



Using Emergency Response Imagery from NOAA

Jon Sellars / Jason Woolard

Webinar

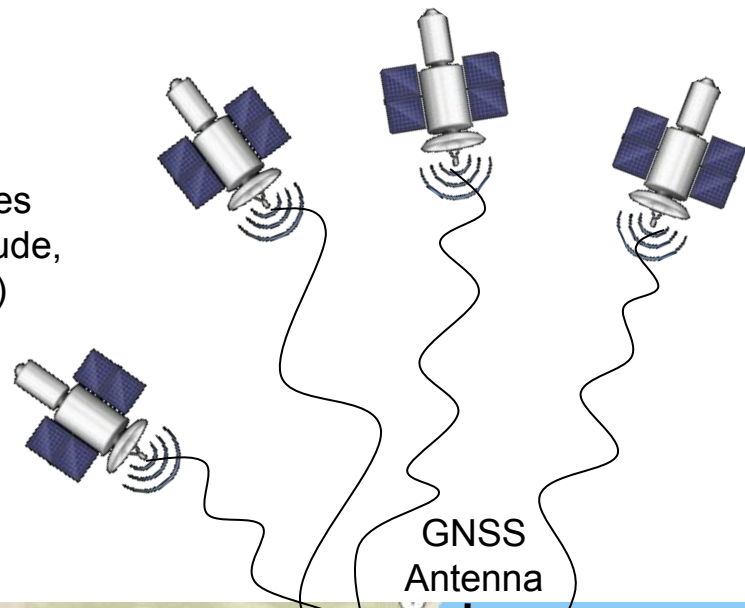
2023-05-11T14:00:00-04:00

Emergency Response Imagery at NOAA

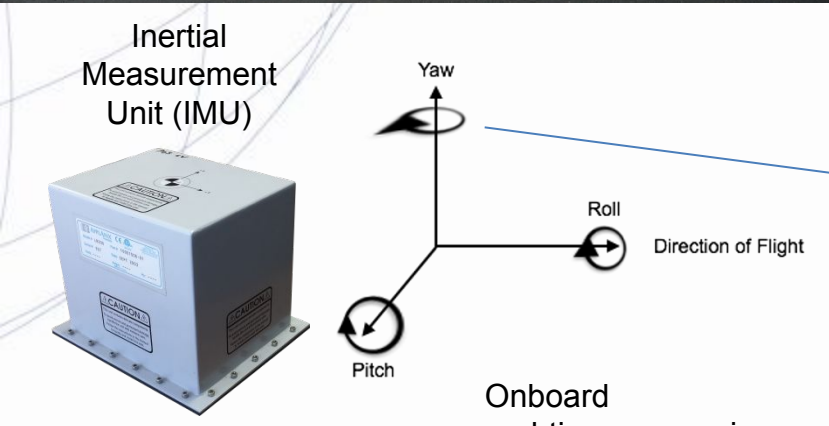
- Remotely sensed data are acquired to support NOAA's homeland security and emergency response requirements as part of the National Response Plan
- Requirements are shared and received through interagency coordination that includes state and local representation
- The remotely sensed data collected are public domain and disseminated to federal, state, and local government agencies as well as the general public to facilitate support efforts
- Primary goal is the rapid delivery of geo-referenced imagery



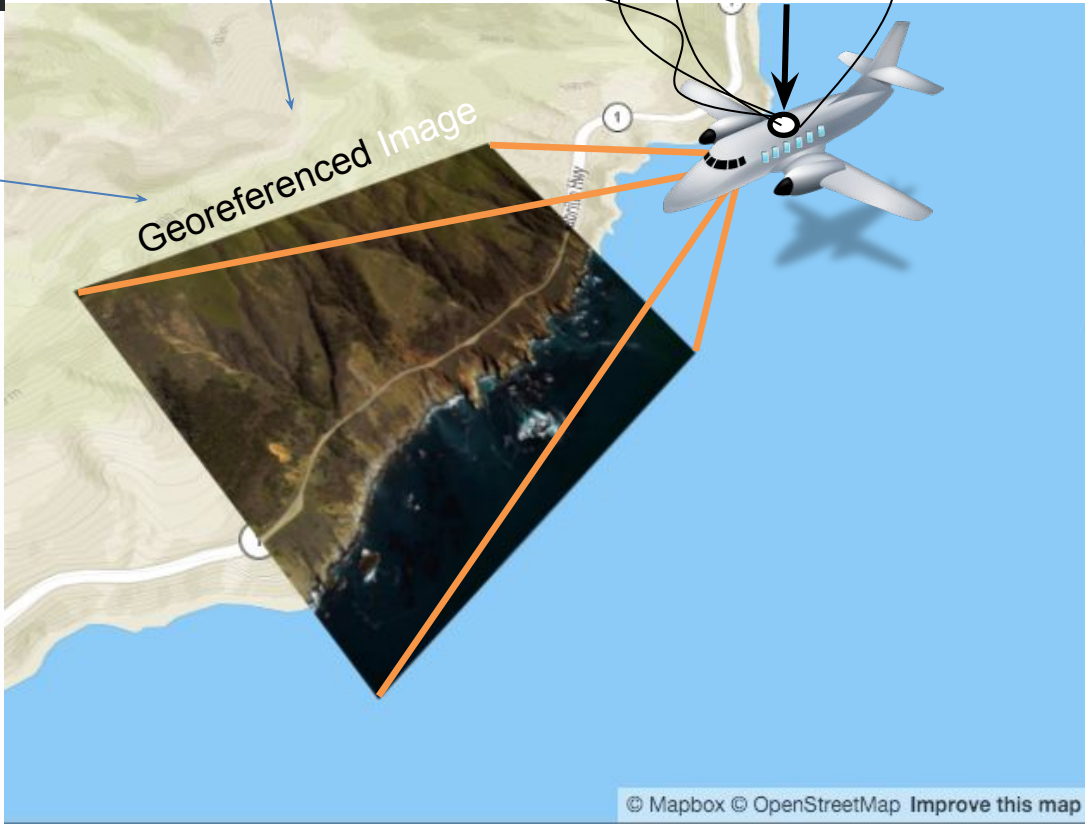
GNSS Satellites
Latitude, Longitude,
Height (x,y,z)



