

# NOAA's National Geodetic Survey 2008 Emergency Response Efforts

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# Background

- Remotely sensed data is acquired to support NOAA's homeland security and emergency response requirements (ESF #10, #11, and #13 of the National Response Plan).
- RSD maintains the capability to provide tools, technology, and expertise in a timely and efficient manner.
- The remotely sensed data collected is disseminated to federal, state, and local government agencies as well as the general public to facilitate support efforts.



# Emergency Response Efforts

- March 27, 1964: Alaska earthquake and tsunami.
- Hurricanes: Camille (1969), Ceila (1970), and Frederick (1979) Isabel (2003), Ivan (2004), Jeanne (2004), Dennis (2005), Katrina (2005), Ophelia (2005), Rita (2005), and Wilma (2005), Humberto (2007), Gustav (2008), Ike (2008).
- February 1978: New England Nor'easter.
- Oil Spills: Texaco Oklahoma (1971) and the Campeche Bay oil spill (1979).
- September 11 terrorist attacks on the World Trade Center and Pentagon.
- Tropical Storm: Ernesto(2006)



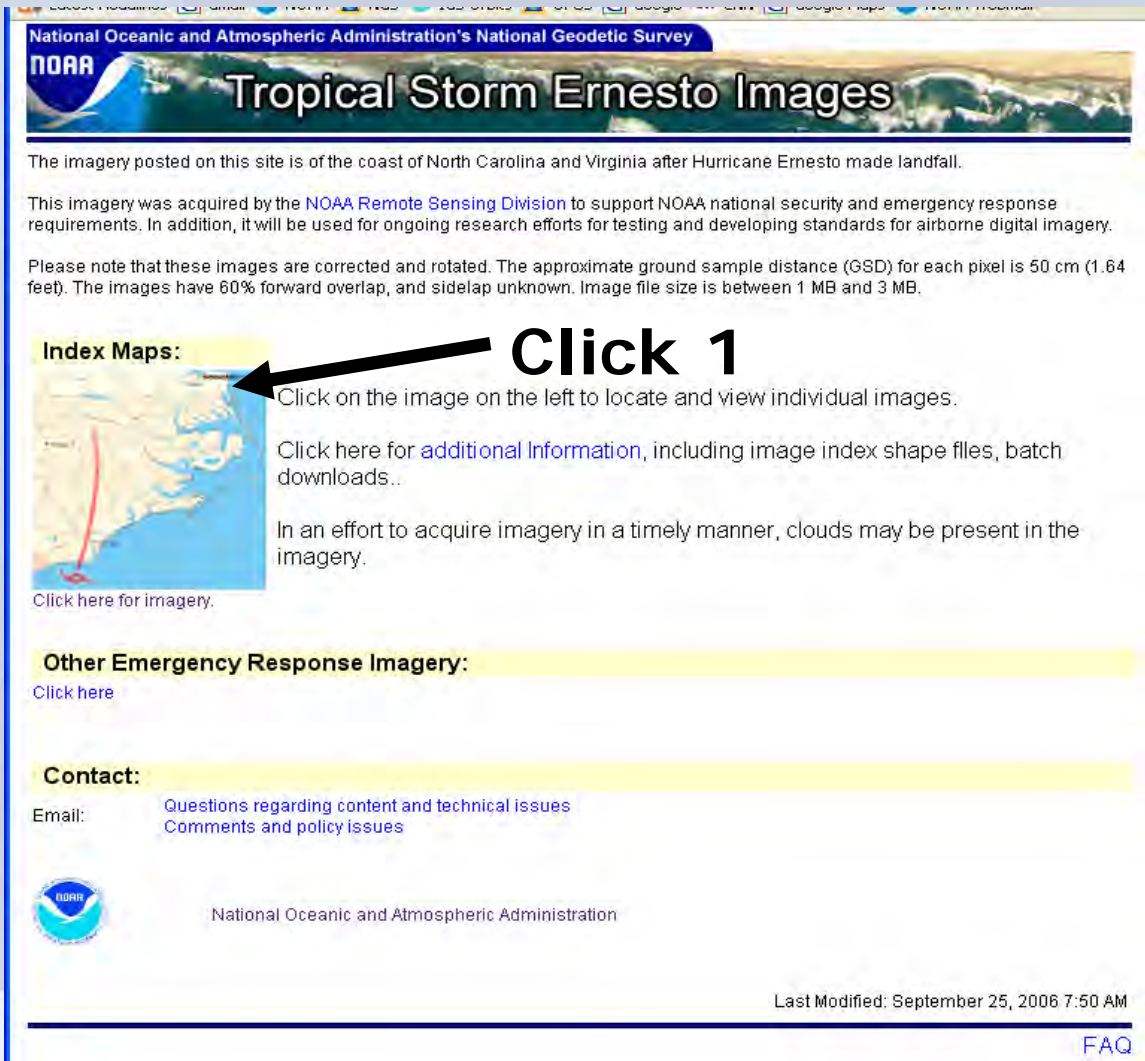
# Emergency Response Platform and Sensor



