



# ESA Climate Change Initiative Phase-II

## Sea Surface Temperature (SST)

[www.esa-sst-cci.org](http://www.esa-sst-cci.org)

## Recap from Day 1

Authors



# Intro to SST CCI

If you want to use products, find the dataset paper by searching for this DOI 10.1002/gdj3.20/full, read it (it is short!) and go on from there

Documents available from [www.esa-sst-cci.org/PUG/documents](http://www.esa-sst-cci.org/PUG/documents)

Product User Guide

Product Validation and Intercomparison Report

Climate Assessment Report

Uncertainty Characterisation Report

User Requirements Document

... and many more ...

Aim for all SST CCI products to have a realistic uncertainty attached to every SST



# Establishing a common vocabulary

Metrologists are very clever and have solved some things for us already  
(very slowly)

Do GUM

Error is not the same thing as uncertainty

Uncertainty is not the same thing as error

Traceability = Unbroken chain of documented analyses of effects causing  
uncertainty in a measurement relative to a reference

Uncertainty arises from effects that may be random or systematic (on a  
range of spatio-temporal scales)

Obey the Law of GUM



# How uncertainties are currently presented

## In L2/L3

- |                      |                         |                          |
|----------------------|-------------------------|--------------------------|
| ○ Random             | Uncorrelated            | Noise                    |
| ○ Systematic         | Large scale correlated  | Calibration, etc         |
| ○ Locally systematic | Synoptically correlated | Retrieval ambiguity, etc |

These (above) arise from independent effects and therefore:

- |         |        |                      |
|---------|--------|----------------------|
| ○ Total | “SSES” | Sqrt(sum of squares) |
|---------|--------|----------------------|

## In L4

- |               |                  |                    |
|---------------|------------------|--------------------|
| ○ Unspecified | Analysis “error” | Interpolation, etc |
|---------------|------------------|--------------------|

## HadSST3 / HadISST2

- Ensemble of interchangeable realisations – includes systematic
- Covariance matrix of micro-errors and under-sampling errors per month – includes random



# Practical activity recommendations

Provide and illustrate use of data readers (from archive to application)

Readers should help with time variables

L4 gridded uncertainties – can't treat as uncorrelated – but what representation of co-variances would be practical?

L3C day/night rather than L3U?

Where in the L4 field was there actually contributing data? Nobs field?

PUG should explain in the full the theoretical basis for treatment of uncertainty

NetCDF4 is a concern for some users (but NCO (netcdf operators) can convert to NetCDF3)



# User presentations

Ensembles are easy to use where an established technique exists that can be fed alternative SST fields

Differences between datasets have big implications for some users

Diurnal cycle (which needs to be taken out for some climate applications) is what some users need

Some downstream users don't want uncertainty information



# Validation of uncertainty

The validation of the uncertainty information is taken as seriously as the validation of the data

Use statistics that fairly represent the main error distribution (e.g., robust)

Proposals were shown for

how to validate uncertainty estimates – are these convincing to users?

how to communicate the level of confidence in uncertainty – are maps of the sort shown useful?



# Agenda - Wednesday

Recap on what we discussed yesterday

How do other people present uncertainty information?

Propagation of uncertainty information through levels of products

Poster session #1 and #2 and general discussion (See handouts for your poster session allocation.)

Small group discussions to explore specific questions, e.g.:

- Aims: What users would like to be able to do, ignoring technical challenges
- Proposals: How do you want to receive uncertainty information?
- Future proofing: What are likely future improvements in users' technical infrastructure and methods?
- What would convince you that uncertainties provided were realistic?

Workshop dinner



# Questions for (later) breakout groups

What would participants like to be able to do with regards to uncertainty, ignoring technical challenges?

How would participants like to receive uncertainty information?

Future proofing: what are the likely future improvements in participant;s technical infrastructure and methods over the next 5 years?

What would convince participants that uncertainties provided were realistic?

