Evaluation and intercomparison of GHRSST products at a global scale

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Motivation

Sea Surface Temperature (SST) plays an **important role** in the **production** of **satellite** based **Sea Surface Salinity** (SSS) observations. On the one hand, it is used as an **auxiliary parameter** for **SSS retrieval** from brightness temperature to produce **L2** dataset. On the other hand, it is used as a **template** to **increase spatial resolution** using multifractal fusion techniques (**L4** product).

Traditionally, Soil Moisture and Ocean Salinity (SMOS) **SSS datasets produced** at the **Barcelona Expert Center** (BEC) were **based on OSTIA SST** product. In this work, we **revisit** this **election** and **assess** different sources of **satellite-derived SST products**. The assessment consists of:

a) comparison with in situ data (ARGO floats)

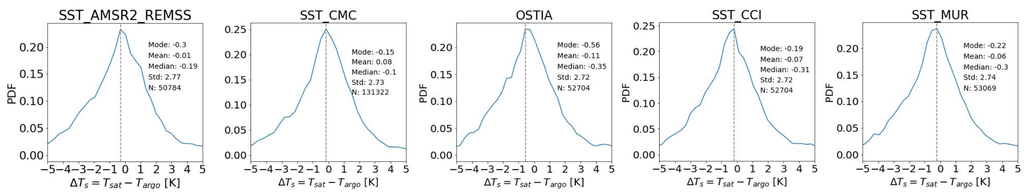
b) spectral analysis to assess the effective spatial resolution of each SST product.

c) singularity analysis to provide a measure of the intensity of SST fronts.

Data

Dataset	Spatial resolution	Nlat	Nlon	Sensor	Ref.
AMSR2-REMSS	0.25ºx 0.25º	720	1440	AMSR2	[1]
CMC	0,1ºx 0,1º	1801	3600	VIIRS,AVHRR_GAC, AMSR2	[2]
OSTIA	0.05º x 0.05º	3600	7200	AVHRR, VIIRS, AMSR2, GOES_IMAGER, SEVIRI, SSMIS, SSM/I	[3]
CCI	0.05º x 0.05º	3600	7200	ATSR, AATSR, AVHRR_GAC	[4]
MUR	0,01ºx 0,01º	17999	36000	AMSR-E, AVHRR, MODIS, SSM/I, VIIRS, in-situ	[5]
Period	daily maps for 2016				

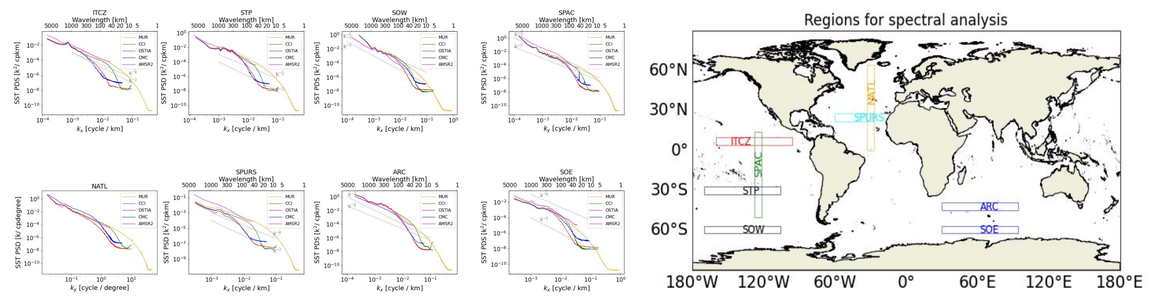
Comparison with In situ (ARGO)



Probability density function (PDF) of the satellite minus ARGO SST differences using shallowest observation between 3m and 5m depth. (all match up considered nighttime and diurnal)

- PDF with higher standard deviations than the reported by literature [6], probably due to different filtering criteria when comparing to insitu.
- Further work is foreseen to re-evaluate the PDF of the satellite minus ARGO SST differences using only nighttime ARGO observations

