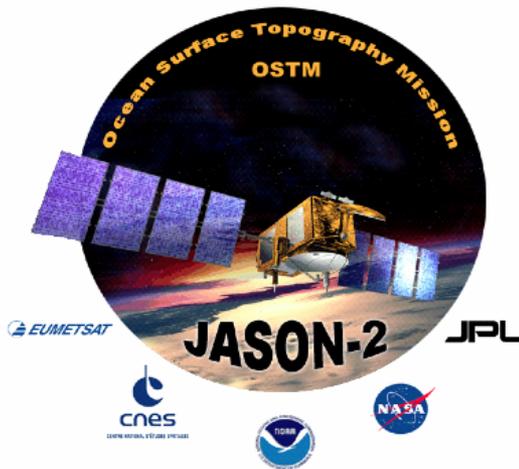


NODC's Data Stewardship for Jason-2 and Jason-3

Ocean Surface Topography Science Team Meeting
October, 2013



Dr. Deirdre A. Byrne
Dr. Yongsheng Zhang
NOAA/NODC





What is NODC?

- **NODC was founded in 1961 as part of the Naval Oceanographic Office**
- **One of three national environmental data centers operated by NOAA.**
- **NODC holds the world's largest collection of publicly available oceanographic data with approximately 100,000 individually archived data sets.**
- **Mission to provide scientific stewardship of marine data and information – extremely broad - scope is all oceanographic data and information of scientific interest - not just NOAA data. (This of course is how we ended up with 100k datasets).**
- **Policy is to preserve data for 75 years or as long as scientifically significant – somewhat different than the original scope of the NASA DAACs and has given rise to the arrangement seen in GHRSSST, where the PO.DAAC serves as the GDAC and NODC serves as the LTSRF.**
- **However, there is no doubt that the mission of NODC and the mission of the PO.DAAC, in particular, overlap in the area of Ocean Surface Topography – not to mention AVISO. Careful and close coordination is required.**



Altimetry User Communities Defined

**High
volume,
Low
assistance**

- **Jason-2/3 Science Working Teams (SWT):** Level of expertise: Highest. SWT members monitor instrument performance, apply calibrations, specify reprocessing requirements and schedule and so on.
- **Ocean Surface Topography Science Team (OSTST):** Level of expertise: high. OSTST members are data users but also data producers. They help define the data formats, products and protocols that should be routinely supported.

**Medium
volume,
medium
assistance**

- **Scientists without subject expertise in altimetry:** most agency clients (e.g. NOAA's NCCOS, NMS and HPC), and academics such as ecologists, chemical and biological oceanographers. Level of expertise: low to intermediate. These users often have a high-level understanding of what altimetry can provide but lack the technical skill or familiarity to manipulate the data. They tend to be primary drivers for routine, value-added products such as gridded fields and derived products such as currents and heat content.

**Low
volume,
high level of
assistance,**

- **Non-specialists** conducting scientific research or planning: undergraduates, geospatial information system (GIS) users. Level of expertise: low. These users are aware of the existence of satellite altimetry and have some idea of the information it might provide, but often need individual help accessing the data or reformulating it into a product such as a time series or georeferenced image.
- **The general public:** Level of expertise: low to non-existent. These users are often seeking general ocean information and have no prior awareness of satellite altimetry. Sample users: individuals wanting wave height statistics.



Altimetry User Communities in Practice

Jason-2 annual data download volume XXXXXXXXXX
XXXXXXXXXX users (based on IP address)
XXXXXXXXXX million files
over XXXXXXXXX% of the annual volume of new data

**ACCESS STATISTICS
UNAVAILABLE DUE TO
US GOVERNMENT SHUTDOWN**

- **Science Working Teams (SWTs)** and **Ocean Surface Topography Science Team (OSTST)**: XXX user queries in past 12 months, primarily when a service outage or product delivery delay occurred.
- **Scientists with subject expertise in altimetry**: Current examples include the Gulf of Mexico Digital Atlas, a combined federal-state partnership to provide information to support the *Gulf Coast Restoration Support Plan*, NCCOS, NMS and NHC, with whom we are working to define needs.
- **Non-specialists**: E.g., XXX% of user requests to the NODC satellite team in past 12 months have been for information/data in GIS-ready format.
- **The general public**: Sample users: individuals wanting wave height statistics. XXX users in the past 12 months requested “radar information” or wave data.



Data Services @ NODC

Available since 2011 or prior

Data Discovery services (all files)

- Federal Geospatial Digital content (FGD) compliant metadata published via a Web Accessible Folder (WAF) supporting the NOAA Global Earth Observation Integrated Data Environment (GEOIDE) and Geospatial One-Stop (GOS).
- GEO 19115-2 metadata published through WAF
- Catalog Service for the Web (CSW) through the ArcGIS Geoportal

Data Access services - Level 2 data (science data)

- FTP
- HTTP
- C/F TileWAP server
- Web Coverage Service (WCS)
- THREDDS Data Service (TDS)

Data Archive services (all files)

- Archival storage in the Comprehensive Large Array-data Stewardship System (CLASS) (provision of versioning, offline backup and redundancy)
- Additional data quality monitoring/notification for delayed-mode Level-2 products

**BASIC DATA ACCESS
STILL AVAILABLE AT
http://data.nodc.noaa.gov/jason2
METADATA NOT CURRENTLY BEING
US GOVERNMENT SHUTDOWN**



NODC Jason-2 home page:

<http://www.nodc.noaa.gov/SatelliteData/Jason2/>

NODC Jason-2 Archive

http://www.nodc.noaa.gov/SatelliteData/Jason2/

NOAA NATIONAL OCEANOGRAPHIC DATA CENTER (NODC) UNITED STATES DEPARTMENT OF COMMERCE

You are here: [NODC Home](#) > [Satellite Oceanography Group](#) > [NODC Jason-2 Archive](#)

NODC Jason-2 Archive

Latest Data News

Introduction

This site contains an overview of the NOAA services being provided by the National Oceanographic Data Center (NODC) for the Jason-2 satellite altimetry mission (note: Jason-2 is also known as the Ocean Surface Topography Mission or OSTM) and for Jason-3, which is scheduled for launch in April, 2014.

