

LETTER No 4

August 2011

GHRSSST XII Science Team meeting Summary +++ New ST members +++ Thanks to GHRSSST founding Chair, Dr. Craig Donlon +++ New GHRSSST ST Chair Prof. Peter Minnett +++ Links to GHRSSST XII presentations +++ Joint Working Group meeting on High Latitude issues +++ GHRSSST Brochure +++ GDS2 Schedule +++ DBCP Pilot Project +++ Status of the JAXA AMSR-2 instrument for GCOM-W +++ The next ST meeting 2012 in Japan



Participants of the XII Science Team Meeting, hosted by Dr Chris Merchant, University of Edinburgh.

GHRSSST XII Science Team meeting - Summary:

The Science Team Chair, Craig Donlon, welcomed all participants and reminded the Science Team of the GHRSSST aim to provide the *best quality SST for short, medium and long term applications* – on which we can measure its success. The GHRSSST phase-1 Pilot Project is complete, the phase-2 international Regional/Global Task Sharing system is built and operating, and GHRSSST is now in phase-3: operational delivery of a wealth of SST products and developing Climate Data Records.

Progress was presented for the major GHRSSST components, and the Space Agencies pointed out their priorities and expressed their continuing support of GHRSSST. For instance:

- The **GHRSSST Project Office**, funded by ESA and now hosted by the UK National Centre for Earth Observation (NCEO) at the University of Reading, continues to support the GHRSSST Science Team for a 10th year.
- The **Global Data Assembly Centre (GDAC)** which is hosted at NASA JPL Physical Oceanography DAAC (PO.DAAC) now interfaces to 12 Regional Data Assembly Centres (RDACs), and ingests ~8000 files per day (~35 GB). The PO.DAAC currently holds a total volume of 202 TB. A new web-portal, metadata database, data mining, subsetting and visualization tools and a GHRSSST forum have been established in this year.

- The **Long Term Stewardship and Reanalysis Facility** (LTSRF) is hosted at NOAA NODC; its operations are in constant progress with automatic daily acquisition from the GDAC and archiving. Current archive holdings are over 28 TB (1981-2010). Progress with reanalysis is being made at both the individual sensor level (L2, L3) and with merged L4 products. One of the tasks for 2011/2012 is to develop the SST Climate Variable Data Processing Framework.
- The **GHRSSST Multi-Product Ensemble system** (GMPE) carried out a gradient intercomparison and assessed the suitability of the ensemble spread as an error estimate. The GMPE median is shown to be more accurate than any individual product in the initial comparison against the independent near-surface Argo data. With the **SST Quality Monitor** (SQUAM), one L3 and 13 L4 GHRSSST products have been cross-compared and validated against in-situ data with the iQuam system.

Progress at the various contributing RDACs has been achieved through continuing operational processing of SST data streams from multiple, complementary satellite sensors and additionally by providing new or improved data. For example:

- New L3 data are now in production by ESA Medspiration and the Australian BOM.
- Real-time and reprocessed SST_{skin} from AVHRR and MTSAT is being provided by ABOM.
- A new processing chain using physical retrievals accounting for atmospheric moisture and Saharan dust in geostationary products has been implemented at the OSI-SAF.
- Navocean selects the best quality data from the GDAC, and adds error estimates to be used for Navy Coupled Ocean Data Assimilation (NCODA).
- EUMETSAT RDAC is now providing very high data quality from IASI (within the error bounds of the matched buoys).
- MyOcean stressed as its main achievement from the last year their OSTIA SST Reanalysis.
- The ESA RDAC is processing all AATSR on a purely operational basis.
- RSS reprocessed the entire AMSR-E data set and is producing a Windsat data set; the MISST RDAC will proceed according to the availability of funds.
- The Japanese GHRSSST server resumed distributing AMSR-E within a week after the earthquake in March. Preparations are underway for the launch of AMSR-2.

All RDACs have either started or are planning to move to the revised GHRSSST data Processing specification (GDS2) that was completed and agreed through international consensus in 2011. There are continuing discussions within various RDACs about multi-resolution products and how the resulting uncertainties should be estimated and communicated.

