9th Meeting Report for the Reanalysis Technical Advisory Group (RAN-TAG) and the Long Term Stewardship and Reanalysis Facility (LTSRF)

19 May 2008

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Executive Summary

The GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSST-PP) Reanalysis Technical Advisory Group (RAN-TAG) has made several key achievements since the 8th Science Team meeting in Melbourne Australia, 14-18 May 2007. First, automated archive operations at the GHRSST Long Term Stewardship and Reanalysis Facility at NOAA’s National Oceanographic Data Center (NODC) have been successfully maintained with nearly 100% reliability. Volumes in the archive grew from approximately 2.5 terabytes in June of 2007 to over 12.5 terabytes in May of 2008. The number of GHRSST netCDF files jumped from approximately 170,000 to over 650,000, and the number of archival information packages (data from one sensor or analysis system per day) increased from about 11,000 to over 38,000. On a daily basis, the rate of files ingested to the LTSRF grew from 800/day to 1000/day, and the volumes from about 16/day gigabytes to over 25 gigabytes/day. In addition, a large number of new products were also added to the LTSRF: four new global Level 4 (L4) analyses, Level 2 Preprocessed (L2P) data for MetOp-A, a regional L4 analysis for the North Sea and Baltic, and an L4 regional analysis for the Galapagos area. New features were also added to the LTSRF archive operations, including three Really Simple Syndication (RSS) feeds and an automated metrics dashboard red/yellow/green indicator. User accesses have also been growing rapidly, from 0.3 GB and 28 netCDF files/day in 2006 to 6.2 GB and 1444 netCDF files/day in 2008.

Extensive progress has also been achieved with the establishment of an SST intercomparison facility at the LTSRF. This new capability, built in association with the Global Climate Observing System (GCOS) SST and Sea Ice Working Group, enables users to easily and rapidly compare numerous historical ship-based SST reconstructions, in situ and satellite input data sets, and modern satellite-in situ blended SST analysis products. All of the various datasets and analyses have been transformed to common space-time grids and made available in both Matlab and GHRSST L4 netCDF formats. This intercomparison framework brings into the GHRSST Reanalysis community the GCOS talent and experience and is enabling the RAN-TAG to meet its goal of connecting the modern primarily satellite-based SST analyses with the longer time series of ship-based SST reconstructions.

Finally, significant progress has been made by the RAN-TAG in generating broader community knowledge and use of the GHRSST products. Publications and posters have been provided and many presentations around the world have been made. These efforts have resulted in increased use of the LTSRF to discover, acquire, and utilize GHRSST products. Details and additional information on these accomplishments are provided in this report.

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19 May 2008
1 Introduction

1.1 Background

Since the inception of the GODAE High Resolution Sea Surface Temperature (SST) Pilot Project (GHRSST-PP), it has been widely appreciated that satellite datasets produced in near-real time operational settings generally fail to provide the most highly accurate and consistent time series information possible. With this knowledge, the GHRSST-PP Science Team initiated the Reanalysis (RAN) program whose goals are to produce delayed-mode products of higher accuracy and consistency than the real-time SSTs by taking advantage of additional delayed mode data streams that cannot be used by the operational real time system, to link the RAN products to existing longer-term SST analyses, and to enable a reprocessing capability so that future users of the data can easily reprocess or utilize the data. As such, the GHRSST RAN is as much about establishing a data processing and management system as it is about creating SST products. The GHRSST-PP RAN Technical Advisory Group (RAN-TAG) is the formal GHRSST-PP body that is responsible for the scientific and operational methods and algorithms used to generate delayed-mode GHRSST-PP data products. The delayed mode products will be suitable for use as climate data records, an important concept in environmental data management, which dictates long-term accuracy and consistency (e.g. NRC, 2000). Target accuracies for GHRSST reanalysis products are on the order of 0.3 K absolute and 0.1 K relative, with a temporal stability requirement of 0.01 K/decade. These ambitious targets may not be strictly achievable given current satellite sensor technologies but they provide demanding and rigorous goals to strive for.