Background

The Jason-2 satellite launched 20 June 2008 and is the latest in a series of ocean altimeter missions designed to observe ocean circulation, sea level rise, and wave heights. Earlier altimeter missions include [Geosat](#) and [Geosat Follow-On](#) satellites, which flew in 1985-1989 and 1998-2000, respectively, and the [TOPEX/Poseidon](#) (1992-2005) and [Jason-1](#) (2001-present) missions, which were launched into the same orbit now operated by Jason-2. Jason-2 is currently flying in what is known as the "reference" orbit. Jason-1 continues to operate today in a similar "interleaved" orbit, offset by approximately 5 days and 0.7 degrees longitude at the equator from Jason-2.

Level-2 X-GDR Data Access

- **HTTP:** <http://data.nodc.noaa.gov/jason2/>
- **FTP:** <ftp://ftp.nodc.noaa.gov/pub/data.nodc/jason2/>
- **OPeNDAP:** <http://data.nodc.noaa.gov/opendap/jason2/>
- **THREDDS:** <http://data.nodc.noaa.gov/thredds/catalog/jason2/catalog.html>
- **OSTM/Jason-2 and Jason-3 Products Handbook**

Quality Monitoring of the Science Data

For deriving long-term quality measurements on Jason satellite data, we have developed a climate science quality monitoring system. This system uses the [Rich Inventory](#) concept developed at NGDC, providing a searchable database for tracking and discovering data quality, metadata, and data set attributes. A near real time data quality check comprising of 8 statistics calculated on 23 parameters is performed as each Level-2 data file is ingested into NODC's archives.

- **Quality Monitoring:** [Jason-2 GDR and IGDR quality monitoring](#)

Jason-2 News from the Archives

Subscribe to RSS feed [[What is RSS?](#)]

- **2011-08-01: OGDR with reduced latency at NODC through directly downloading from DDS/ESPC**
NODC started to download the OGDRs directly from Data Distribution Server(DDS) at ESPC. We are now replicating the OGDR on data.nodc.noaa.gov within one hour of its appearance on the DDS.
- **2010-07-01: Drop of Jason 2 Data on 06/23/10 to 06/24/10**
OGDR ssha values between 12:00 UTC on 23-Jun-2010 and 12:00 UTC on 24-Jun-2010 have been set to missing.
- **2010-03-04: Jason-2 Cycles 57-60 Reprocessed IGDR Data**
1752 reprocessed Jason-2 IGDR, S-IGDR, and IGDR-SSHA files, from cycle-057 pass-197 through cycle-060 pass-018, were received from CNES and replaced at CLASS.

Archive

1. Requirements
2. Strategy
3. Submission Agreement
4. Services

SOG NODC NOAA CLASS AVHRR SST GODAE MPMC GAC RSMAS GHRSSST-PP MCSST NLSST SeaWIFS OAIS AIP SIP DIP GOSTA NPOESS VIIRS OPeNDAP DODS LAS HRPT LAC GAC HDF-SDS DMAC PO.DAAC LTRSF CoRTAD

[Access Data](#) - [Submit Data](#) - [Site Map](#) - [Intended Use of the Data?](#) - [Online Store](#) - [Customer Service](#)



STILL FUNCTIONING - BUT UNMAINTAINED DURING SHUTDOWN



Data access: THREDDS Data Server

NODC
National Oceanographic Data Center



NODC TDS

THREDDS Data

Server

Catalog

http://data.nodc.noaa.gov/thredds/catalog/jason2/gdr/gdr_ssh/cycle114/catalog.html

Dataset: cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200

- ID: jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200

Access:

1. **OPENDAP:** /thredds/dodsC/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
2. **HTTPServer:** /thredds/fileServer/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
3. **WCS:** /thredds/wcs/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
4. **WMS:** /thredds/wms/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
5. **NCML:** /thredds/ncml/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
6. **UDDC:** /thredds/uddc/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200
7. **ISO:** /thredds/iso/jason2/gdr/gdr_ssh/cycle114/JA2_GPR_2PTP114_254_20110816_093547_20110816_103200

Dates:

- 2011-10-11 01:22:31Z (modified)

Viewers:

- NetCDF-Java ToolsUI (webstart)
- Godiva2 (browser-based)

**STILL FUNCTIONING -
BUT UNMAINTAINED
DURING SHUTDOWN**



Data Visualization: Live Access Server (LAS)

