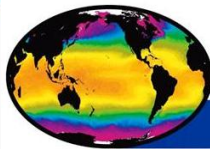




Assessment of Sea Surface Temperature Datasets for Climate Applications in SST-VC

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Sea Surface Temperature*



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**sst
cci**

SST-VC and GHRSSST

- GHRSSST Science Team
- Group for High Resolution Sea Surface Temp
 - >10 years co-operation
 - Space and Met agencies, universities, institutes ...
- Climate Data Record Technical Advisory Group
 - Climate Data Evaluation Framework (CDEF)
- SST VC implementation plan
 - CDEF development co-ordinated with WG Climate

CDR-TAG ToR (extract)

- Define, document, maintain and improve the Climate Data Evaluation Framework (CDEF) in conjunction with relevant international bodies.
- Review, revise and approve evaluations made of GHRSSST data sets that are proposed as CDRs. Maintain the authoritative list of evaluation results, indicating which evaluations have CDR-TAG approval.
- Maintain CDR-TAG documents and information on the GHRSSST web site (<http://www.ghrsst.org>), including:
 - climate data evaluation framework
 - authoritative source of CDEF outcomes

Climate Data Evaluation Framework

Basic screen

E.g.: dataset covers minimum ten years, consistently processed; GDS2 compliant data are in LTSRF

Generate evaluation information and submit
I.e., provide complete information for climate data evaluation by CDR-TAG and users

CDR-TAG review
Critical review of information, including clarifications and requests for revision if necessary

Approval and publication
CDEF information is maintained in accessible location on GHRST web site and with the dataset

Status of assessment:

Dataset name and version:

Lead Investigator and/or Agency:

Principal strengths of data set:

Principal recommended applications:

KEY DESCRIPTIVE FEATURES	INFORMATION
Period covered	
Geographic range	
Spatial resolution	
Temporal resolution	
Timeliness of new data	
Dataset volume	
Valid data fraction	
Data level / grid	
Observation technology	
Dependence on other data	
Type(s) of SST	
Traceability	
Uncertainty info in product	

QUANTITATIVE METRICS	VALUE	COMMENTS
Systematic uncertainty		<i>Geographical variation in bias, as described by the standard deviation of mean satellite minus drifting buoy SST differences on space scales of ~1000 km, across the full dataset.</i>
		<i>Geographical variation in bias, as described by the standard deviation of mean satellite minus upper Argo float SST differences on space scales of 20° latitude by 90° longitude, across the full dataset.</i>
Non-systematic uncertainty		<i>Uncertainty associated with all effects not included in systematic uncertainty, as quantified by the standard deviation of residual differences of satellite and validation data</i>
Stability		<i>95% confidence interval for the relative multi-year trend between satellite SSTs and the Global Tropical Moored Buoy Array</i>
Sensitivity to true SST		<i>Average weight of the satellite observations in determining SSTs in the dataset, the difference from 100% representing the weight of prior information in the SSTs</i>

First lessons

- Words need explanatory comments
- Quantitative measures derive from GCOS requirements where possible
- Inverting from GCOS requirements to specific quantitative metrics is not necessarily obvious
 - Must define a recipe, otherwise no comparability
 - (Ideally would have a shared system and tools)
 - Inevitably involves some interpretation
 - Approach will be ECV specific
- Some requirements are impossible to assess
- Requirements for some properties missing
 - Because users don't ask for them, from ignorance

Example: systematic effects

- GCOS (2011) requires “accuracy” of “0.1 K over 100 km scales”
- Notes that “some ... datasets may approach 0.1 K accuracy on a global average basis but have biases >0.5 K for many important regions”.
- Requirement therefore relates to the degree to which the SST in the product may differ from the truth on average across some spatial domain