1.2 Period of Report and Document Organization

This document describes the current status of the GHRSST RAN-TAG with a focus on its activities since the 8th GHRSST Science Team meeting, held in Melbourne, Australia from 14-18 May of 2008. The year since that meeting has been a productive one for GHRSST in general and for the RAN-TAG as well. The remainder of this document covers four key areas of RAN-TAG activity:

- Operations of the GHRSST Long Term Stewardship and Reanalysis Facility (LTSRF) at NOAA’s NODC
- Establishment of the GHRSST/Global Climate Observing System (GCOS) Intercomparison Facility
- Reanalysis product developments
- Reanalysis Data Access and Application efforts

2 Operations of the Long Term Stewardship and Reanalysis Facility

2.1 Operational Reliability

The LTSRF (http://ghrsst.nodc.noaa.gov) has continued operations over the last year with nearly 100% availability and reliability. Only one unanticipated outage occurred due to a failure at the LTSRF, though some additional brief outages occurred when the Global Data Assembly Center (GDAC) indexing system, on which the LTSRF transfers are based, failed. See Annex 1 for a listing of all LTSRF Operational Messages between May of 2007 and May of 2008.

2.2 Operational Data Streams

The LTSRF is currently acquiring on a daily basis from the GDAC all GHRSSST L2P and L2P_GRIDDED files greater than 30 days old from the following sensors. New data streams are in bold face:

AATSR
AMSR-E
AVHRR-16, (no longer active but are still available in the archive)
AVHRR-17, AVHRR-18 (GAC and LAC/HRPT)
GOES-11 and GOES-12
MODIS Aqua and Terra
SEVIRI
TMI
AVHRR on MetOp-A

In addition, on the same 30-day lag nine L4 analysis products are currently being received from several Regional Data Assembly Centers (RDACs) and archived, an increase from two at the time of last year’s report. New data streams are in bold face:

European (EUR): 2.2km Mediterranean L4 SST (now uses ODYSSEA system)
UK Met Office (UKMO): OSTIA 5.6 km Global OSTIA L4 SST
EUR: ODYSSEA 10 km Global L4 SST
EUR: ODYSSEA 0.02° Galapagos Region L4 SST
EUR: ODYSSEA 0.02° North-Western European Shelves Region L4 SST
National Climatic Data Center (NCDC): AVHRR_AMSR_OI 25 km Global L4 SST
NCDC: AVHRR_OI 25 km Global L4 SST
Remote Sensing Systems (REMSS): 9 km Global mw_ir_OI L4 SST
Danish Meteorological Institute (DMI): 0.03° North Sea-Baltic Sea Region L4 SST
2.3 Archive Metrics

Together, these L2P, L2P_GRIDDED, and L4 files occupy over 12.5 terabytes (compressed, ~250 terabytes uncompressed) of disk space, and consist of over 650,000 netCDF data files, an increase from 2.5 terabytes and 170,000 files at the time of last year’s report. Current temporal coverage varies for each product line, with the earliest dataset available back to the beginning of 1985 (though the majority do not begin until 2005-2007).

The following four figures illustrate the growth of the LTSRF archive holdings. Figures 1 and 2 show the daily rates of GHRSSST data in terms of volumes and numbers of netCDF files, respectively. Figures 3 and 4 show the cumulative growth of the archive in terms of volumes and numbers of netCDF files, respectively. These graphics are generated automatically each day and posted to the LTSRF web site.

These graphs indicate that approximately 1000 netCDF files occupying about 25 gigabytes of disk space (compressed, about 500 gigabytes uncompressed) are arriving at the NODC LTSRF
each day. These are substantial increases over the 800 files/day and 16 gigabytes/day at the time of the last report.

The data are grouped in the archive system in Archival Information Packages (AIPs, also known as NODC “accessions”), or logical groupings of data. For GHRSSST, an AIP is defined as the data from a single sensor (or analysis system and region), from a given RDAC, for a particular date. For example, all of the approximately 288 netCDF data files (and corresponding metadata files) from MODIS Aqua, produced by the JPL RDAC for 01 January 2007 are grouped into a single NODC accession. As of 26 March 2007 there were 11,176 GHRSSST AIPs in the formal NODC archive systems. As of 16 May 2008, that number had increased to 38,535. The growth of the number of AIPs in the GHRSSST archive is shown below in Figure 5. Like the previous four figures, this graphic is also generated automatically each day and posted to the LTSRF web site.