The use of available **in-situ data for validation and calibration** was discussed and Helen Beggs pointed out that for regions sparse in buoy observations, the IMOS ships of opportunity (SOOP) SST provide an alternative, calibrated, in-situ data set for validation. David Meldrum gave a presentation on the DBCP Pilot Project releasing upgraded drifting buoys based on GHRSSST specifications. Further evaluation and financial commitment to DBCP buoy upgrades are required through a joint DBCP-GHRSSST pilot project.

During the **Users and Science Symposium**, it was clear that SST continues to be of great interest to the numerical weather prediction community, where SST serves as an indispensable boundary condition. There is increasing interest in lake surface temperatures and in ocean mesoscale SST patterns and their feedbacks on winds which can in turn affect rain rate and cyclone intensity. More scientific understanding is needed to link SST_{skin} and the foundation temperature (SST_{fld}), i.e., in understanding diurnal variability. More explicit reporting of information content and uncertainties for each analysed SST value is needed for subsequent optimal applications. A recently observed ENSO influence on the satellite SST errors in the Atlantic Ocean was highlighted, and the research issues associated with estimating long-term SST climate records were discussed by several speakers. The approaches to uncertainty and validations were reviewed by Chris Merchant, who called for validation of both the SST and their uncertainty estimates. Merchant discussed a decomposition of uncertainty estimates into uncorrelated (random), synoptically correlated (pseudo-random, which can be simulated) and large-scale correlated components (systematic); examples will be developed and tested as part of the ESA CCI SST project.

A discussion was held about GHRSSST needing to **capture better the user requirements** from the operational community, the climate change community and other users. A wide range of user requirements with respect to **uncertainty characterisation** can be served by GHRSSST. In particular, the working groups ST-VAL, IC-TAG, DVWG and EARWiG are addressing various aspects of uncertainty estimation required by users. Craig Donlon called for **co-ordination of user feedback and urged the GHRSSST Science Team to take steps to share user feedback**. Peter Minnett pointed out the importance of user requirements in the design of next generation satellite instruments. A discussion was held on clarification of the current GHRSSST definitions. A need for an additional piece of information on wavelengths together with the GHRSSST definition on SST_{skin}, and the need to **educate the users** was identified.

Ten Breakout sessions were held by the GHRSSST sub-groups:

ST-VAL, the Satellite Sea Surface Temperature Validation Working Group, discussed the value of ship measurements, the QC of Drifter Data, the DBCP Pilot Project concerning upgraded drifters, use of Argo near surface data, and the ST-VAL workplan for the next years.

DAS-TAG, the Data Assembly and Systems Technical Advisory Group, reviewed the GDS2 revisions, the GDS2 transition timeline, possible netCDF4 translation from netCDF3, GDS2 format compliance checker and the advantages of netCDF-4 vs. NetCDF-3.

DVWG, the Diurnal Variability Working Group, discussed diurnal warming estimates derived from satellite data, in-situ data and modelling, as well as effects of waves, wind and advection in diurnal variability. Pierre LeBorgne proposed a SEVIRI SST_{skin} hourly analysis in delayed mode. Helen Beggs described the Tropical Warm Pool Diurnal Variability (TWP+) data set and research plans, and proposed a joint working group meeting to exploit these data.

AUS-TAG, the Applications and User Services Technical Advisory Group, addressed the Users Manual, a "one-pager" concept for first-time SST users, a dashboard concept for the RDACs and several new data discovery and access tools.

HL-TAG, the High Latitude Technical Advisory Group, discussed efforts to improve cloud and ice masking. Users are calling for the highest possible resolution of sea ice products, ideally for one data set where all ice data have been merged and different resolutions are reflected in the uncertainties. Future work includes developing algorithms for high latitude SST and IST, reanalysis products, lake ice products, and validation with in-situ measurements.

R2HA2, the Rescue and Reprocessing of Historical AVHRR Archives Working Group, met for the first time. It agreed on the next steps to identify and locate historical archives (pre-2000) of AVHRR HRPT and LAC data, and to copy them to a central location. R2HA2 will define in the next year a common L1P format for storing these data.