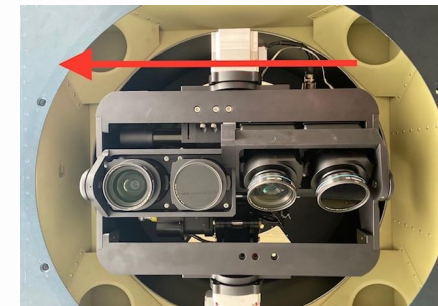
GNSS
Antenna



Georeferenced Image



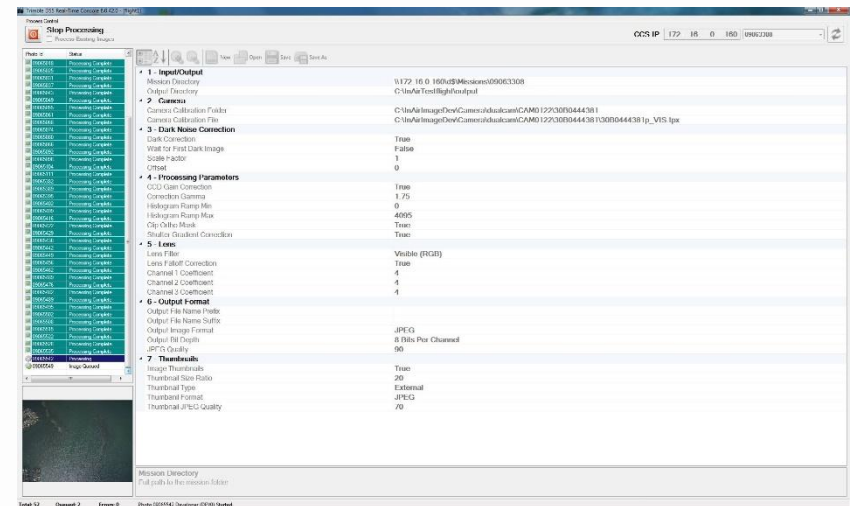
Onboard
real-time processing
to JPEG



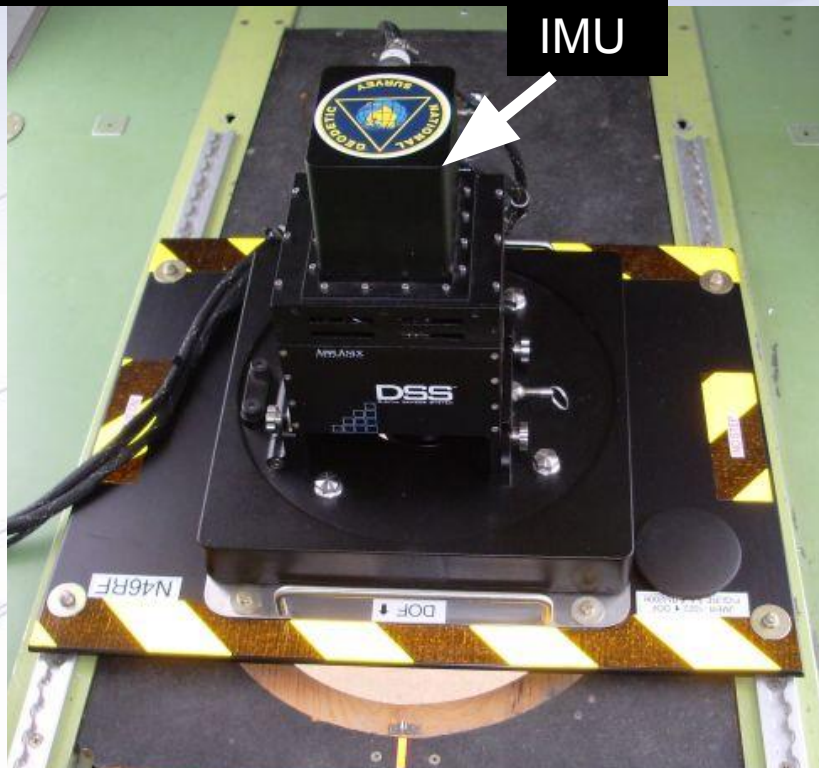
Digital Camera System

Typical ER Mission Profile

- 3500-5500 ft (1050 -1675 m) AGL
- ~160-170 kts
- 4-8 hour duration
- 30% endlap / 30% sidelap
- 2 camera array
- 7.5 – 30 cm mosaic
- In air development to JPEG →
- Flight crew of 2 pilots + 1 sensor operator
- 1-2 person field crew for data upload



1 RGB Camera
(Nadir mounting)



Applanix DSS 301 / 322
16 MP / 22 MP



1 RGB Camera
1 NIR Camera (Nadir mounting)

Applanix DSS 439 Dual Cam
(2) 39 MP



2 RGB 39 MP Cameras
(semi-oblique mounting)

1 RGB 80 MP Camera
1 NIR 60 MP Camera
(Nadir mounting)

Applanix DSS 539 Dual Cam

LeadAir DSS V6

4 camera array

RGB-1 RGB-2 / 150 MP

NIR-1 NIR-2 / 100 MP

Multiple mapping modes



Computer rack

3 Days to Un-rectified Image



2003 16 MP

~24 hr to Ortho Image



2006 22 MP

~8-12 hr to Tiled Ortho-mosaic



2012 39 MP

~3 hr to Tiled Ortho-mosaic



39 MP

80 MP

39 MP

2016 158 MP total

~3 hr to Tiled Ortho-mosaic



150 MP

150 MP

2021 300 MP total

Imagery Viewer (2003 – 2005)



The imagery posted on this site is of the Gulf coast after Hurricane Rita made landfall.

This imagery was acquired by the NOAA Remote Sensing Division to support NOAA national security and emergency response requirements. In addition, it will be used for ongoing research efforts for testing and developing standards for airborne digital imagery.

Please note that these images are uncorrected and not rotated. The approximate ground sample distance (GSD) for each pixel is 37 cm (1.2 feet). The images have 60% forward overlap, and sidegap unknown. Image file size is between 2 MB and 3 MB.

Index Maps:

Click on the image on the left to locate and view individual images.

Click here for [additional information](#), including batch downloads and Exterior Orientation files.

In an effort to acquire imagery in a timely manner, clouds may be present in the imagery.



[Click here for imagery.](#)

NOTE: The date of the photography can be derived from the first 3 characters of the image name. Image names beginning with 269 were acquired Sept 25, 2005.