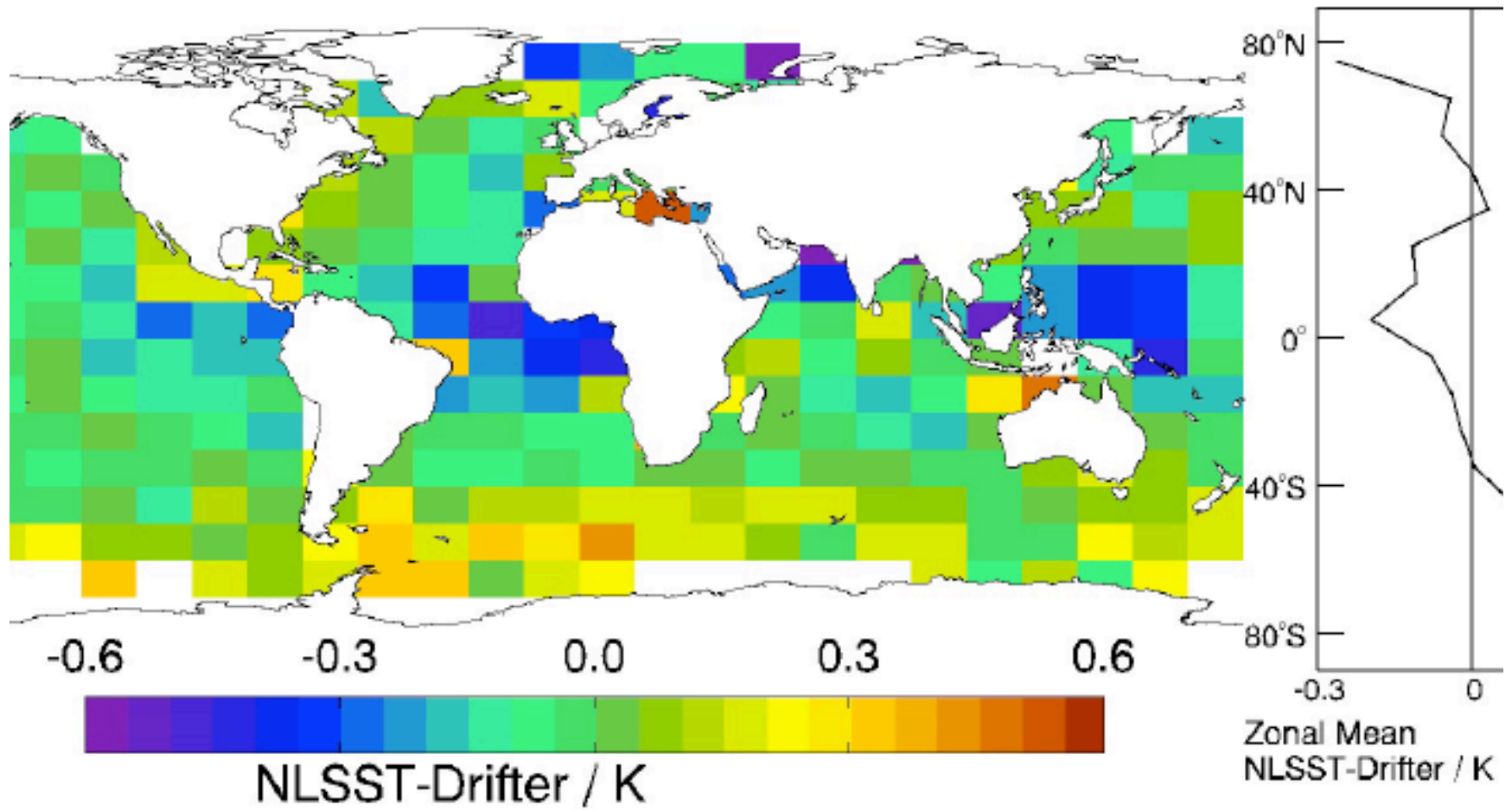
Issues to resolve

- Any averaging requires space and time scale
 - No time scale stated
 - Choose “whole dataset” and “contributing mission”
- No validation data set capable of assessing this GCOS requirement on stated space scale
 - Drifting buoy ensemble has error SD > 0.1 K
 - Averaging that requires space scales of ~1000 km
 - Drifting buoys are used in some GHRSSST products, therefore ineligible for comparability
 - Argo upper measurements, accurate but sparse