**STILL FUNCTIONING -
BUT UNMAINTAINED
DURING SHUTDOWN**

Close

Datasets

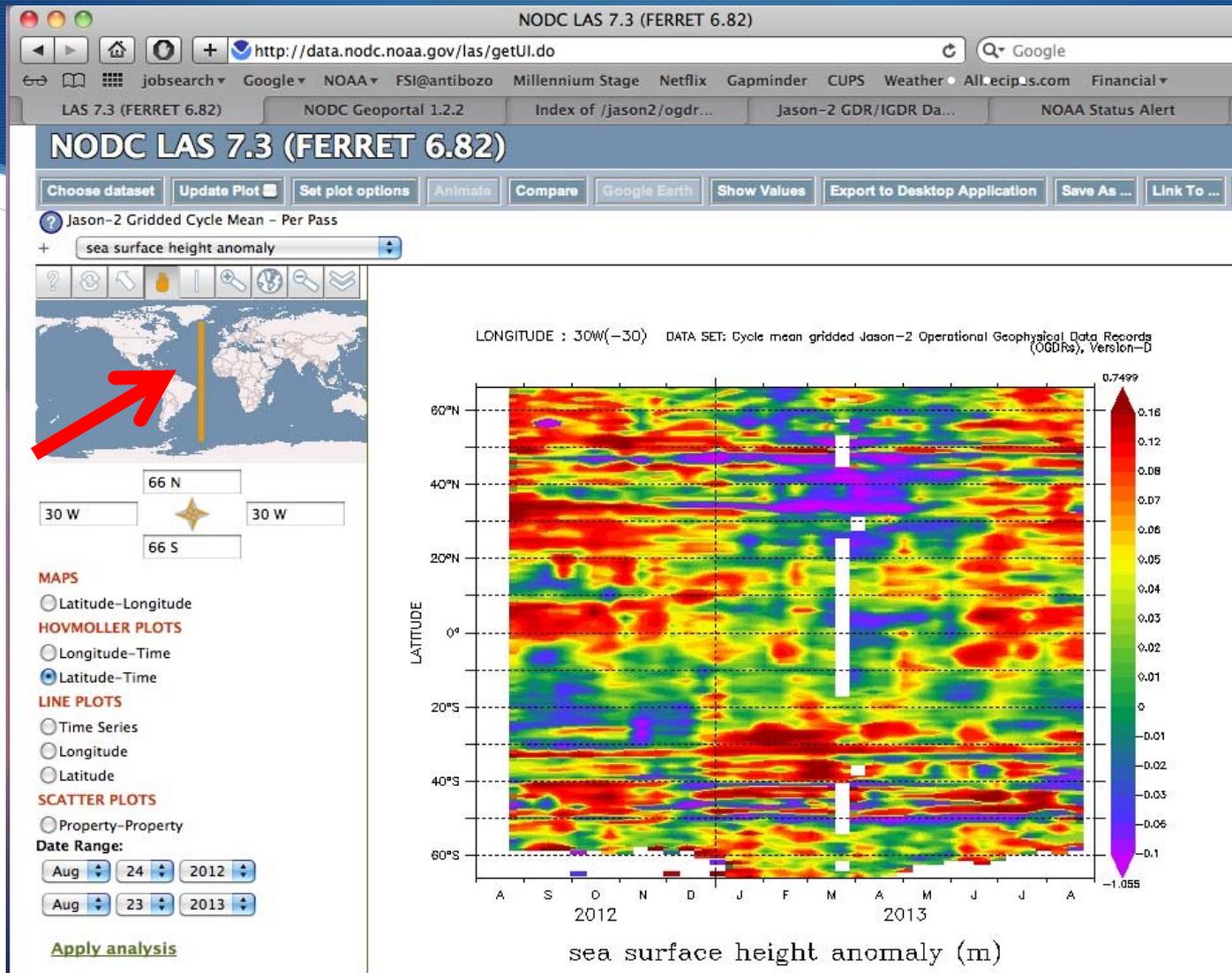
- AVHRR Pathfinder SST Climatology at 9 km
- CoRTAD
- Experimental Datasets, Under Testing
- GCOS
- GHRSSST - Aggregation
- Jason-2 Granule Statistics - Per Pass
- Jason-2 Gridded Cycle Mean - Per Pass
 - Geophysical Data Records (GDRs)
 - Interim Geophysical Data Records (IGDRs)
 - Operational Geophysical Data Records (OGDRs)
 - Ku band corrected significant waveheight
 - altimeter wind speed
 - model wet tropospheric correction
 - radiometer water vapor content
 - radiometer wet tropospheric correction
 - radiometer wind speed
 - sea surface height anomaly
- NODC
- Pathfinder 5.2 RI Statistics
- Version 5.0/5.1 AVHRR Pathfinder Sea Surface Temperature
- Version 5.2 AVHRR Pathfinder Sea Surface Temperature
- World Ocean Atlas 09

Operational Geophysical Data Records (OGDRs), Version-D

sea surface height anomaly (m)



Data Visualization: LAS



Hovmoller
of Atlantic
SSH
anomaly
derived
from
OGDR.



Data access and visualization



Radar Altimeter Data Acquisition from RADS



Data selection
Output data:
<input checked="" type="checkbox"/> Time
<input checked="" type="checkbox"/> Latitude
<input checked="" type="checkbox"/> Longitude
<input checked="" type="checkbox"/> sea level anomaly
<input type="checkbox"/> significant wave height
<input type="checkbox"/> backscatter coefficient
<input type="checkbox"/> wind speed



**STILL FUNCTIONING -
BUT UNDERLYING
DATABASE UNMAINTAINED**

Search the NODC Archive

Search metadata content, e.g. title:SST; use + to require keywords, e.g. +water +temperature;

use "" to search for an exact phrase, e.g. "water temperature"

(Search tips!)

Additional Options

Clear

WHEN

Dates overlap range Dates within range

From: (yyyyymmdd)

To: (yyyyymmdd)

WHERE

Zoom the map to desired area and choose "intersecting" or "fully within"

You can zoom the map by shift-click-dragging a bounding box

Anywhere Intersecting Fully within

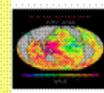


Results 1-6 of 6 record(s)

Expand results [Zoom To Results](#) [Zoom To Searched Area](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Level-2 Geophysical Data Records \(GDR\) \(NODC Accession 0043269\)](#)

OSTM/JASON-2 is a follow-on mission continuing the TOPEX/Poseidon and Jason-1, and is designed to ensure continuity of high quality measurements for ocean science and to provide operational products for assimilation and forecasting applications. The Jason...



[Website](#) [Details](#) [Metadata](#) [Download](#) [Search Granules](#) [LAS](#) [TDS](#) [OPeNDAP](#)
[Zoom To](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Telemetry \(NODC Accession 0044986\)](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Ancillary Files \(NODC Accession 0044982\)](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Near Real-Time Altimetry Validation System \(NRTAVS\) QA Reports \(NODC Accession 0044984\)](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Orbital Information \(NODC Accession 0044985\)](#)

[Ocean Surface Topography Mission \(OSTM\) /Jason-2: Auxiliary Files \(NODC Accession 0044983\)](#)

Search

Search metadata content, e.g. title:SST; use + to require keywords, e.g. +water +temperature;
use "" to search for an exact phrase, e.g. "water temperature"

Additional Options

WHEN

Dates overlap range Dates within range

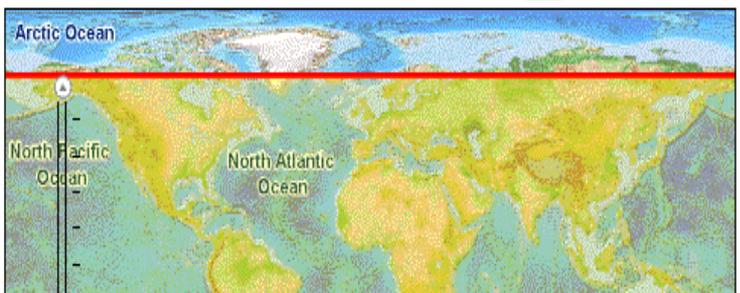
From: ... (yyyymmdd)

To: ... (yyyymmdd)

WHERE

Zoom the map to desired area and choose "intersecting" or "fully within"
You can zoom the map by shift-click-dragging a bounding box