Other Emergency Response Imagery:

[Click here](#)

Contact:

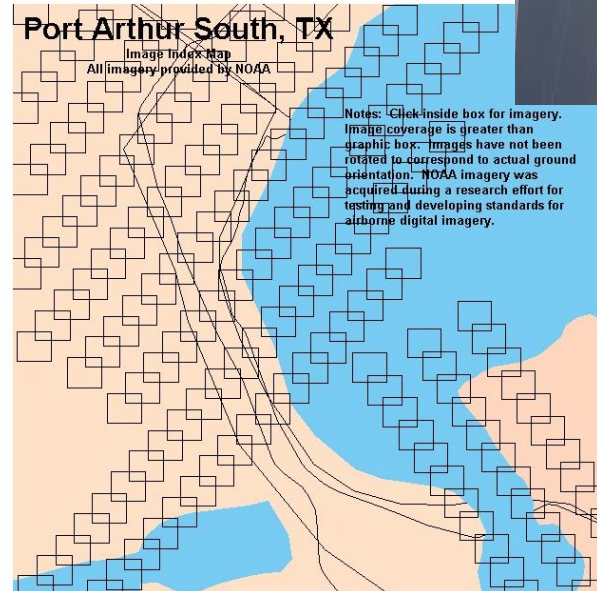
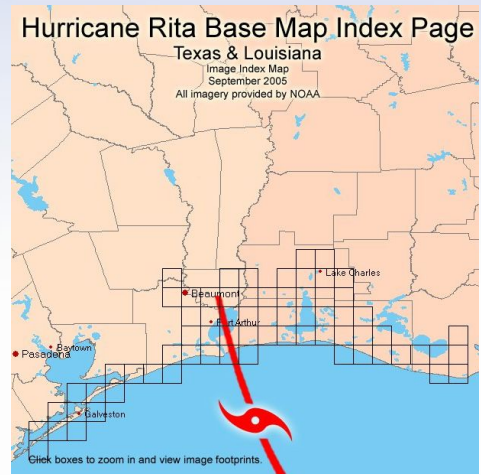
Email: [Questions regarding content and technical issues](#)
[Comments and policy issues](#)



National Oceanic and Atmospheric Administration

NOAA News Story

Last Modified: October 13, 2005 3:23 PM



Notes: Click inside box for imagery. Image coverage is greater than graphic box. Images have not been rotated to correspond to actual ground orientation. NOAA imagery was acquired during a research effort for testing and developing standards for airborne digital imagery.

Imagery Viewer (2006 – 2009)

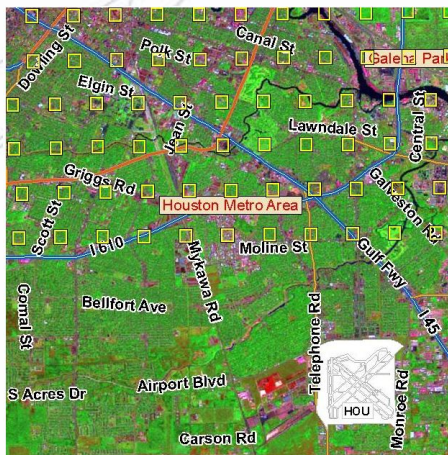


Image: C25954969



Date: 9/15/2008
Time: 14:15:39
Heading: 275.5

[World File](#) [What is a world file?](#)
[Metadata File](#)



[Previous Image](#) [Next Image](#)



[Back to Image Index](#) [Back to IKE index](#)



[Help/FAQ](#)

Imagery Viewer (2010 – present)

Hurricane IAN Imagery

storms.ngs.noaa.gov/storms/ian/index.html#11.38/26.4089/-81.8345

Hurricane IAN Imagery About Download Contact

Fort Myers Beach

Belle Lago Estero Oaks Shadow Wood Bonita Springs

NOAA | © MapTiler © OpenStreetMap contributors

Lat/Lon: 26.42203 : -81.92836

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Response Imagery Deliverables

Data Type

- RGB Ortho Mosaic Imagery
- Geographic Lat/Lon, NAD83(2011)

Resolution

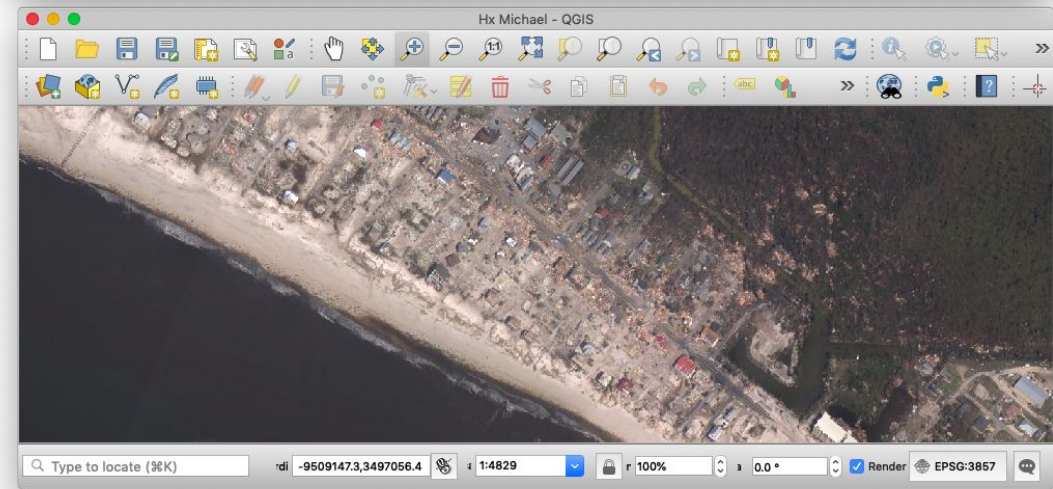
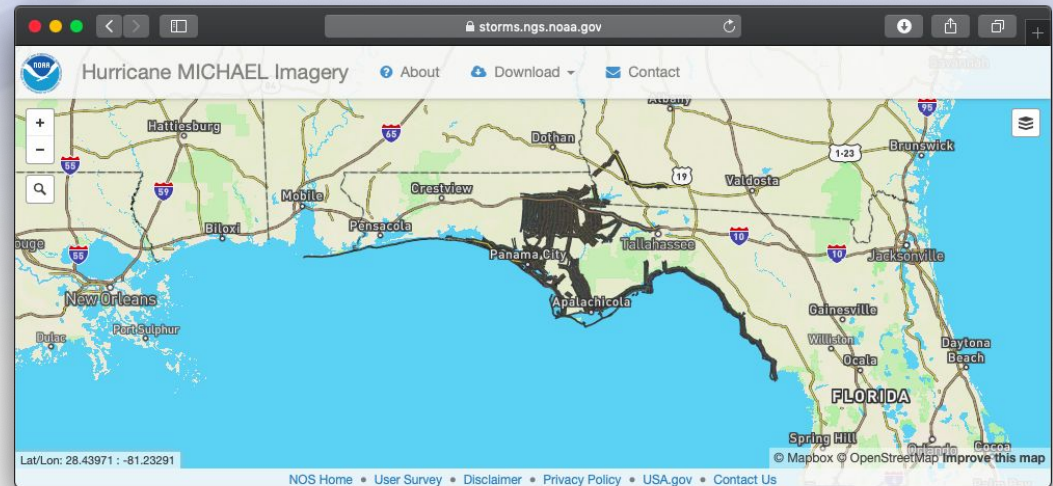
- 7.5 - 30 cm (dependent on response/weather conditions/etc)