National Oceanic and Atmospheric Administration



# Emergency Response Website




National Oceanic and Atmospheric Administration's National Geodetic Survey  
**NOAA** Tropical Storm Ernesto Images

The imagery posted on this site is of the coast of North Carolina and Virginia after Hurricane Ernesto 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 corrected and rotated. The approximate ground sample distance (GSD) for each pixel is 50 cm (1.64 feet). The images have 60% forward overlap, and sidelap unknown. Image file size is between 1 MB and 3 MB.

**Index Maps:**



**Click 1**

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

Click here for [additional information](#), including image index shape files, batch downloads..

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


[Click here for imagery.](#)

**Other Emergency Response Imagery:**

[Click here](#)

**Contact:**

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



National Oceanic and Atmospheric Administration

Last Modified: September 25, 2006 7:50 AM

[FAQ](#)



# Emergency Response Website

**Tropical Storm Ernesto Project Index Page**  
Wilmington, NC  
Project Index  
September 2006  
All imagery provided by NOAA

Back to main [ERNESTO](#) page  
[Help/FAQ](#)

Click 2

Click boxes to zoom in and view image footprints.

NOAA  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
U.S. DEPARTMENT OF COMMERCE



# Emergency Response Website



## Wrightsville Beach, NC

Image Index Map

All imagery provided by NOAA

Notes: Click inside yellow boxes for imagery.  
Image coverage is greater than graphic box.  
Graphic boxes have not been rotated to correspond to actual ground orientation.

The background was created using satellite data downloaded from the [Global Land Cover Facility](#) at the [University of Maryland](#)

[Back to ERNESTO Index](#)



[Help/FAQ](#)

# Emergency Response Website

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



Click 4

**Image: 24567165**



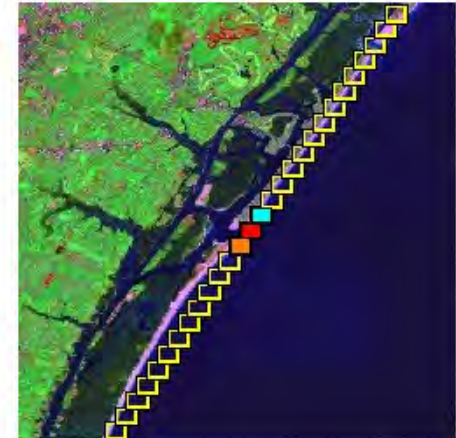
Date: 9/2/2006

Time: 17:38:55

Heading: 26.9

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

[Metadata File](#)



