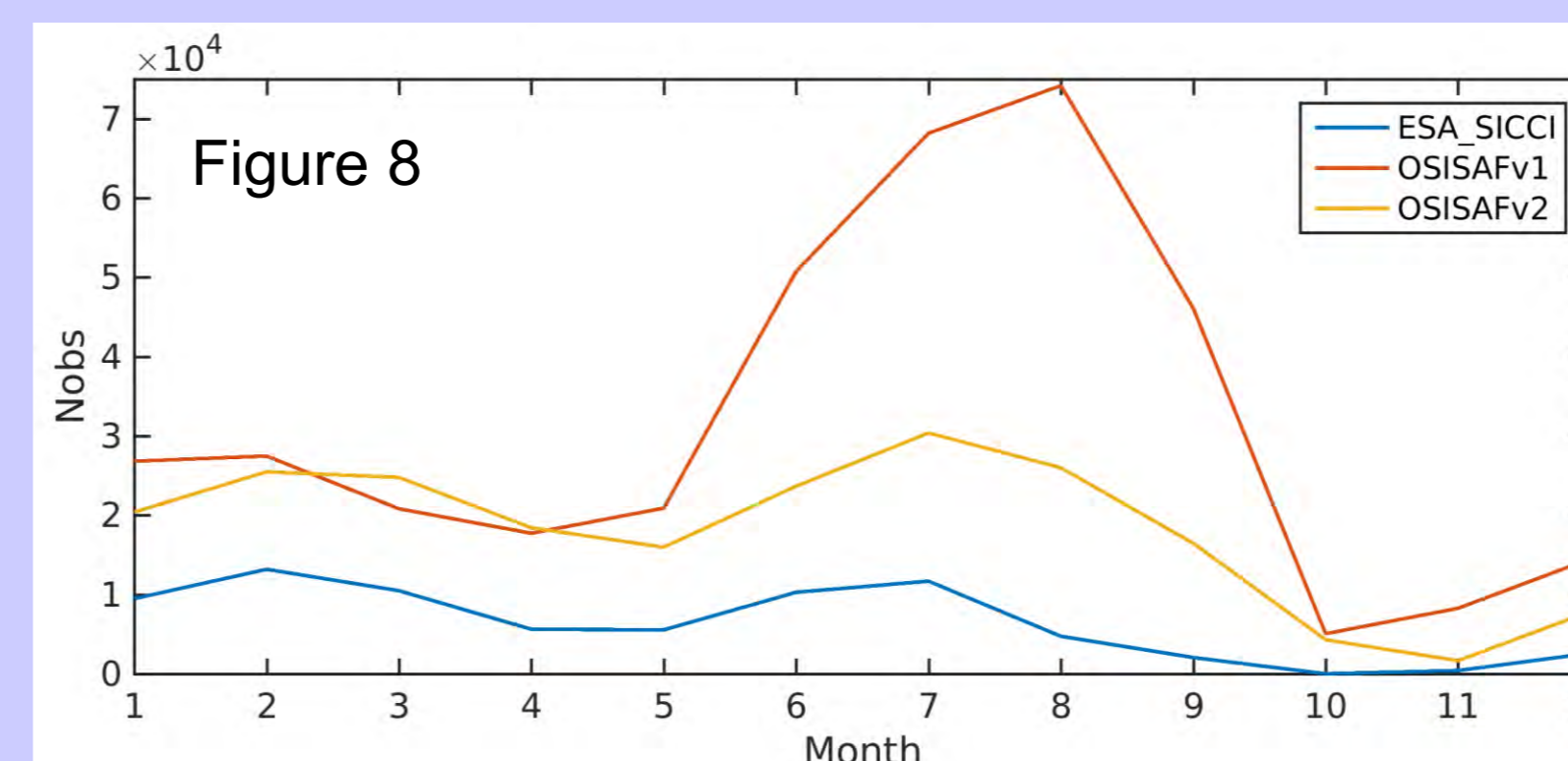


Figure 8: Same as Figure 7 but for CMC SST.