Distribution

- ~1.25 x 1.25 km tiles in JPEG compressed GeoTIFF
- Cloud Optimized GeoTiff
- RAW JPEG + telemetry

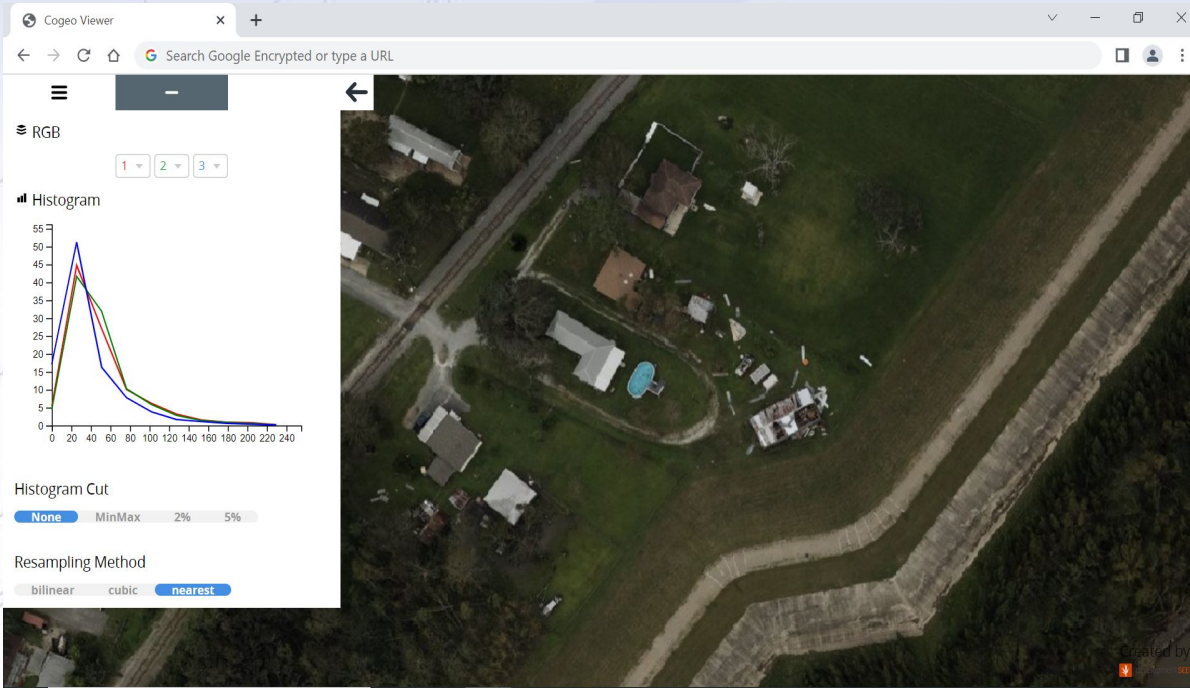
Desktop Web

- Live xyz map tiles
- Bulk image download by flight
- Metadata
- Web Map Tile Service WMTS



Cloud Optimized GeoTIFFs (COGs)

- GeoTIFF imagery optimized for hosting over HTTPS
- Avoids large downloads
- Only access the parts of the data you need
- Build efficient cloud workflows



Bulk Download .tar file

The screenshot shows a web browser window with the URL `storms.ngs.noaa.gov/storms/ian/index.html#12.32/26.33359/-81.81052`. The page title is "Hurricane IAN Imagery". A navigation bar includes "About", "Download", and "Contact" links. A central table lists 13 flight events with download icons, dates, flight numbers, and file formats. The background is a satellite map of the Bonita Springs area, Florida, with various landmarks and roads labeled. A sidebar on the left contains zoom controls and a search icon. The bottom of the page features a footer with coordinates, navigation links, and copyright information.

September 29 2022 Flight 1	(TIF)	(RAW JPEG)
September 30 2022 Flight 1	(TIF)	(RAW JPEG)
September 30 2022 Flight 3	(TIF)	(RAW JPEG)
September 30 2022 Flight 4	(TIF)	(RAW JPEG)
October 01 2022 Flight 1	(TIF)	(RAW JPEG)
October 01 2022 Flight 2	(TIF)	(RAW JPEG)
October 01 2022 Flight 3	(TIF)	(RAW JPEG)
October 02 2022 Flight 1	(TIF)	(RAW JPEG)
October 02 2022 Flight 2	(TIF)	(RAW JPEG)
October 02 2022 Flight 3	(TIF)	(RAW JPEG)
October 02 2022 Flight 4	(TIF)	(RAW JPEG)
October 03 2022 Flight 1	(TIF)	(RAW JPEG)