Anywhere Intersecting Fully within



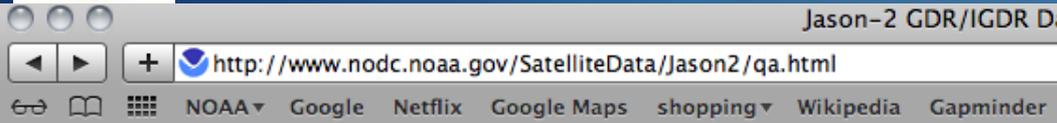
Results 1-25 of 26006 record(s)

Expand results [Zoom To Results](#) [Zoom To Searched Area](#)

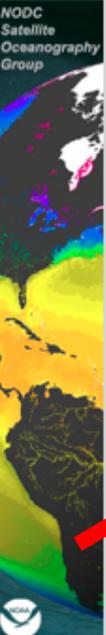
- [J2 OGDR new](#)
- [JA2_OPN_2PdS156_205_20121003_233159_20121004_012811.nc](#)
[Open](#) [Preview](#) [Details](#) [Metadata](#) [CLOUD](#) [WMS](#) [Download](#) [WCS](#) [TDS](#)
[OPeNDAP](#) [FTP](#) [Zoom To](#)
- [JA2_OPN_2PdS156_208_20121004_012810_20121004_045422.nc](#)
- [JA2_OPN_2PdS156_211_20121004_045421_20121004_064844.nc](#)
- [JA2_OPN_2PdS156_213_20121004_064843_20121004_084739.nc](#)
- [JA2_OPN_2PdS156_215_20121004_084738_20121004_104613.nc](#)
- [JA2_OPN_2PdS151_015_20120807_234038_20120808_013726.nc](#)
- [JA2_OPN_2PdS151_018_20120808_013725_20120808_033345.nc](#)
- [JA2_OPN_2PdS151_020_20120808_033346_20120808_052059.nc](#)
- [JA2_OPN_2PdS150_115_20120801_232001_20120802_011750.nc](#)
- [JA2_OPN_2PdS150_118_20120802_011750_20120802_031403.nc](#)
- [JA2_OPN_2PdS150_120_20120802_031402_20120802_051024.nc](#)



Quality monitoring (QM) of O/I/GDRs



You are here: [NODC Home](#) > [Satellite Oceanography Team](#) > [NODC Jason-2 Archive](#) > GDR/IGDR Data Quality Monitoring

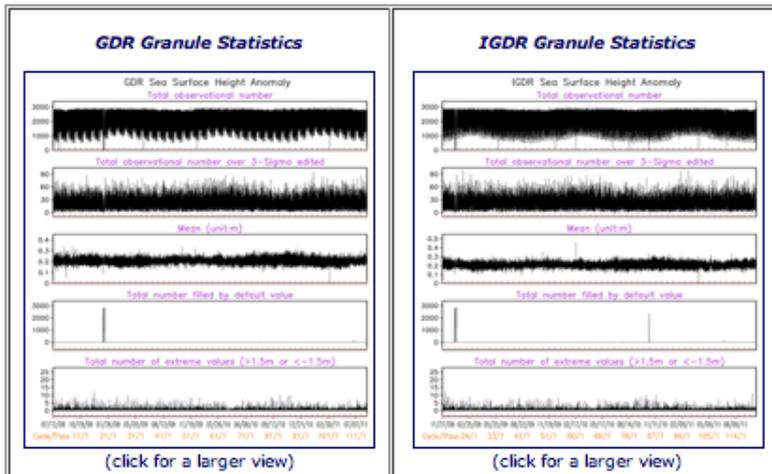


Jason-2 Geophysical Data Record (GDR) and Interim GDR Data Quality Monitoring

The data quality monitoring (DQM) system developed by the satellite oceanography team at NODC is based on the concept of a Rich Inventory developed by the Enterprise Data Systems Group at the National Geophysical Data Center (NGDC). The principle concept of a Rich Inventory is to calculate statistics for selected parameters as files are received and ingested into the archive, store them in a database, and make them available to users and managers of the archive. A "granule" is the smallest data unit over which statistics are calculated - in this case, one pass (half-orbit) of the Jason-2 satellite. Thus, the DQM produces 254 statistical estimates per cycle, one for each pass.

Below are some representative statistics calculated from the selected parameters in a granule as it is ingested into NODC's archive. Parameters we monitor include sea surface height anomaly, Ku-band significant wave height, altimeter wind speed, the difference between altimeter and radiometer wind speeds, the radiometer water vapor content, and the difference between the radiometer and model wet tropospheric corrections.

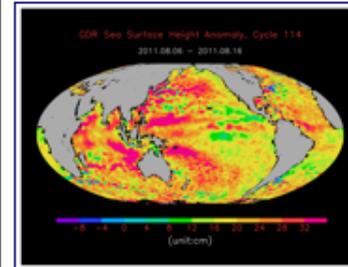
- [Take me to the Data Quality Monitoring Interface](#)



Statistics for other parameters:

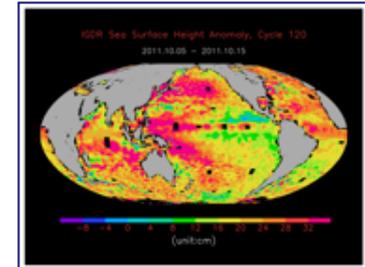
- Significant wave height (Ku Band): [GDR](#); [IGDR](#)
- Altimeter wind speed: [GDR](#); [IGDR](#)
- Difference between radiometer wet tropospheric and model correction: [GDR](#); [IGDR](#)
- Difference between altimeter and radiometer wind speed: [GDR](#); [IGDR](#)
- Radiometer water vapor content: [GDR](#); [IGDR](#)

Latest GDR Sea Surface Height Anomaly (gridded to 3.0x1.0 longitude/latitude)



(click for a larger view)

Latest IGDR Sea Surface Height Anomaly (3.0x1.0 longitude/latitude)



(click for a larger view)

Observations for other parameters:

- Significant wave height (Ku Band): [GDR](#); [IGDR](#)
- Altimeter wind speed: [GDR](#); [IGDR](#)
- Difference between radiometer wet tropospheric and model correction: [GDR](#); [IGDR](#)
- Difference between altimeter and radiometer wind speed: [GDR](#); [IGDR](#)
- Radiometer water vapor content: [GDR](#); [IGDR](#)

Observations gridded to 0.25x0.25 longitude/latitude:

- Sea surface height anomaly: [GDR](#); [IGDR](#)
- Significant wave height (Ku Band): [GDR](#); [IGDR](#)
- Altimeter wind speed: [GDR](#); [IGDR](#)
- Difference between radiometer wet tropospheric and model correction: [GDR](#); [IGDR](#)
- Difference between altimeter and radiometer wind speed: [GDR](#); [IGDR](#)
- Radiometer water vapor content: [GDR](#); [IGDR](#)



Quality monitoring of O/I/GDRs

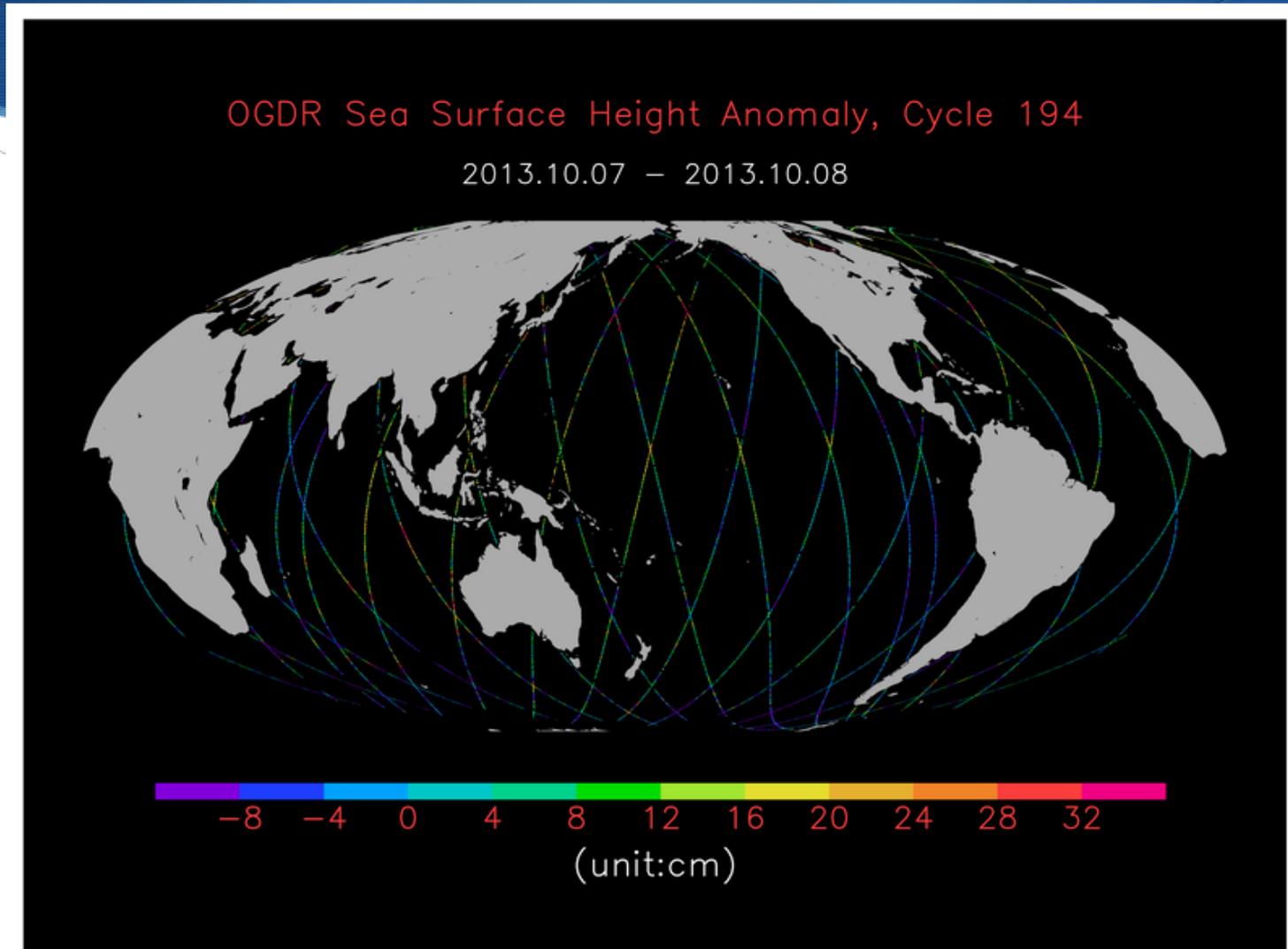
SIX KEY PARAMETERS

- Sea surface height anomaly
- Ku-band significant wave height
- Altimeter wind speed
- Difference between altimeter and radiometer wind speeds
- Radiometer wet tropospheric correction
- Difference between the radiometer and model wet tropospheric corrections

COMPUTED, PUBLISHED and MONITORED through:

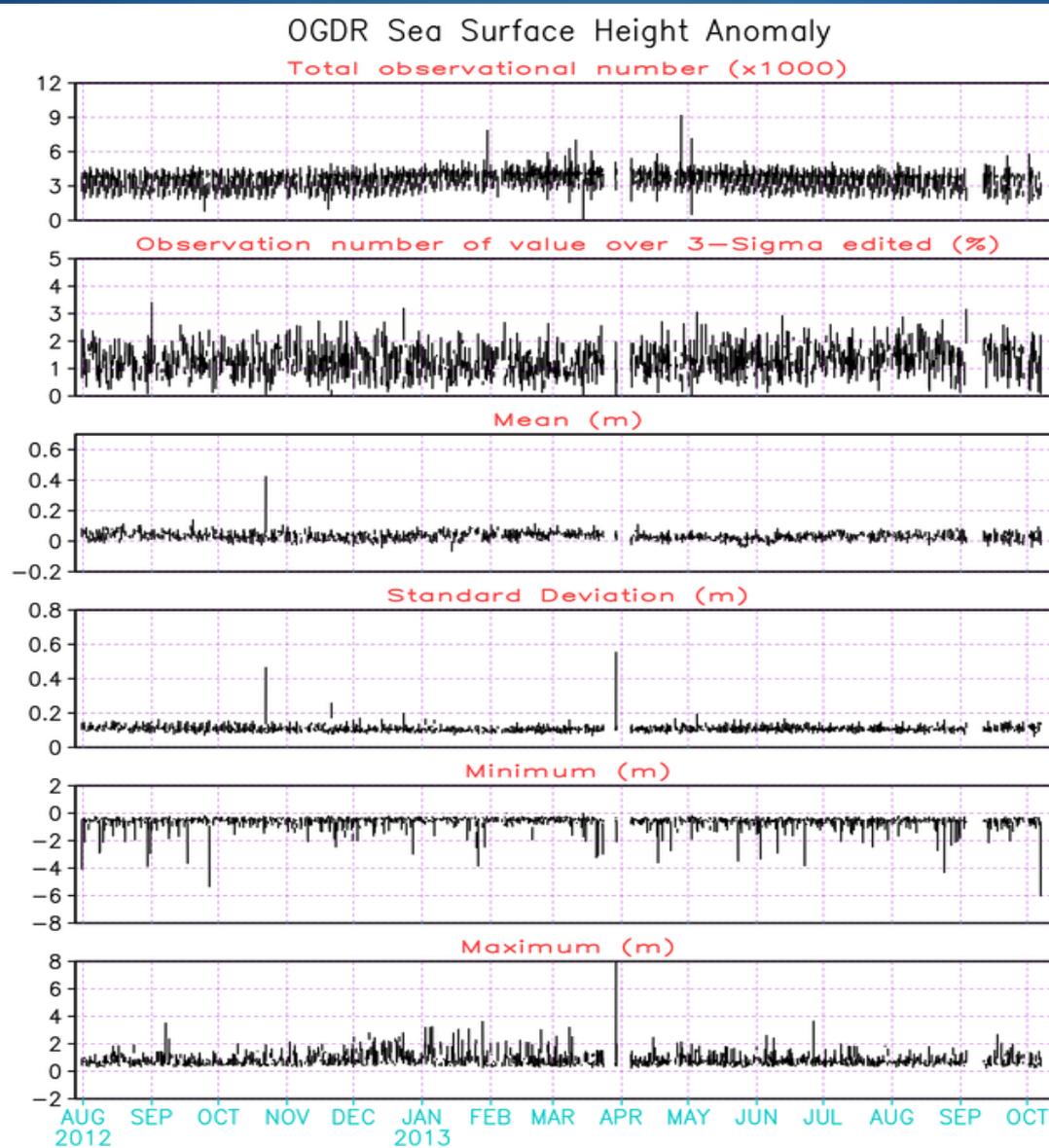
1. LAS server visualization of the QA statistics at NODC and public access to the NetCDF-format statistical values - robust and simple. NODC Jason-3 Real-time QA assurance homepage.
2. NODC Jason-3 RSS Feed of operational status and automated notification service if any predefined conditions met (e.g., to Project Scientist and/or Systems or Archive and Access Engineers)

Quality monitoring of O/I/GDRs





Quality monitoring of O/I/GDRs

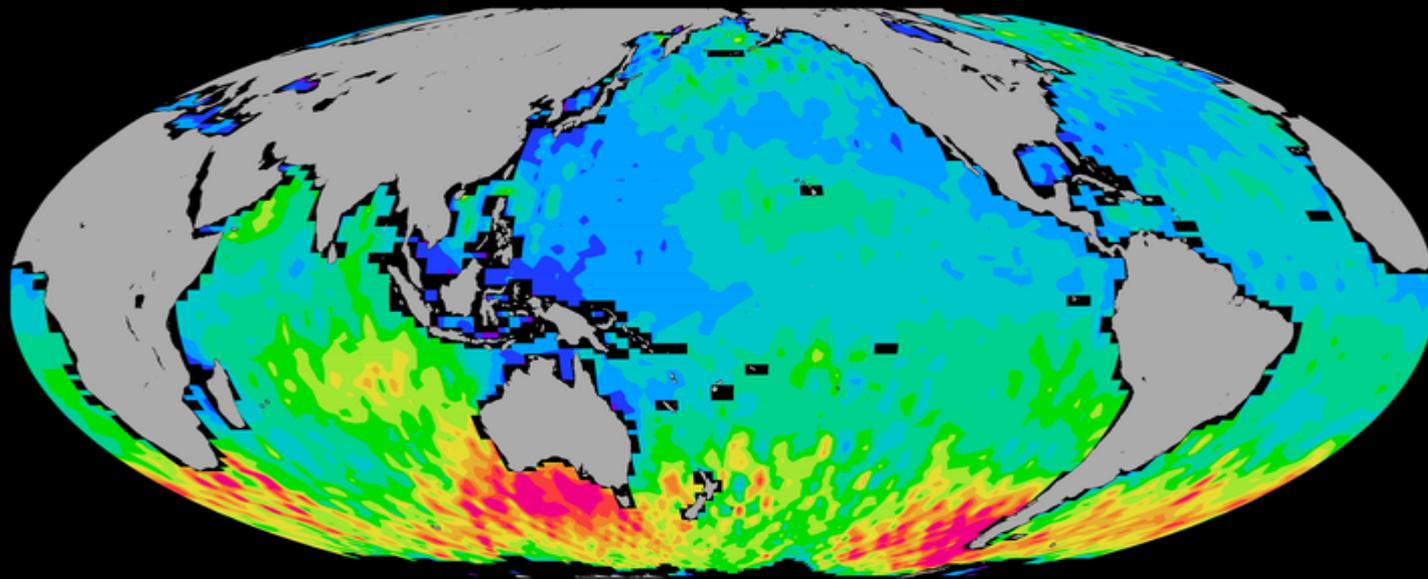


Quality monitoring of O/I/GDRs



GDR Ku Band Significant Waveheight, Cycle 188

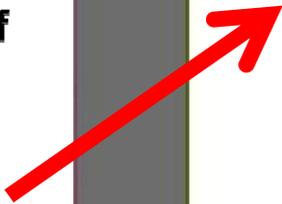
2013.08.09 – 2013.08.19





On-line visualization of QM using LAS

**Can plot
radiometer-
model water
vapor
difference
for yourself
using the
LAS
interactive
interface.**



NODC LAS 7.3 (FERRET 6.82)

http://data.nodc.noaa.gov/las/getUI.do

jobsearch Google NOAA FSI@antibozo Millennium Stage Netflix Gapminder CUPS W

NODC LAS 7.3 (FERRET 6.82) NODC Geoportal 1.2.2 Index of /jason2/ogdr/ogdr...