![Number of GHRSSST Accessions in NODC LTSRF](image)

**Figure 5**: Growth in the number of accessions, or Archival Information Packages, in the LTSRF.

2.4 Operational Reporting

In addition to the automated graphics that are generated and posted to the LTSRF site on a daily basis, the LTSRF has also developed and deployed 3 Really Simple Syndication (RSS) feeds in the last year. The first feed is manually updated as necessary, providing LTSRF Operational Messages (http://ghrsst.nodc.noaa.gov/LTSRF_OpMessages.xml) as demonstrated in Annex 1. The second syndication is a news feed for noteworthy items of interest to users of the LTSRF.
2.5 Archive Access Metrics

An increasing number of users have begun accessing GHRSST data from the LTSRF. Table 1 below summarizes the FTP access statistics since GHRSST logs have been recorded at the LTSRF in June of 2006.

<table>
<thead>
<tr>
<th>FTP Statistics</th>
<th>2006 (Jun-Dec)</th>
<th>2007 (Jan-Dec)</th>
<th>2008 (Jan-Apr)</th>
</tr>
</thead>
<tbody>
<tr>
<td># Unique Users</td>
<td>24 (592*)</td>
<td>134 (1307*)</td>
<td>86 (626*)</td>
</tr>
<tr>
<td># netCDF Files</td>
<td>5380 (28/day)</td>
<td>387,799 (1062/day)</td>
<td>174,425 (1444/day)</td>
</tr>
<tr>
<td>Volume</td>
<td>56 GB (0.3 GB/day)</td>
<td>648 GB (1.8 GB/day)</td>
<td>517 GB (6.2 GB/day)</td>
</tr>
</tbody>
</table>

Table 1: FTP access statistics for the GHRSST LTSRF for the period June 2006 through April 2008. Numbers of unique users indicated with an asterisk (*) are for HTTP.
Note the dramatically increasing number of netCDF files and volumes being accessed from the LTSRF each day. In 2006, 28 files were transferred per day on average. That number grew to 1062 per day in 2007 and to 1444 in 2008 (through April, the last month of complete logs available at the time of this report). The volume rates increased from 0.3 GB per day in 2006 to 1.8 GB per day in 2007 and 6.2 GB per day in 2008.

2.6 Planned Archive Improvements

While substantial progress has been made, future development of the LTSRF and its stewardship capabilities is needed in two keys areas. The first is a robust and preferably automated way to manage new versions of data already held in the archives. This problem is surprisingly non-trivial as many permutations exist, and current GHRSSST metadata is inadequate to handling new versions in an automated fashion. The inadequacy of the metadata has been addressed in the planned revisions in the GHRSSST Data Specification (GDS) version 2, but in the meantime manual version-handling is required.

The second area is to develop an automated “rich inventory” system that examines incoming granules of GHRSSST data, calculates various statistics, and puts the results in a searchable database for quality control and more content-specific search capabilities. Such a system might also include browse graphics, generated automatically for each ingested netCDF file.

3 Establishment of the GHRSSST/GCOS SST Intercomparison Facility

In the last year, the LTSRF completed the initial build of an intercomparison capability for different L4 SST analysis products and historical SST reconstruction datasets. This work is being done in conjunction with the Global Climate Observing System (GCOS) SST/Sea Ice Working Group and is available at http://ghrsst.nodc.noaa.gov/intercomp.html. The site is helping to meet one of the key goals of the RAN-TAG: to connect historical reconstructions of SST with the modern, satellite-based analyses. It is also being used to help understand differences in the various analysis techniques and input data sets. The initial set of SST analyses used in the development of this framework (see Table 1 below) consists of satellite and in situ input data sets, SST reconstructions produced outside of the GHRSSST project, and L4 analysis produced both within GHRSSST and separately from GHRSSST.
Data Set Name | Time-Space Resolution | Intercomparison Date Range
--- | --- | ---
Hadley Centre SST | Weekly One Degree, Monthly Five Degree | Dec 1981 – Nov 2005
Hadley Centre Sea Ice and SST (HadISST) | Monthly Five Degree | Jan 1981 – Nov 2007