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



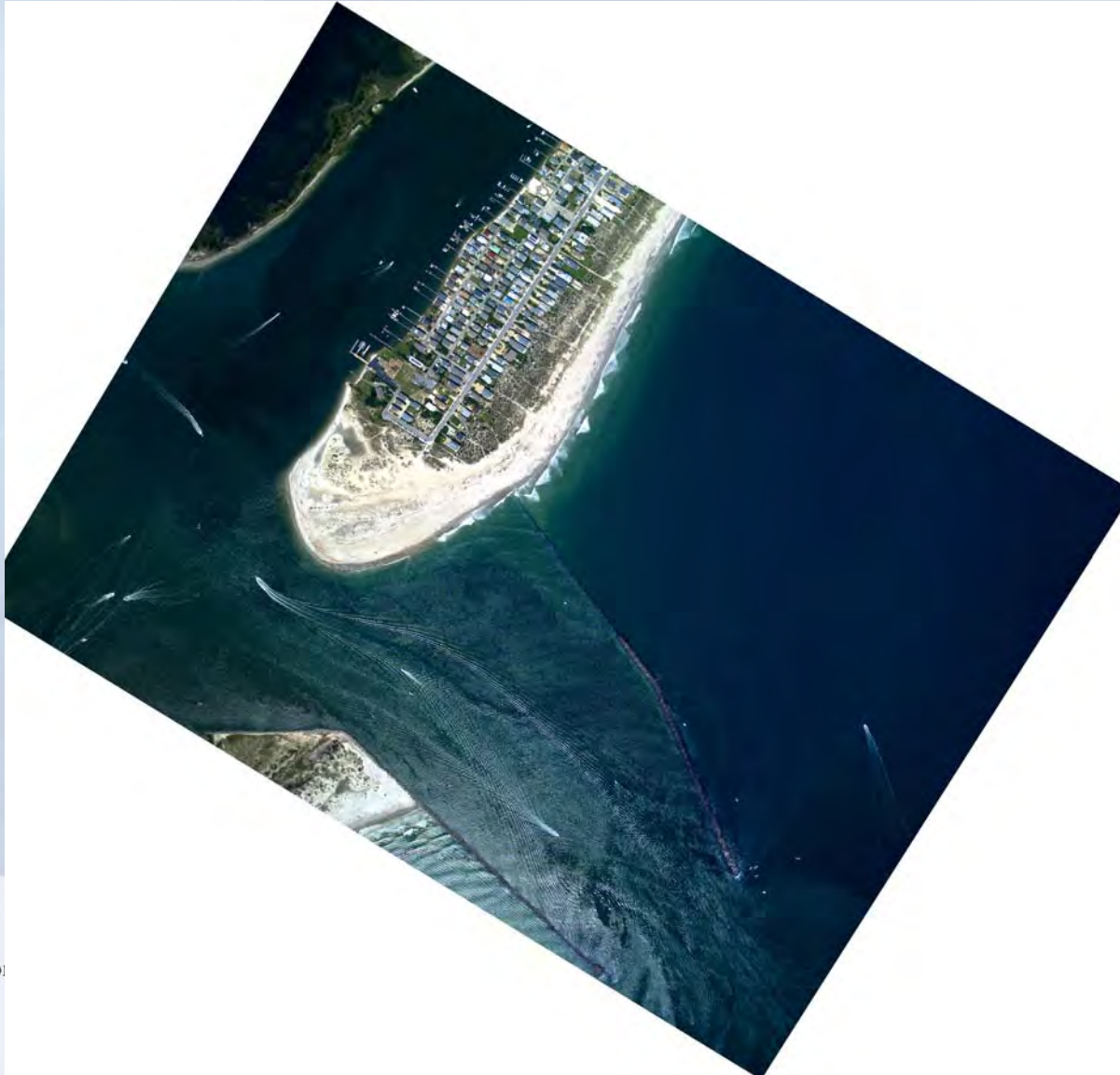
[Back to Image Index](#) [Back to ERNESTO index](#)



[Help/FAQ](#)



# Emergency Response Website



Natio

# Emergency Response Website

National Oceanic and Atmospheric Administration's National Geodetic Survey

NOAA

## Tropical Storm Ernesto Images

### Shape Files

Shape files provide information to enable image indexing. One set of shape files is provided for each day plus one for the entire project. Each set contains separate shape files for flight lines, image centers and image footprints.

Please review shape file attributes for further information.

[All Images](#) Last Modified: September 25, 2006 7:44 AM

[September 3, 2006](#) Last Modified: September 25, 2006 7:49 AM

[September 2, 2006](#) Last Modified: September 25, 2006 7:49 AM

### Batch ZIP Files

Images can be downloaded in batches via ZIP files. To reduce overhead on the server, each mission flight is divided into coverage area such that the ZIP files are no larger than approximately 250 MB each. You should only download this data if you have a high speed internet connection AND only if you have a specific need to download blocks of images. Click on a thumbnail to get a larger image of coverage.