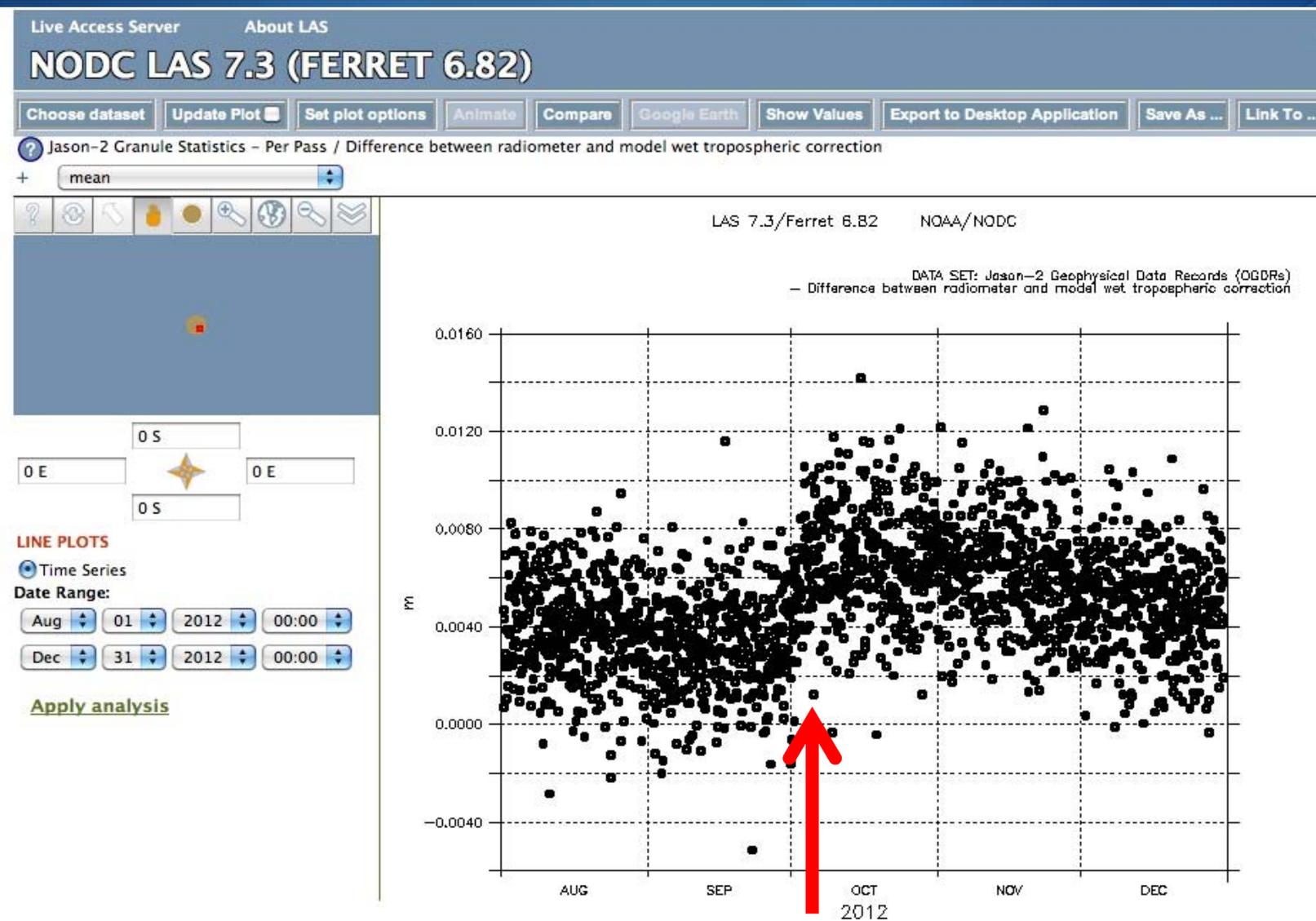
Close

Datasets

- AVHRR Pathfinder SST Climatology at 9 km
- CoRTAD
- Experimental Datasets, Under Testing
- GCOS
- GHRSSST - Aggregation
- Jason-2 Granule Statistics - Per Pass
 - Geophysical Data Records (GDRs)
 - Interim Geophysical Data Records (IGDRs)
 - Operational Geophysical Data Records (OGDRs)
 - Altimeter wind speed
 - Difference between altimeter and radiometer wind speed
 - Difference between radiometer and model wet tropospheric correction
 - Ku band corrected significant waveheight
 - Radiometer water vapor content
 - Sea surface height anomaly
 - Valid Observation Number
 - number of over 3-Sigma edited
 - mean
 - standard deviation
 - minimum
 - maximum
- Jason-2 Gridded Cycle Mean - Per Pass
- NODE
- Pathfinder 5.2 PL Statistics