Table 2: GHRSST/GCOS SST Intercomparison Products

Some of these are daily analyses; some extend back as far as the satellite SST record (end of 1981), and others use in situ data to reconstruct the SST record for the past two centuries. The original SST analyses used vary in temporal and spatial resolution and coverage, so for ease of intercomparison, all GCOS data sets were processed to adhere to one standard format at two resolutions. This format is a “data cube” of weekly, one degree gridded SST or monthly, five degree gridded SST between 1981 and 2007. The standardized data are available in both GHRSST L4 format (using the proposed GDS 2.0 naming convention) and in Matlab’s “.mat” format.

From these data sets a series of intercomparisons metrics have been generated, based on requirements set by the GCOS SST and Sea Ice Working Group. These metrics include:

- Standard deviation of anomalies in time
- Linear trend of anomalies in time
- Lag1 autocorrelation of anomalies in time
- Time series of global and hemispheric anomalies
- Time-latitude sections of anomalies (averaged across all longitudes)
- Map of root mean square (RMS) differences
- Map of time-averaged differences
Examples of the graphics available at the GHRSSST/GCOS SST Intercomparison Facility are shown below, showing time series of global and hemispheric anomalies for the HadSST2 dataset (Figure 6) and a map of time-averaged differences between AVHRR Pathfinder and the HadSST2 dataset (Figure 7). The metrics data are also available in netCDF.

**Figure 6:** Time series of global and hemispheric anomalies for the HadSST2.

*Figure 7:* Time-averaged differences between AVHRR Pathfinder and HadSST2.

### 4 Reanalysis Product Developments

Progress has been made since the last Science Team meeting in the development of reanalysis SST products. Demand for these more accurate, consistent, and longer-term products is very high, with users ranging from fisheries scientists to numerical modelers interested in longer data sets than the GHRSSST forward-mode operational data streams can provide.
First, two new daily, 25-km resolution optimal interpolation SST products from Richard W. Reynolds, Thomas M. Smith, Chunying Liu, Dudley B. Chelton, Kenneth S. Casey, and Michael G. Schlax have been published (*Journal of Climate*, volume 20, 2007) and made available to the GHRSST data management structure by NOAA’s National Climatic Data Center RDAC. The first of these products uses AVHRR Pathfinder Version 5 data when available (1985-2005) and operational AVHRR data for 2006 onwards to create a dataset going back to 1985. The second uses AVHRR and the microwave SSTs from AMSR-E and is available back to 2002.

Work has also begun by John Stark and Craig Donlon to produce a retrospective Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA) product at the Met Office, UK. The forward-mode OSTIA product is already part of the GHRSST system, but the retrospective product will go backward in time using reprocessed inputs like AVHRR Pathfinder when available. The entire 1-terabyte collection of AVHRR Pathfinder data has been delivered to the Met Office and initial OSTIA reanalysis products are expected later in 2008.

In addition to the above efforts aimed at producing retrospective reanalyses, progress has also been made in single sensor reprocessing efforts whose goals are to provide better inputs to the reanalysis systems. One of these involves European efforts to provide a rapidly-reformatted (A)ATSR archive in L2P core with uncertainty estimates in early 2008, as well as a longer term reprocessing effort called the (A)ATSR Reanalysis for Climate (ARC). This project is led by Chris Merchant of the University of Edinburgh and will deliver an improved (A)ATSR series in L2P core in 2010. The other effort involves NODC and UMiami’s work to transition the AVHRR Pathfinder processing system to NODC and to migrate it into the SeaDAS environment. This NOAA-funded work is well underway and NODC’s goal is to have an initial capability to produce Pathfinder version 5 data in SeaDAS by October 1, 2008. The NASA SeaDAS group has already made some changes to the latest formal release of SeaDAS (version 5.2) to set the stage for inclusion of the Pathfinder capability in a future public release of the software environment.