Spectral analysis

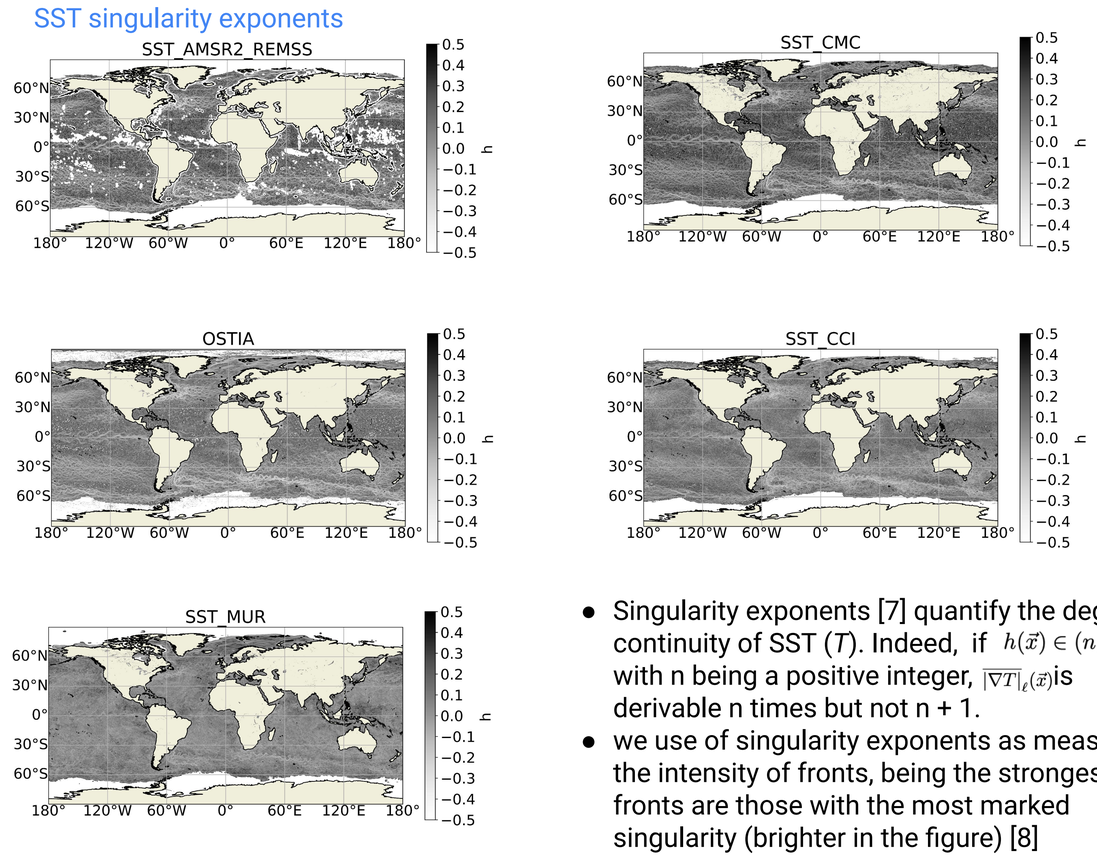


- The effective spatial resolution can be estimated as the spatial scale where the Power Spectrum departs from the expected power-law behaviour.
- In general, CCI and MUR have higher effective spatial resolution. At higher latitude regions (SOW, SOE), AMSR2 has higher effective spatial resolution.

Higher resolution grid does not imply higher effective spatial resolution

Singularity analysis

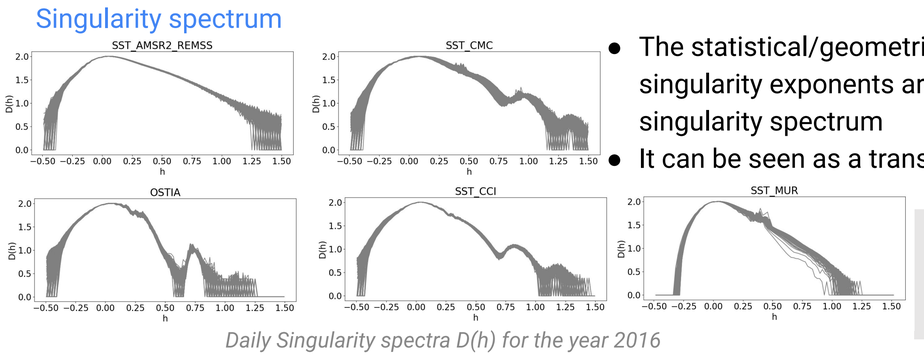
SST singularity exponents



- Singularity exponents [7] quantify the degree of continuity of SST (*T*). Indeed, if $h(\vec{x}) \in (n, n+1)$ with n being a positive integer, $\overline{|\nabla T|}_\ell(\vec{x})$is derivable n times but not n + 1.
- we use of singularity exponents as measure for the intensity of fronts, being the strongest fronts are those with the most marked singularity (brighter in the figure) [8]

Singularity exponents h(x) for the SST image corresponding to the 29th September 2016

Singularity spectrum



- The statistical/geometrical properties of singularity exponents are given by the singularity spectrum
- It can be seen as a transformed PDF of h(x)

AMSR2_REMSS and MUR present more realistic D(h)

Daily Singularity spectra D(h) for the year 2016

Summary and conclusions

- We have evaluated and intercompared five different GHRSST products at a global scale with the aim of selecting the best SST dataset as an auxiliary SST product in the retrieval of SMOS SSS.
- SST_CCI and SST_MUR give the best performance, and thus they could be considered as new template in the multifractal fusion scheme for generating BEC SMOS L4 SSS.

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