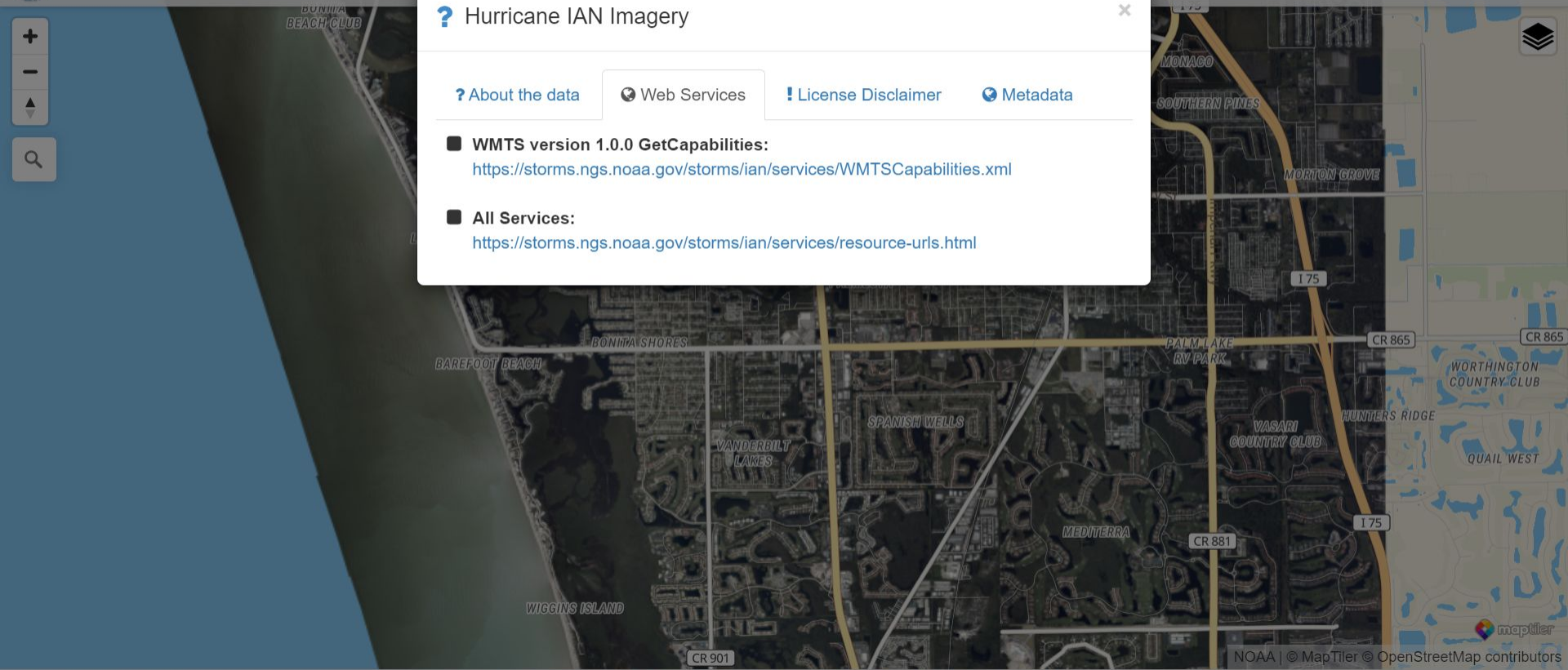
Web Services



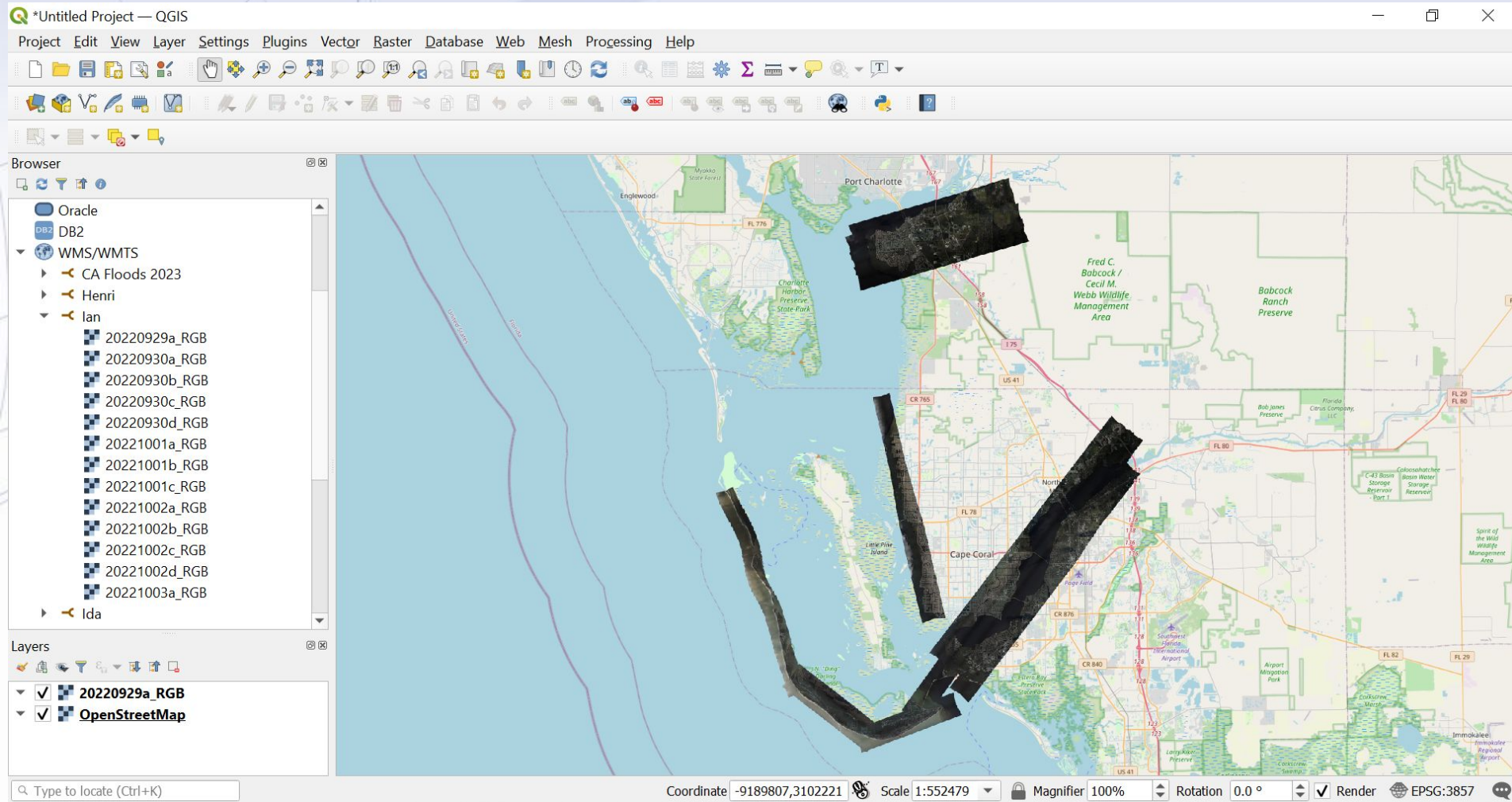
? Hurricane IAN Imagery

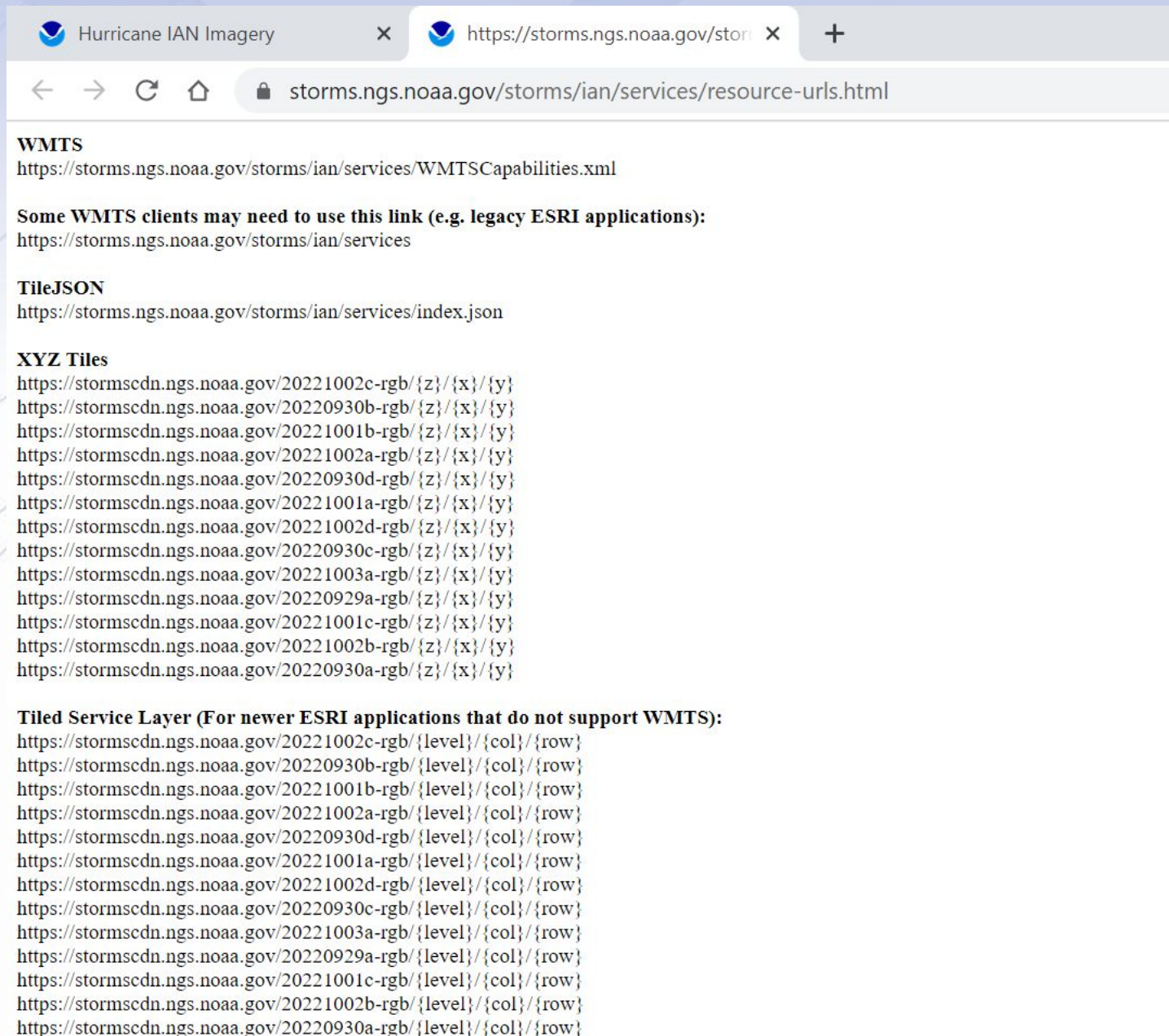
? About the data Web Services ! License Disclaimer Metadata

- **WMTS version 1.0.0 GetCapabilities:**
<https://storms.ngs.noaa.gov/storms/ian/services/WMTSCapabilities.xml>
- **All Services:**
<https://storms.ngs.noaa.gov/storms/ian/services/resource-urls.html>



WMTS in Quantum GIS





WMTS
<https://storms.ngs.noaa.gov/storms/ian/services/WMTSCapabilities.xml>

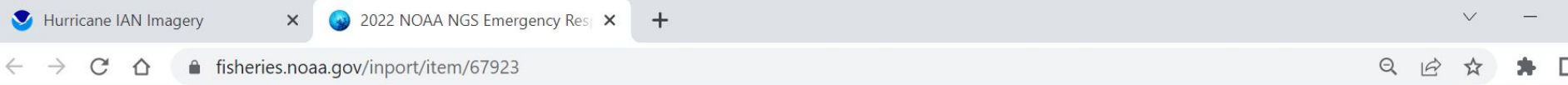
Some WMTS clients may need to use this link (e.g. legacy ESRI applications):
<https://storms.ngs.noaa.gov/storms/ian/services>

TileJSON
<https://storms.ngs.noaa.gov/storms/ian/services/index.json>

XYZ Tiles
<https://stormscdn.ngs.noaa.gov/20221002c-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20220930b-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20221001b-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20221002a-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20220930d-rgb/{z}/{x}/{y}>
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<https://stormscdn.ngs.noaa.gov/20221002d-rgb/{z}/{x}/{y}>
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<https://stormscdn.ngs.noaa.gov/20221003a-rgb/{z}/{x}/{y}>
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<https://stormscdn.ngs.noaa.gov/20221001c-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20221002b-rgb/{z}/{x}/{y}>
<https://stormscdn.ngs.noaa.gov/20220930a-rgb/{z}/{x}/{y}>