On-line visualization of QM using LAS





NODC's Data Stewardship for Jason-2 and Jason-3

*Thank you for your time
and attention!*

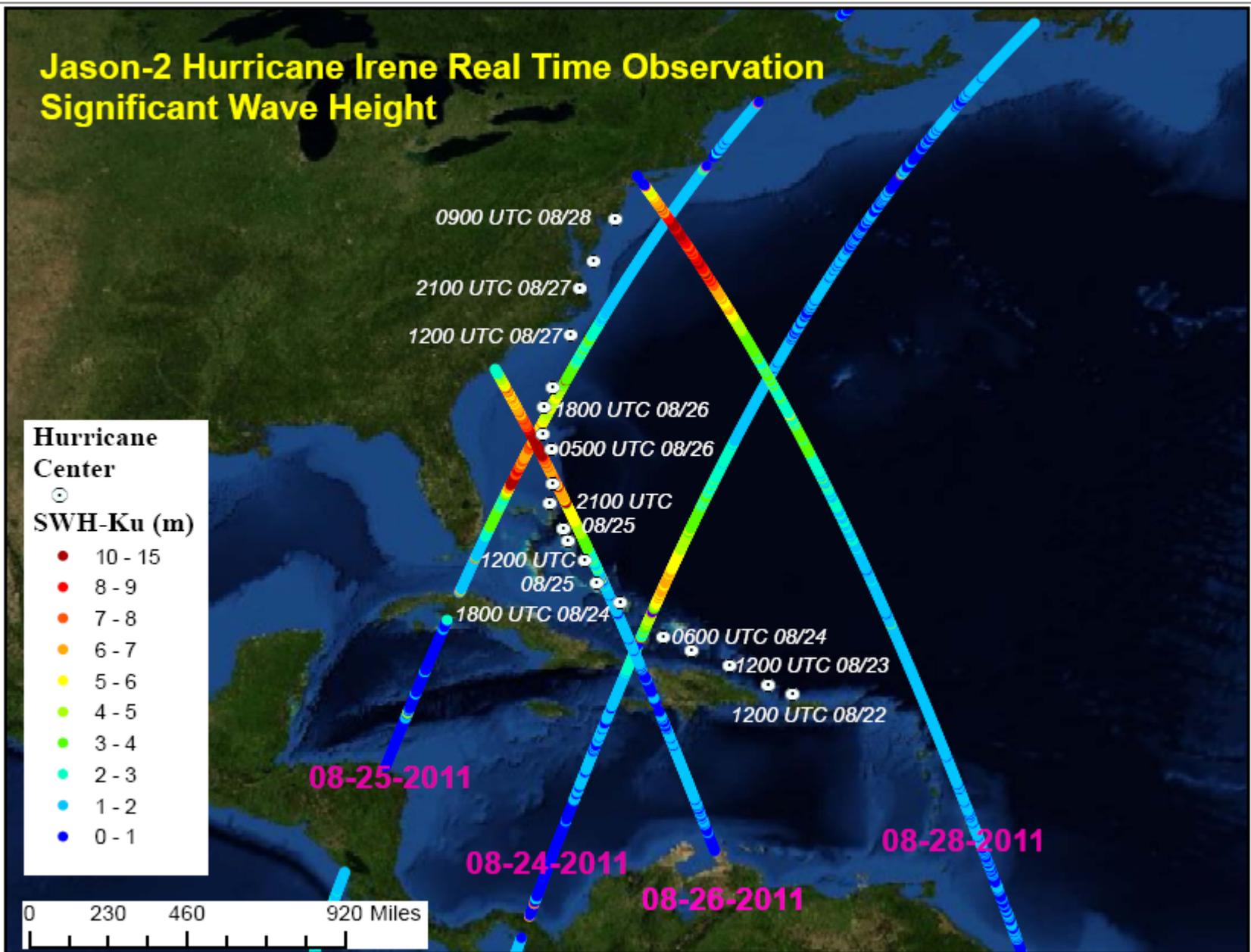


Spare slides follow



NODC Jason-2 data visualization services

Jason-2 Hurricane Irene Real Time Observation Significant Wave Height



Jason-2 H
Significan

Hurricane
Center

SWH-Ku (m)

●	10 - 15
●	8 - 9
●	7 - 8
●	6 - 7
●	5 - 6
●	4 - 5
●	3 - 4
●	2 - 3
●	1 - 2
●	0 - 1

Octol

0 230 460 920 Miles



Dashboard monitoring (under development)

Take me to the [GDR](#) →

Jason-3 IGDR - SLA

	Cycle	278	277	276	275	274
Pass	1	○	●	●	●	●
	2	○	●	●	●	●
	...	●	●	●	●	○
	254	●	●	●	●	●

QA Key:





Dashboard monitoring (under development)

Jason-3 IGDR – SLA Cycle 278

Take me to the [GDR](#) →

Pass	SLA	SWH-Ku	U_{alt}	$U_{alt}-U_{rad}$	RWT	RWT-MWT
1	●	●	●	●	●	●
2	●	●	●	●	●	●
...	●	●	●	●	●	●
254	●	●	●	●	●	●

QA Key:

- Excellent
- Good
- Fair
- Poor



Dashboard monitoring (under development)

Jason-3 IGDR – SLA Cycle 278

Take me to the [GDR](#) →

Pass	SLA	SWH-Ku	U_{alt}	$U_{alt}-U_{rad}$	RWT	RWT-MWT
1	●	●	●	●	●	●
2	●	●	●	●	●	●
...	●	●	●	●	●	●
254	●	●	●	●	●	●

QA Key:

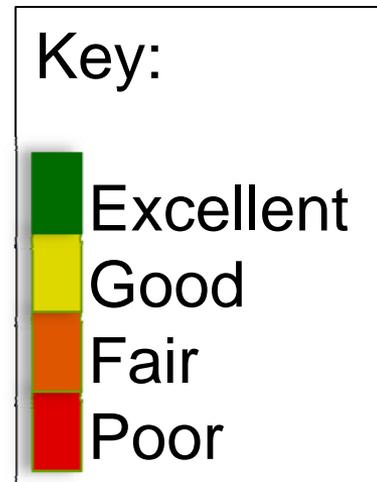
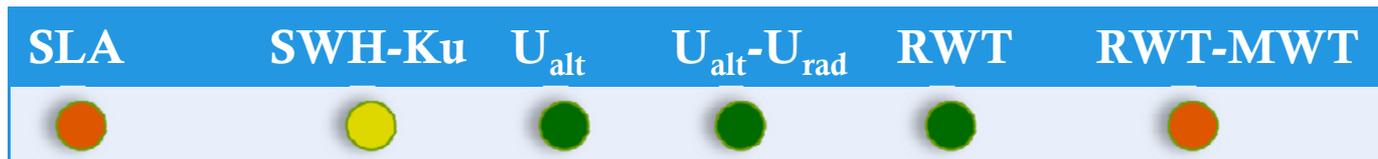




Dashboard monitoring (under development)

[Back to grid](#) →

Jason-3 IGDR – Cycle 278 Pass 2





NODC Service Provision Model

ESPC (frames, packets, telemetry, Level-2 data)

DDS

NODC
(ingest via CLASS)

Immediate data processing: dumping and QA statistics calculation
(Fortran, Perl, c-shell scripts, xml, html ..)

(a new mission datatype)

These steps plus computation of checksums = validation

Generate simple data monitoring and QA graphics

Automated Granule QA monitoring and notification.

Update anomaly table and populate with low-level QA information

NOAA Jason-2/3 homepage with daily updates.

NODC access and visualization services using LAS, GrADS, OpenDAP, Geoportal Extension, etc.

NGDC RI database and interface for QA statistics



NJGS Data Quality Monitoring System: NODC QM System and Rich Inventory

Jason-2/3 Rich Inventory (JRI) is a granule metadata management and quality monitoring tool, developed as a NODC/NGDC collaboration. JRI provides:

A database management mechanism for tracking data quality, metadata, and data set attributes. Smallest segment of data monitored = “granule”.

Tracks eight QA statistics and attributes for over 20 Jason-2 parameters for O/I/GDR data, and makes the results available to data manager and public users via a web interface in both graphical and numerical representations.

Performs an immediate quality check when granules are ingested into NODC's archives.