If you are looking for a specific image or just browsing, please return to the previous page and click on the thumbnail image of Ernesto's path to locate and view individual images.

[All world files](#) < 1 MB Last Modified: September 25, 2006 6:52 AM

Flight 1:



2006 4:22 PM

[ERNESTO24561256\\_1\\_1.ZIP](#) 77 MB Last Modified: September 8,



Nation



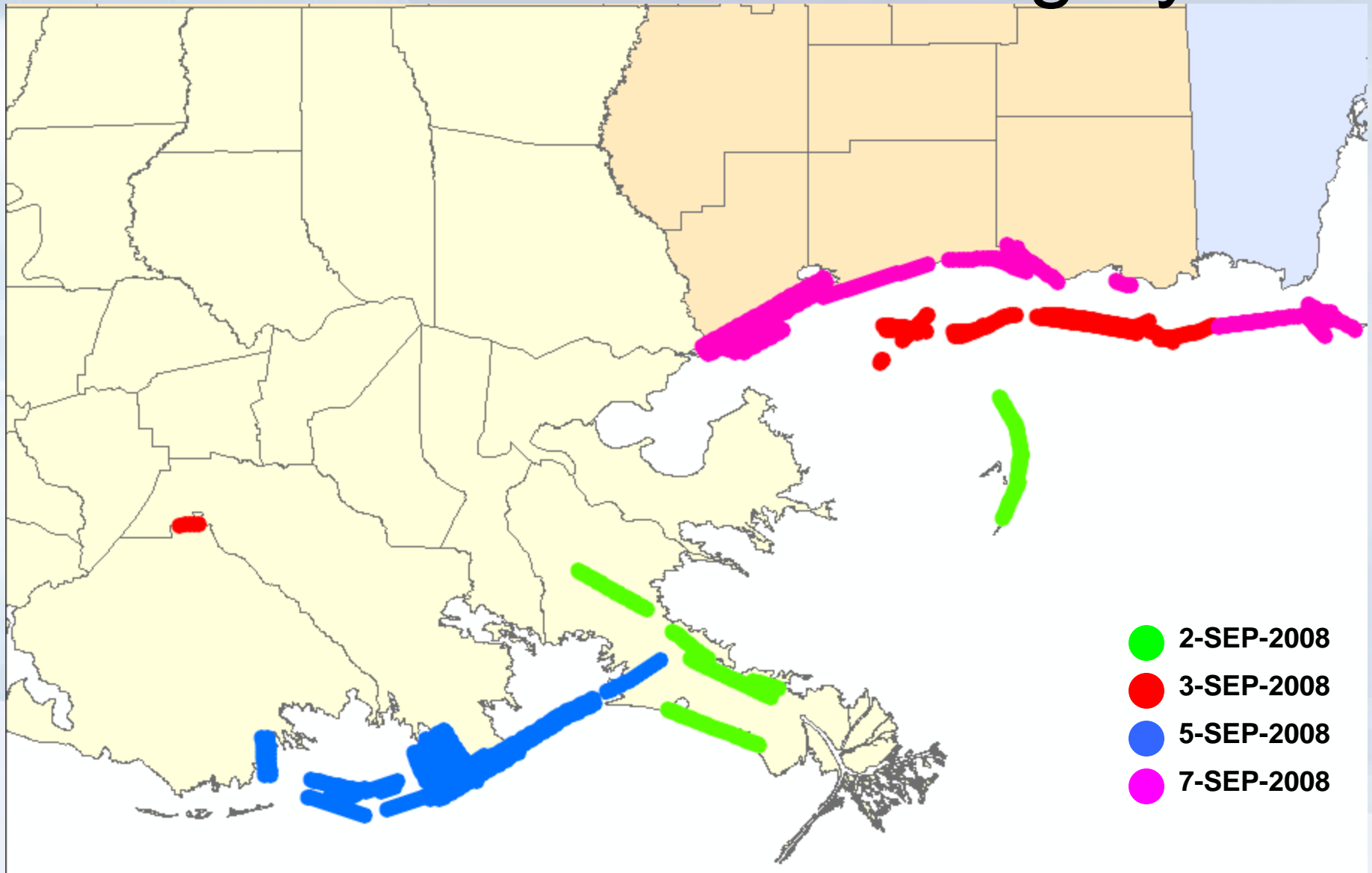
# Hurricane Gustav



National Oceanic and Atmospheric Administration



# Hurricane Gustav Imagery



# Grand Isle, LA Post Gustav

## 1994 Total Images

**2-SEP-2008 – 440 Images**

**3-SEP-2008 – 390 Images**

**5-SEP-2008 – 618 Images**

**7-SEP-2008 – 546 Images**



National Oceanic and Atmospheric Administration