IC-TAG, the Inter-Comparison Technical Advisory Group, added a new objective to its Terms of References: "to assess and improve the specification of error in the L4 analysis". This issue is under active discussion in the group, in addition to on-going inter-comparison work. A three-part paper on the GMPE, L4-SQUAM and HRDDS systems, which form the basis of inter-comparison in the IC-TAG, is in preparation for submission to a special issue of Deep Sea Research II.

RAN-TAG, the Reanalysis Technical Advisory Group reviewed the current status and future plans of reanalysis activities, and defined and discussed the implementation of a Data Processing Framework for the SST Essential Climate Variable. Twenty-seven projects from the international SST reanalysis community were summarized. The quality metrics and standards (scientific, engineering and data management) of several high-level programs (GCOS, ESA CCI, NOAA CDR) are planned to be considered, together with community-established metrics. Further, the group called for an established, traceable, reliable network of in situ radiometers as reference measurement standard. The group thanked Ken Casey for his dedicated and energetic work to build and develop the RAN-TAG over the last 10 years. Chris Merchant will take over as new Chair of RAN-TAG.

EARWiG, the Estimation and Retrievals Working Group discussed the open issues related to the retrievals (especially for a 0.05K/decade stability requirement). Several new experimental approaches to

the process of SST retrieval boosted fresh thinking about how more value/quality can be squeezed out from the data. The group welcomed the multi-sensor match-up dataset being built within the ESA CCI.

LWST, the Lake Surface Water Temperature Working Group met for the first time. Stuart MacCallum presented ARC Lake temperatures. Emma Fiedler tested of LWSTs in the OSTIA system. The lake definitions, retrieval issues, in-situ validation and error estimates as well as improved cloud masks needs addressing in the next years. The new Chair of the LWST Working Group is Simon Hook.

New ST members: Congratulations to Misako Kachi, Shiro Ishizaki, Viva Banzon, William Emery, Lei Guan, Gary Corlett, Jon Mittaz and Tim Liu for joining the GHRSSST Science Team.

Thanks to GHRSSST founding Chair.

Dr. Craig Donlon: Echoing the sentiments of the entire Science Team, David Llewellyn-Jones thanked **Craig Donlon for his more than 10 years of dedicated work as GHRSSST Founding Chair.** Craig Donlon wished GHRSSST and its Science Team well under the new ST Chair, Peter Minnett, who thanked Craig Donlon for his leadership of GHRSSST for over a decade. Peter expressed the debt that we all owe Craig for his tireless dedication to establishing GHRSSST as a well-organized group that has become a model for how international groups can cooperate to achieve mutual aims. GHRSSST is recognized by many as an example to be followed for how Climate Data Records can be derived from satellite data.



New GHRSSST ST Chair: Peter Minnett is a Professor of Meteorology and Physical Oceanography at the Rosenstiel School of Marine and Atmospheric Science at the University of Miami, USA. His primary research interests are in satellite oceanography, especially in the remote sensing of temperature using satellite and ship-based infrared radiometers, and the use of infrared hyperspectral measurements to study air-sea interactions. In addition he has conducted field research in the Arctic on the surface energy budget and cloud radiative forcing. He is a member of the Science Teams of MODIS and VIIRS and of the NASA SST Science Team. He serves on the Science Advisory Group for the AATSR, the EUMETSAT Post-EPS Mission Experts Team, the Earth Science Council of the US Universities Space Research Association, and on the Science Study Group for the Hyperspectral Infrared Imager (HyspIRI, a planned NASA Decadal Survey Mission). In the past he has served as a Board Member of the Arctic Research Consortium of the US, the US Arctic Icebreaker Coordinating Committee, and co-chaired the US-Swedish Working Group on Scientific Research on the *Oden*.