Adopted evaluation information

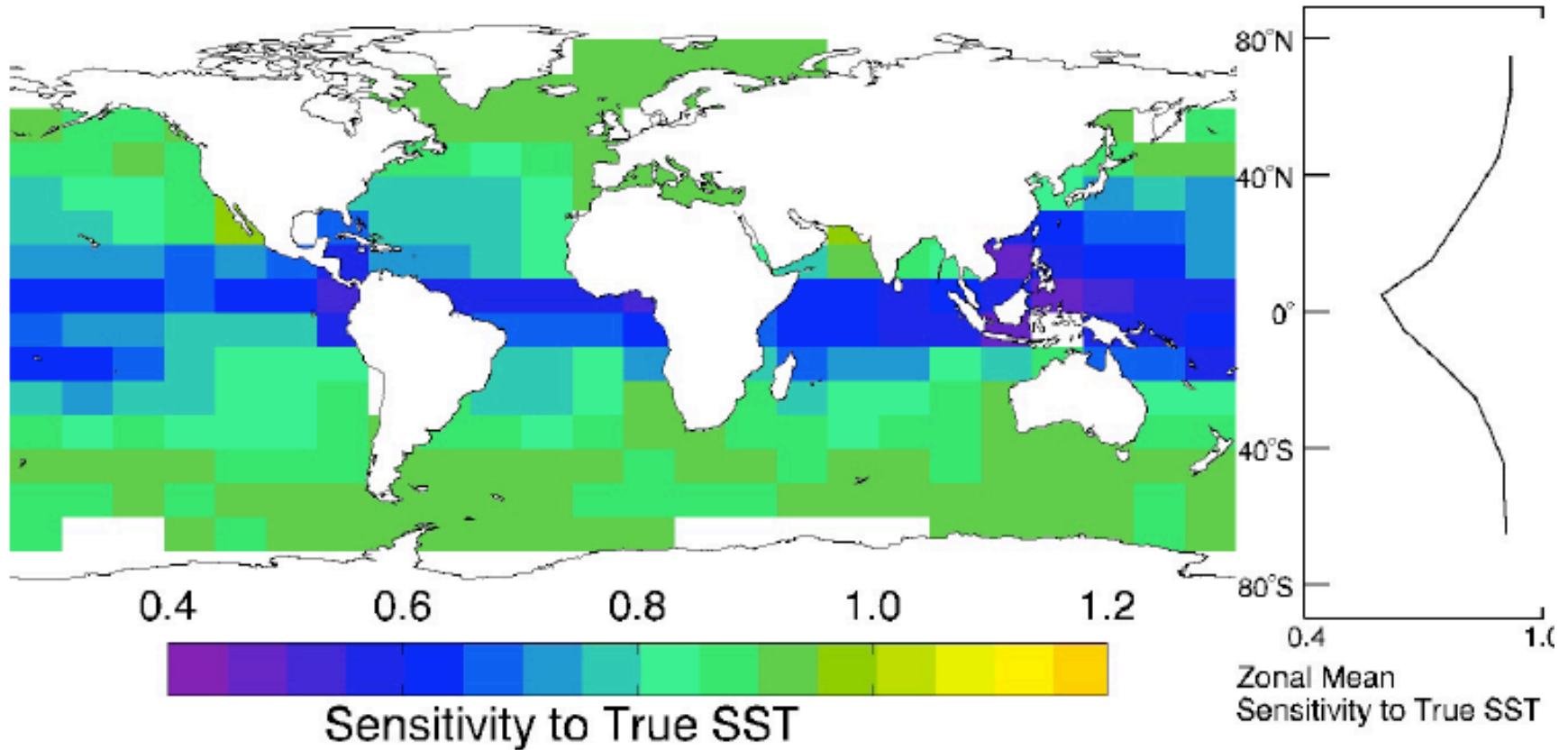
- *Geographical variation in bias, as described by the standard deviation of mean satellite minus drifting buoy SST differences on space scales of ~ 1000 km*
- *Geographical variation in bias, as described by the standard deviation of mean satellite minus upper Argo float SST differences on space scales of 20° latitude by 90° longitude, across the full dataset.*

Measuring this



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How much new information in the dataset?



MATURITY INDICES	SCORE (1 – 6)	COMMENTS
Software readiness		
Metadata		
Documentation		
Product validation		
Public Access		
Utility		



OTHER PRINCIPLES (GCOS)	COMMENTS
2. <u>and 12.</u> Overlaps between sensors exist and are exploited to harmonize the dataset	
3. Detailed history of methods/ algorithms is available	
11. Constant sampling within diurnal cycle	

Not tackled – wider “climate assessment”

- In CCI projects, climate research groups are embedded in projects, tasked to synthesize applied user experiences
- E.g., will use SST CCI products for
 - Prescribed SST high res atmospheric simulations
 - Impact on hydrological cycle in AMIP simulations
 - SST CCI vs other hydrological datasets (seek links)
 - 10 year ocean hindcast re-analysis for seasonal forecasting
- And will consolidate feedback from experiences

Not tackled – quality of uncertainty information

- Not enough GHRSSST producers are yet signed up to providing enhanced uncertainties in products
- Research is needed on how simply to validate uncertainties in products

CDEF development

- Overall approach agreed GHRSSST 2012 Tokyo
- CDEF drafted, now with CDR-TAG members
- Revise in light of comments (April)
- Demo application to SST CCI dataset (May)
- Present for CDR-TAG approval (June)
- Roll out (producer's timescales)

Possible conclusions

- Quantitative measures for data assessment turn out to be complex
- ECV-specific
- But perhaps some cross-ECV commonality
 - Link to GCOS requirements where possible
 - Need recipes that are sufficiently prescribed to ensure comparability of assessments
 - Fairness requires independent validation data
 - Some education of users by producers needed too
- Separate system metrics and data assessments clearly