To enable production of the AVHRR Pathfinder dataset in GHRSST L2P, NASA has agreed to provide additional support to Bob Evans at UMiami/RSMAS and Peter Cornillon at URI/GSO. This additional funding will be used to generate error uncertainties for Pathfinder and also to include a large collection of 1-km HRPT data within the Pathfinder framework.

### 5 Reanalysis Data Access and Application Efforts

The RAN-TAG and staff at the LTSRF have also continued efforts to enable easier and broader use of all GHRSST products. These efforts have taken various forms and are of growing importance owing to the growing awareness and number of users of GHRSST products.
Progress made includes:

- Numerous presentations and discussion at venues around the world, including the US, Norway, Japan, Poland, and the UK
- Responding to a growing number of user services requests

6 Summary and Look Forward

The past year has been a highly active one for GHRSSST reanalysis and the LTSRF. A large data management system has been maintained and improved, and progress made toward creating high resolution, multi-sensor reanalysis products. Many new data streams have entered the archives, and growing numbers of users are accessing more and more GHRSSST data. The coming year promises to be even more successful, with longer time series of data being made available to a wider range of users and the use of the intercomparison facility for understanding key differences in the available data. Supporting the creation of long-term reanalysis products will again be the high priority for the RAN-TAG, and more effort will be expended in making GHRSSST products more easily used by the archive user community. Above all, international collaboration will continue to be the means by which the ambitious goals of GHRSSST Reanalysis will be achieved.

References


2008-03-17: LTSRF Archive Graphics Restored
After an approximately two week hiatus, the daily GHRSSST LTSRF archive status graphics have been restored. These graphics are available at http://ghrsst.nodc.noaa.gov/opmessages.html.

2008-03-07: NODC Archive undergoing maintenance
The NODC Archive Management System will be undergoing maintenance in order to enhance processing and to increase speed and capacity. The system will be unavailable beginning at 5pm EST, Saturday, March 8. We expect the maintenance to be completed by Monday, March 10. Automatic archiving of GHRSSST data will by necessity be suspended during the maintenance period. All GHRSSST data will continue to be acquired from the NASA GDAC and automatic ingest and archiving of the data will resume once the maintenance has been completed. We apologize for any inconvenience this may cause.

2008-02-12: Problem with Acquisition Corrected
A problem with the data acquisition system at the LTSRF was discovered. A lock was left in place when the data acquisition system crashed last week and monitoring scripts failed to detect the errant lock. The monitoring scripts have been updated and the data acquisition system is back on line.

2007-12-10: NODC Archive fully operational
The maintenance and upgrade of the NODC Archive Management System has been completed. Additional processing capacity is now available. The LTSRF has resumed automatic ingest and archival of GHRSSST data. Any backlog should be processed within the next few days.

2007-12-07: NODC Archive undergoing maintenance
The NODC Archive Management System is undergoing maintenance in order to provide additional processing capacity. We expect the maintenance to be completed by Monday, December 10. In the meantime, automatic archiving of GHRSSST data has been suspended. All GHRSSST data will continue to be acquired and automatic ingest and archiving of the data will resume once the maintenance has been completed. We apologize for any inconvenience this may cause.

2007-10-26: GDAC indexing system problem fixed
The 19 October NASA GDAC indexing system problem was resolved today and the LTSRF has resumed ingesting and archiving the backlogged data. Roughly 11,000 data files appear to have been backlogged, so it will be at least several days before they have all been archived.

2007-10-23: Problem with the indexing system at the NASA PO.DAAC's GDAC
Since 19 October, no new accessions have been brought into the LTSRF archive due to a problem with the indexing system at the NASA PO.DAAC's GDAC. No data are being lost, and
the backlog will be ingested into the archive as soon as the GDAC resolves the issue. We apologize for any inconvenience this may cause.

**2007-07-28: Daily ingest and automatic archiving of GHRSST data has resumed**
Daily ingest and automatic archiving of GHRSST data has resumed. Within approximately one week the backlog of data will be processed.