Peter studied Physics at the University of Oxford, UK, before earning a PhD in Physical Oceanography at the University of Southampton. Following four years at the University of Kiel, Germany, he joined the newly-formed Remote Sounding Group at the Rutherford Appleton Laboratory in the UK where he worked with David Llewellyn-Jones on the early development of the ATSR. In 1985 he moved to Italy to join the NATO Undersea Research Centre, in La Spezia, and in 1990 joined the staff of the Brookhaven National Laboratory in the USA, moving to the University of Miami in 1995.

As Chair of the GHRSSST Science Team, Peter anticipates an exciting time ahead, given the challenges and opportunities offered by the imminent launches of three new satellite radiometers with SST capabilities and which hold the potential of extending the Climate Data Record of SST into the future.

Recognizing the invaluable contribution of Craig Donlon, the founding Chair of GHRSSST, Peter looks forwards to working with all members of GHRSSST and the wider remote sensing community.

Links to GHRSSST XII presentations: via Agenda with links, or reference and background documents via the web-site:

<https://www.ghrsst.org/documents/q/category/ghrsst-science-team-meetings/ghrsst-xii-edinburgh/>.

Joint Working Group meeting on High Latitude issues: There was a high level of interest during the 12th GHRSSST Science Team Meeting in an inter-sessional meeting with working days on Tropical Warm Pool SST diurnal variation and Southern Ocean satellite SST retrieval. After discussion with the Chairs of five of the GHRSSST working groups/TAGs (EARWiG, ST-VAL, DV-WG, HL-TAG and IC-TAG), Helen Beggs (Bureau of Meteorology) proposed to host a joint working group meeting at the Bureau of Meteorology Head Office, Melbourne, Australia with following themes: (i) Tropical Warm Pool Diurnal Variability Project (TWP+), and (ii) SST retrievals and validation south of 50°S. Dates: **5-9 March 2012**. Anyone interested in attending this meeting or wanting more information can contact Helen Beggs (h.beggs@bom.gov.au).

GHRSSST Brochure can be downloaded from:

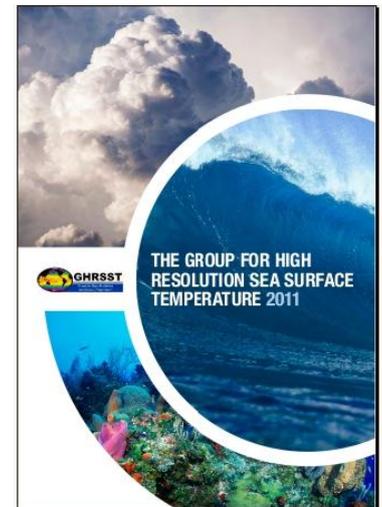
https://www.ghrsst.org/files/download.php?m=documents&f=110615210654_-GHRSSST2011WEB.pdf. Please contact the GPO (ghrsst-po@nceo.ac.uk) for hard copies.

GDS2 Schedule: The Regional Data Assembly centres are transitioning to the GDS2 format. Their schedule is detailed here: <https://www.ghrsst.org/ghrsst-science/science-team-groups/das-tag/gds2-schedule/>

DBCP Pilot Project: description and data access: Details of the joint DBCP and GHRSSST [Pilot Project](#) to upgrade elements of the GDP buoy fleet to allow the reporting of higher resolution SST and position can be found at <https://www.ghrsst.org/ghrsst-science/science-team-groups/stval-wg/dbcp-ghrsst-pilot-project/>

Status of the JAXA AMSR-2 instrument for GCOM-W

When at the March 2011 earthquake disaster a wall of the test building collapsed and caused contamination in the clean room, the proto-flight AMSR-2 model was contaminated, but remarkably no serious damage was suffered. The remaining tests were somewhat delayed while the building was repaired. Now, after repairing the test facilities and cleaning of the instruments, all the components were tested and found to work normally! A recovery schedule has been created. The launch is still scheduled for Japan Fiscal Year 2011 (late 2011 to early 2012). For joint research studies on calibration/validation with JAXA, L1 data will be distributed after an initial checkout (launch + 3 months).



The next GHRSSST ST meeting

The next venue will be in Tokyo,
4th -8th June 2012.

GHRSSST XIII will be hosted by JAXA in
collaboration with JMA.