Tiled Service Layer (For newer ESRI applications that do not support WMTS):
<https://stormscdn.ngs.noaa.gov/20221002c-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20220930b-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221001b-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221002a-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20220930d-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221001a-rgb/{level}/{col}/{row}>
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<https://stormscdn.ngs.noaa.gov/20220930c-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221003a-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20220929a-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221001c-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20221002b-rgb/{level}/{col}/{row}>
<https://stormscdn.ngs.noaa.gov/20220930a-rgb/{level}/{col}/{row}>

Metadata



Enter Keywords / Cat ID... Search

[Login](#) [Organizations](#) [Search](#) [Stats](#) [Help](#)

[NGS Metadata Library](#) > [emergency_response](#) >

2022 NOAA NGS Emergency Response Imagery: Hurricane Ian

[Data Set \(DS\)](#) | [National Geodetic Survey \(NGS\)](#)

GUID: gov.noaa.nmfs.inport:67923 | Updated: February 21, 2023 | Published / External

COMPLETION RUBRIC

83%

29 / 35

[View Report](#)

[View As](#) [View in Hierarchy](#)

Short Citation:

National Geodetic Survey, 2023: 2022 NOAA NGS Emergency Response Imagery: Hurricane Ian, <https://www.fisheries.noaa.gov/inport/item/67923>.

[Full Citation Examples](#)

Item Identification

Title: 2022 NOAA NGS Emergency Response Imagery: Hurricane Ian

Status: Completed

Creation Date: 2022

Publication Date: 2022

Abstract: Oblique and nadir imagery was acquired following Hurricane Ian from September 29 - October 3, 2022. The aerial photography missions were conducted by the NOAA Remote Sensing Division. The images were acquired from an altitude of 2500 to 5000 feet, using a Digital Sensor System (DSS) version 6.

Purpose: This imagery was acquired by the NOAA Remote Sensing Division to support NOAA national security and emergency response requirements. This aerial imagery will primarily support NOAA interests including safety of navigation, HAZMAT and marine debris impacts, as well as impacts to coastal zone management interests. It is not intended for mapping, charting or navigation. In addition, it will be used for ongoing research efforts for testing and developing standards for air-borne digital imagery.

Supplemental The ground sample distance (GSD) for each pixel is 15 cm to 30 cm. In an effort to acquire imagery in a timely manner after the event, clouds may be present in

Show / Hide Imagery by Mission Flight

Hurricane IAN Imagery

storms.ngs.noaa.gov/storms/ian/index.html#12.32/26.33359/-81.81052

Hurricane IAN Imagery About Download Contact

CR 901 CR 881 175

- + Base Maps
- September 29 2022
 - Flight a
- September 30 2022
 - Flight a
 - Flight c
 - Flight d
- + October 01 2022
- + October 02 2022
- + October 03 2022

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Lat/Lon: 26.33845 : -81.86026

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Address / Coordinate Searching

Hurricane IAN Imagery x +
storms.ngs.noaa.gov/storms/ian/index.html#14/26.44922/-81.94434