**2007-07-26: Problem with the indexing system at the NASA PO.DAAC's GDAC**
Since 17 July, no new accessions have been brought into the LTSRF archive due to a problem with the index file generation system at the NASA PO.DAAC's GDAC. No data are being lost, and the backlog will be ingested into the archive as soon as the GDAC resolves the issue which should be within the next couple of days. We apologize for any inconveniences this may cause.
008-04-09: GHRSSST Archive Adds REMSS MW+IR Global L4 Analysis
Today the GHRSSST Long Term Stewardship and Reanalysis Facility archive added a new global Level 4 SST analysis product from Remote Sensing Systems (REMSS) known as the "MRIR optimal interpolation SST". This product line using AMSR-E, TMI, and MODIS observations, and commences with data from 21 August 2005 and is produced daily on a 9 km grid. Thanks to Chelle Gentemann and the team from Remote Sensing Systems for bringing these new products into GHRSSST!

2008-03-14: GHRSSST Archive Adds European RDAC Galapagos and Northwest European Shelves Ultra-high resolution L4 ODYSSEA Analyses
Today the GHRSSST Long Term Stewardship and Reanalysis Facility archive added two new regional Level 4 SST analysis products generated using the European RDAC's ODYSSEA system. These new product lines, one for the region around the Galapagos Islands and the other for the Northwest European Shelves, commence with data from 23 January 2008 and are produced daily on a 0.02 degree (2 km) grid. Thanks to Jean-Francois Piolle and the team from IFREMER/CERSAT for bringing these new products into GHRSSST!

2008-12-18: GHRSSST Archive Exceeds 10 Terabytes!
Today the GHRSSST Long Term Stewardship and Reanalysis Facility archive surpassed 10 Terabytes of compressed data in its collection. These data span 546516 netCDF files and are organized into 34836 Archival Information Packages (also known as NODC accessions). Each Archival Information Package contains the files from an individual data set from a given day. For example, all of the JPL MODIS Aqua Level 2P data from Dec 1, 2007 are organized into one of these packages.

2007-12-18: GHRSSST Archive Adds European RDAC Global L4 ODYSSEA Analysis
Today the GHRSSST Long Term Stewardship and Reanalysis Facility archive added a new global Level 4 SST analysis product called ODYSSEA, created by the European RDAC. This new product line commences with data from 26 September 2007 and is produced daily on a 0.10 degree grid. Thanks to Jean-Francois Piolle and the team from IFREMER/CERSAT for bringing this new product into GHRSSST!

2007-12-18: GHRSSST Archive Adds DMI North Sea - Baltic L4 Analysis
Today the GHRSSST Long Term Stewardship and Reanalysis Facility archive added a new Level 4 SST analysis product for the North Sea and Baltic region, created by the new Danish Meteorological Institute (DMI) RDAC. This new product line commences with data from 04 June 2007 and is produced daily on a 0.03 degree latitude-longitude grid. Thanks to Jacob Hoyer and the DMI team for their efforts to bring this new product into GHRSSST!

2007-12-07: GHRSSST Archive tops 9 Terabytes and a half of a million files
Today the GHRSST Long Term Stewardship and Reanalysis Facility archive holdings exceeded 9 terabytes (compressed, approximately 180 terabytes uncompressed) and over 500,000 netCDF data files. Archive operations continue to ingest about 1000 netCDF files containing roughly 23 gigabytes of data per day. In the coming weeks, the LTSRF also expects to begin receiving new global L4 analysis products as well as regional analysis products for the Mediterranean and North Sea/Baltic Sea regions.

2007-11-08: MetOp-A AVHRR Global Area Coverage data now available!
The US Naval Oceanographic Office (NAVO) has begun delivering Global Area Coverage data from the AVHRR onboard the MetOp-A platform. This dataset begins with observations on 26 September 2007. Thanks to Doug May and his team from NAVO for adding this important dataset to the GHRSST collection!