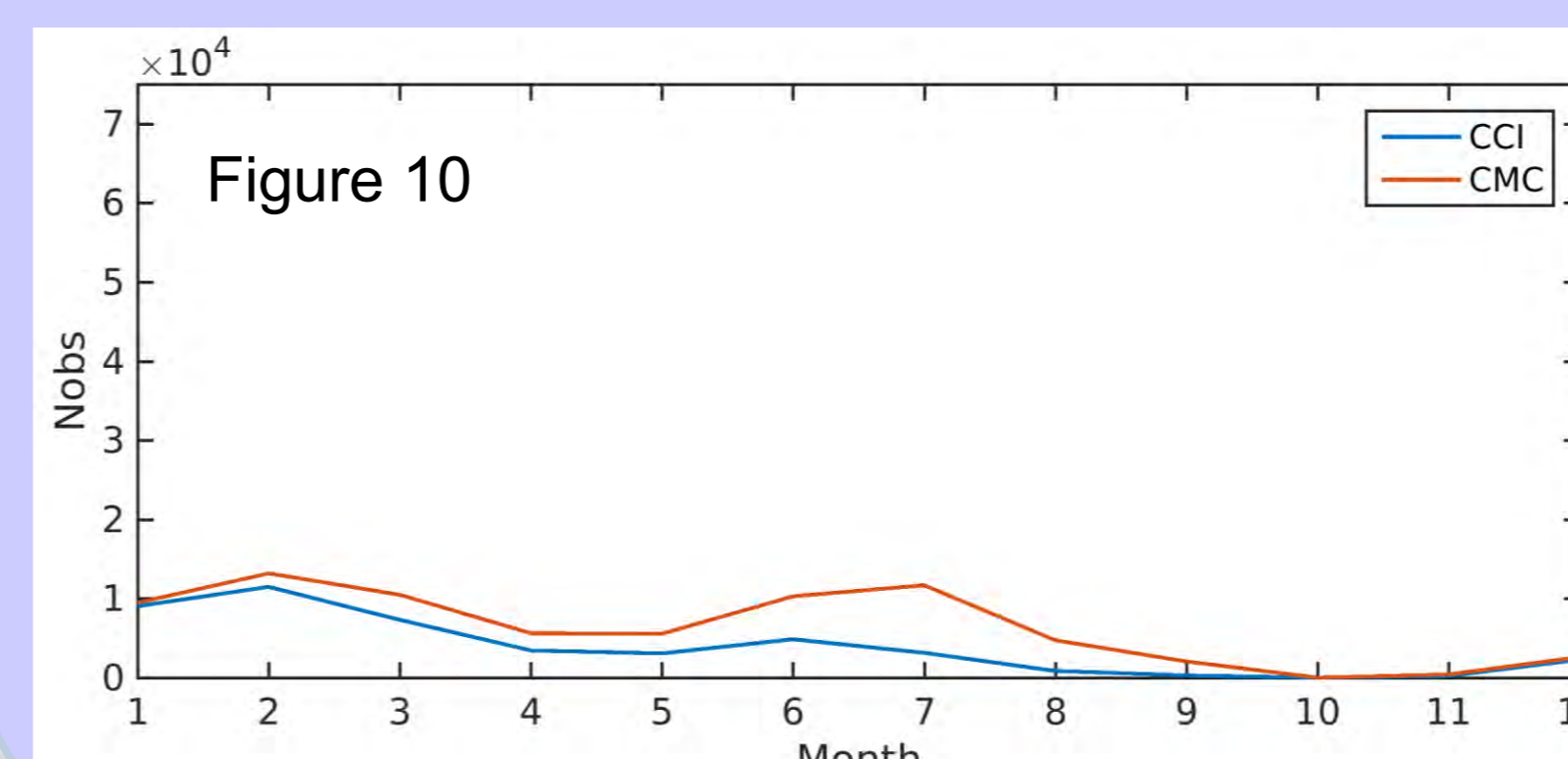


Figure 9: Same as Figure 6c but with CMC SST instead of CCI SST.

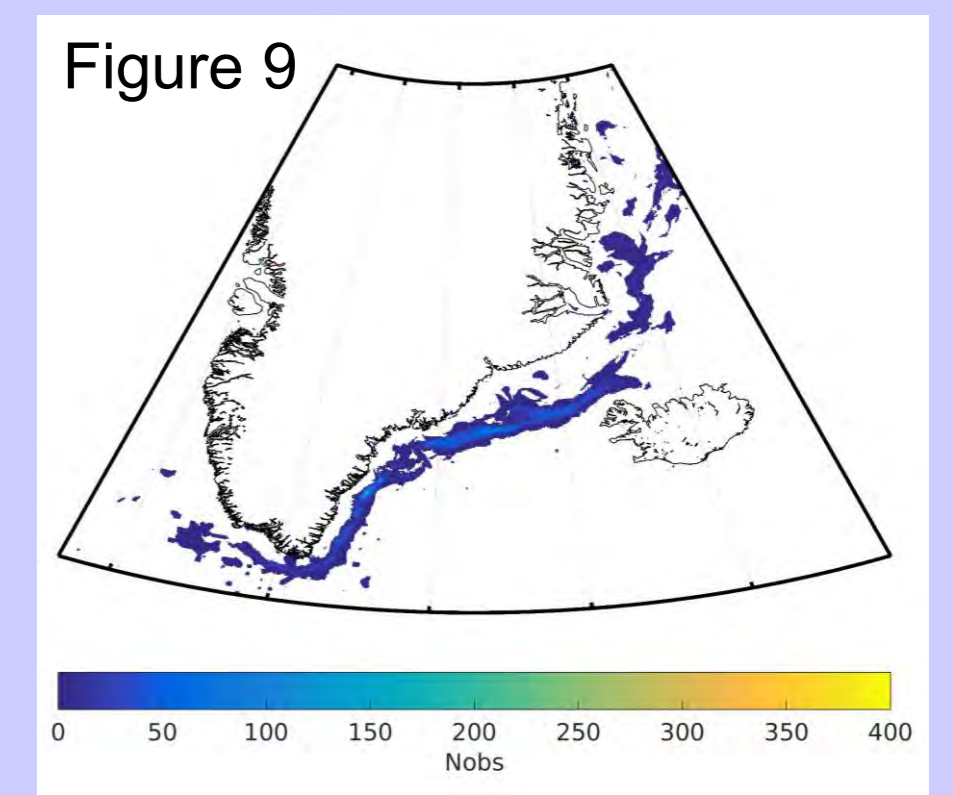


Figure 10: Number of observations with coincident ESA_SICCI > 15% and SST > 3°C summed for each month and averaged for the years 2007-2009.

Acknowledgements

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