Hurricane IAN Imagery About Download Contact



URL Hashing

#ZoomLevel/Latitude/Longitude

Ida oil slick

<https://storms.ngs.noaa.gov/storms/ida/index.html#14.22/29.05852/-90.17705>

Mexico Beach, FL

<https://storms.ngs.noaa.gov/storms/michael/index.html#18/29.95023/-85.42293>

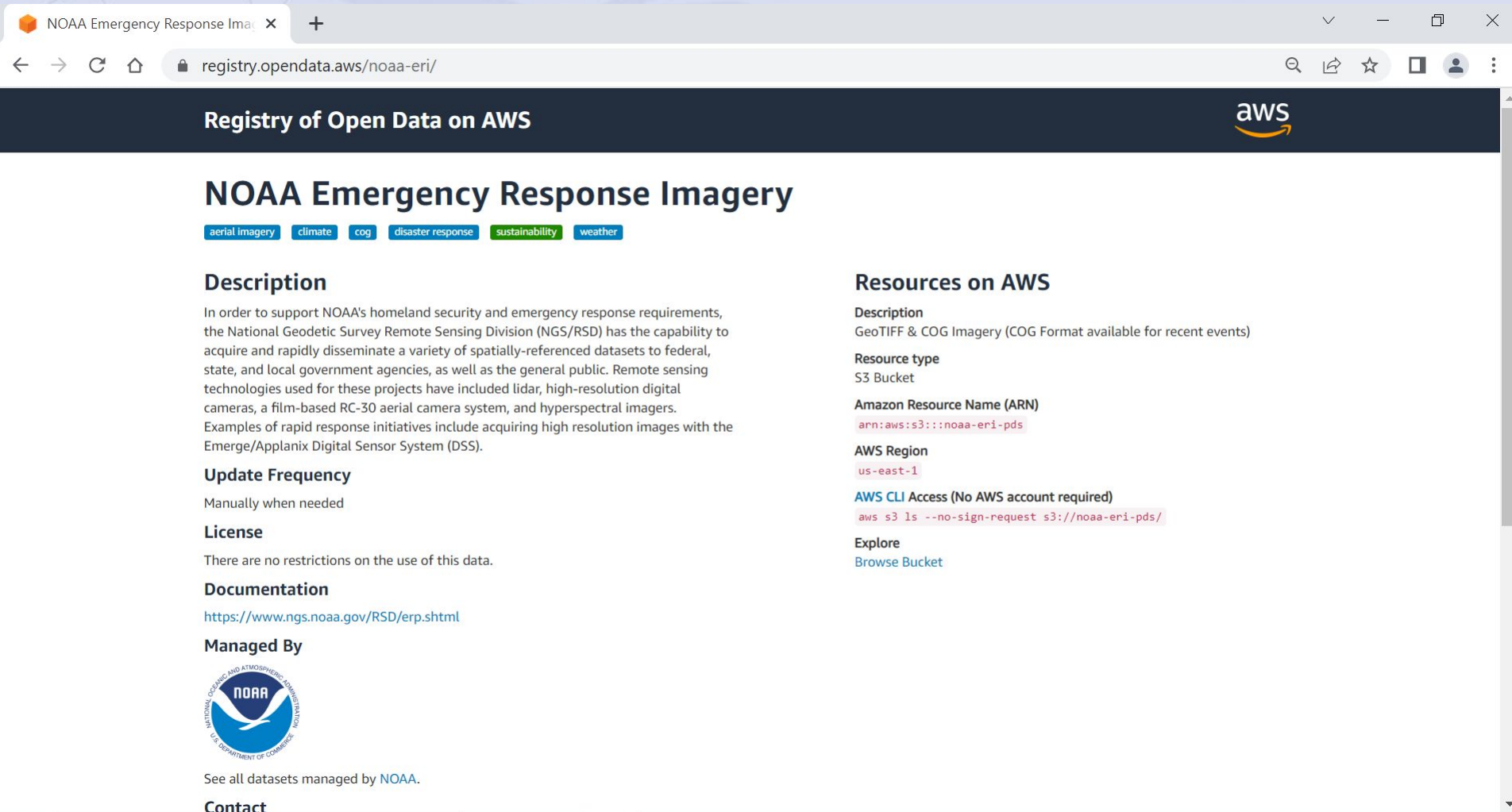
Ian Sanibel Causeway

<https://storms.ngs.noaa.gov/storms/ian/index.html#17.57/26.465166/-82.030991>

HELP

<https://storms.ngs.noaa.gov/storms/michael/index.html#19/30.33131/-85.41875>

Accessible Through NOAA's Big Data Program




The screenshot shows a web browser window with the address bar displaying "registry.opendata.aws/noaa-eri/". The page title is "Registry of Open Data on AWS" with the AWS logo in the top right. The main heading is "NOAA Emergency Response Imagery", followed by a row of category tags: "aerial imagery", "climate", "cog", "disaster response", "sustainability", and "weather".

Description
In order to support NOAA's homeland security and emergency response requirements, the National Geodetic Survey Remote Sensing Division (NGS/RSD) has the capability to acquire and rapidly disseminate a variety of spatially-referenced datasets to federal, state, and local government agencies, as well as the general public. Remote sensing technologies used for these projects have included lidar, high-resolution digital cameras, a film-based RC-30 aerial camera system, and hyperspectral imagers. Examples of rapid response initiatives include acquiring high resolution images with the Emerge/Applanix Digital Sensor System (DSS).

Update Frequency
Manually when needed

License
There are no restrictions on the use of this data.

Documentation
<https://www.ngs.noaa.gov/RSD/erp.shtml>

Managed By

See all datasets managed by [NOAA](#).

Contact

Resources on AWS

Description
GeoTIFF & COG Imagery (COG Format available for recent events)

Resource type
S3 Bucket

Amazon Resource Name (ARN)
`arn:aws:s3:::noaa-eri-pds`

AWS Region
`us-east-1`

AWS CLI Access (No AWS account required)
`aws s3 ls --no-sign-request s3://noaa-eri-pds/`

Explore
[Browse Bucket](#)

Big Data Bucket Explorer

AWS S3 Explorer + noaa-eri-pds.s3.amazonaws.com/index.html#2021_Hurricane_Ida/20210830a_RGB/

AWS S3 Explorer noaa-eri-pds / 2021_Hurricane_Ida / 20210830a_RGB Hide folders? Folder Bucket 897

Show entries

Search:

Object	Last Modified	Timestamp	Size
raw/			
20210830aC0895915w295145n.tif	8 months ago	2021-08-31 02:18:53	27 MB
20210830aC0895915w295230n.tif	8 months ago	2021-08-31 02:18:54	19 MB
20210830aC0900000w294415n.tif	8 months ago	2021-08-31 02:18:54	1 MB
20210830aC0900000w294930n.tif	8 months ago	2021-08-31 02:18:54	921 KB
20210830aC0900000w295015n.tif	8 months ago	2021-08-31 02:18:53	74 MB
20210830aC0900000w295100n.tif	8 months ago	2021-08-31 02:18:54	208 MB
20210830aC0900000w295145n.tif	8 months ago	2021-08-31 02:18:54	192 MB
20210830aC0900000w295230n.tif	8 months ago	2021-08-31 02:18:55	162 MB
20210830aC0900000w295315n.tif	8 months ago	2021-08-31 02:18:55	156 MB
20210830aC0900000w295400n.tif	8 months ago	2021-08-31 02:18:59	3 MB
20210830aC0900045w294330n.tif	8 months ago	2021-08-31 02:18:59	9 MB
20210830aC0900045w294415n.tif	8 months ago	2021-08-31 02:19:00	205 MB

Big Data Programmatic Access

cmd Command Prompt

Microsoft Windows [Version 10.0.19044.1645]

(c) Microsoft Corporation. All rights reserved.

```
C:\WINDOWS\System32>aws s3 ls --no-sign-request s3://noaa-eri-pds/
PRE 2005_Hurricane_Katrina/
PRE 2005_Hurricane_Wilma/
PRE 2006_Tropical_Storm_Ernesto/
PRE 2007_Hurricane_Humberto/
PRE 2008_Hurricane_Gustav/
PRE 2008_Hurricane_Ike/
PRE 2009_NorEaster/
PRE 2011_Hurricane_Irene/
PRE 2011_Joplin_Tornado/
PRE 2012_Hurricane_Isaac/
PRE 2012_Hurricane_Sandy/
PRE 2014_Hurricane_Arthur/
PRE 2015_Illinois_Tornadoes/
PRE 2015_Midwest_Flood/
PRE 2016_Hurricane_Matthew/
PRE 2016_Louisiana_Flooding/
PRE 2017_Hurricane_Harvey/
PRE 2017_Hurricane_Irma/
PRE 2017_Hurricane_Maria/
PRE 2017_Hurricane_Nate/
PRE 2018_Hurricane_Florence/
PRE 2018_Hurricane_Michael/
PRE 2018_Tropical_Storm_Gordon/
PRE 2019_Hurricane_Barry/
PRE 2019_Hurricane_Dorian/
PRE 2020_Hurricane_Delta/
PRE 2020_Hurricane_Laura/
PRE 2020_Hurricane_Sally/
PRE 2020_Hurricane_Zeta/
PRE 2020_Nashville_Tornado/
PRE 2021_Hurricane_Henri/
PRE 2021_Hurricane_Ida/
```

2021-09-27 15:47:56

32357 index.html