2007-11-01: Two new RSS Feeds added to GHRSST LTSRF
The GHRSST LTSRF site now has two new RSS feeds to go along with this feed: one is an Operational Messages feed and the other is an automated Operational Status feed. The Operational Status feed is updated manually whenever changes occur in the archival processes. The Operational Status Feed is updated automatically each day and indicates the red/yellow/green status of the archival processes and how many Archival Information Packages (AIPs, or NODC Accessions) were ingested into the archive that day. The status is set to "red" when no AIPs were ingested, "yellow" when between 1 and one less than the typical number ingested each day are ingested (currently, the typical number is 20), and "green" when the typical number or more are ingested (more than the expected or typical number can be ingested when backlogs are being processed).

2007-10-17: "The GHRSST Archive Today" automatic updates on LTSRF site
The GHRSST LTSRF web site now displays on its home page daily-updated metrics showing archive volume, number of netCDF files, and the number of NODC accessions. Look under the heading, "The GHRSST Archive Today". These metrics are updated by a process which begins automatically each day at 0700 UTC and normally concludes by 0900 UTC.

2007-10-12: GHRSST LTSRF publishes RSS Feed
The GHRSST Long Term Stewardship and Reanalysis Facility (LTSRF) is now publishing a GHRSST LTSRF RSS news feed linked to this news page. Users subscribing to this feed will be provided with occasional updates and announcements from the GHRSST archives, including announcements of new product lines, planned (and unplanned!) service outages, and other items of interest to users of GHRSST data.

2007-08-30: GHRSST Article in Bulletin of the American Meteorological Society Published
The Bulletin of the American Meteorological Society (BAMS) paper on the GODAE High Resolution SST project (GHRSST) was published this month: C. Donlon, I. Robinson, K. S. Casey, J. Vazquez-Cuervo, E. Armstrong, O. Arino, C. Gentemann, D. May, P. LeBorgne, J. Piollé, I. Barton, H. Beggs, D. J. S. Poulter, C. J. Merchant,
2007-07-28: GHRSSST archive now exceeds 6 Terabytes!
The compressed volume of the GHRSSST archive now exceeds 6 Terabytes, 351,000 netCDF files, and 27,000 accessions. Please see the LTSRF Statuspage for details and for graphical representations of the archive holdings.

2007-07-10: GHRSSST Data Now Available back to 1985!
Thanks to Dr. Richard Reynolds and his team at NOAA's National Climatic Data Center, GHRSSST now has Level 4 gap-free analysis SSTs available back to 1985. These data are daily, 25 km resolution and created by optimally interpolating AVHRR Pathfinder V5 datafor the 1985-2005 portion and Operational AVHRR data for the more recent periods. These data are now available through the LTSRF. See the Access GHRSSST Data page access these data.

Thanks to Dr. Chelle Gentemann and her team at the Remote Sensing Systems RDAC, GHRSSST formatted data for AMSR-E and TMI are now back to 2002 and 1998, respectively. These data are now available through the LTSRF. See the Access GHRSSST Data page access these data.
Annex 3: Recent LTSRF RSS Automated Operational Status Messages

2008-05-15: Ingested 52 new AIPs into NODC LTSRF - Status Green
GHRSST archival status is "Green": 52 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-14: Ingested 1 new AIP into NODC LTSRF - Status Yellow
GHRSST archival status is "Yellow": 1 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-13: Ingested 11 new AIPs into NODC LTSRF - Status Yellow
GHRSST archival status is "Yellow": 11 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-12: Ingested 39 new AIPs into NODC LTSRF - Status Green
GHRSST archival status is "Green": 39 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-11: Ingested 52 new AIPs into NODC LTSRF - Status Green
GHRSST archival status is "Green": 52 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-10: Ingested 0 new AIPs into NODC LTSRF - Status Red
GHRSST archival status is "Red": 0 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".

2008-05-09: Ingested 12 new AIPs into NODC LTSRF - Status Yellow
GHRSST archival status is "Yellow": 12 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".
2008-05-08: Ingested 40 new AIPs into NODC LTSRF - Status Green
GHRSSST archival status is "Green": 40 new out of an expected
26 Archival Information Packages (AIPs) were added today to the LTSRF
archive at NODC. An AIP contains one day of data from one RDAC for one sensor
or blended product. An AIP is also known as an NODC "accession".
## Annex 4: RAN-TAG Membership

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