# Gustav Internet Statistics

247,524 Total Hits for September 2008

22,392,216 Total KB Transferred

## Locations:

86% United States

8% Unknown

1% Canada

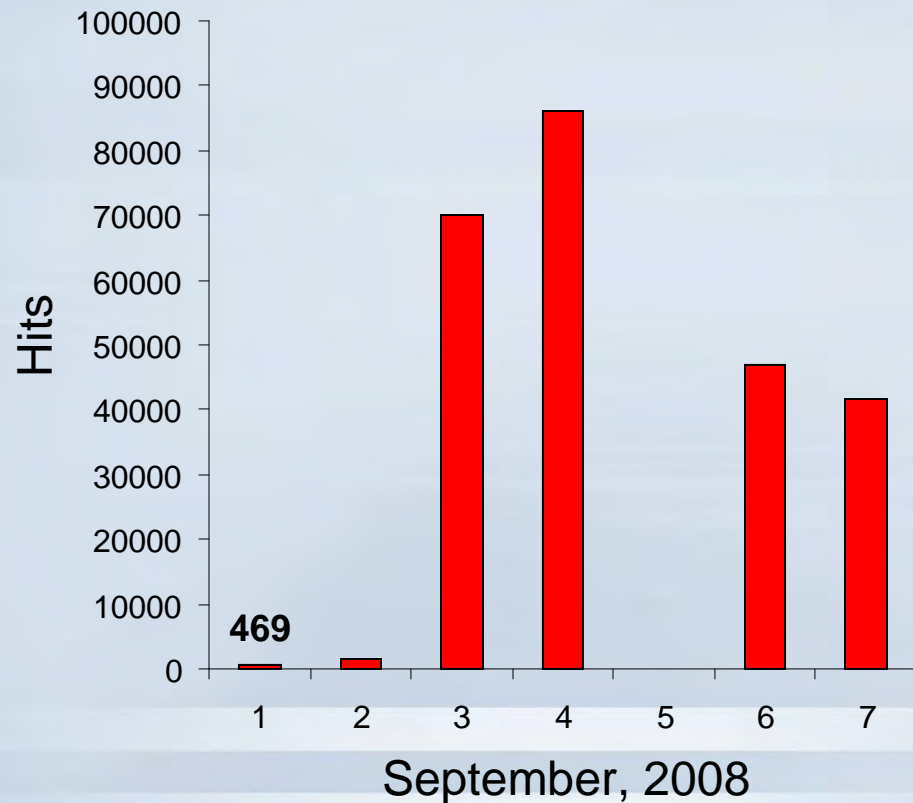
1% Great Britain

4% Other

Kazakhstan (20 Hits)

Iceland (11 Hits)

Greenland (1 Hit)





# Hurricane Ike



National Oceanic and Atmospheric Administration

# Hurricane Ike Planning

## Coordination:

- Federal Remote Sensing Working Group
- The Department of Homeland Security Interagency Remote Sensing Coordination Cell
- NOAA's Incident Coordination Center (ICC).



NOAA's Citation Jet

## Platforms:

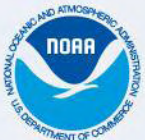
- NOAA Citation Jet (N52RF)
- NOAA Jet-Prop Commander (N45RF)

## Sensors:

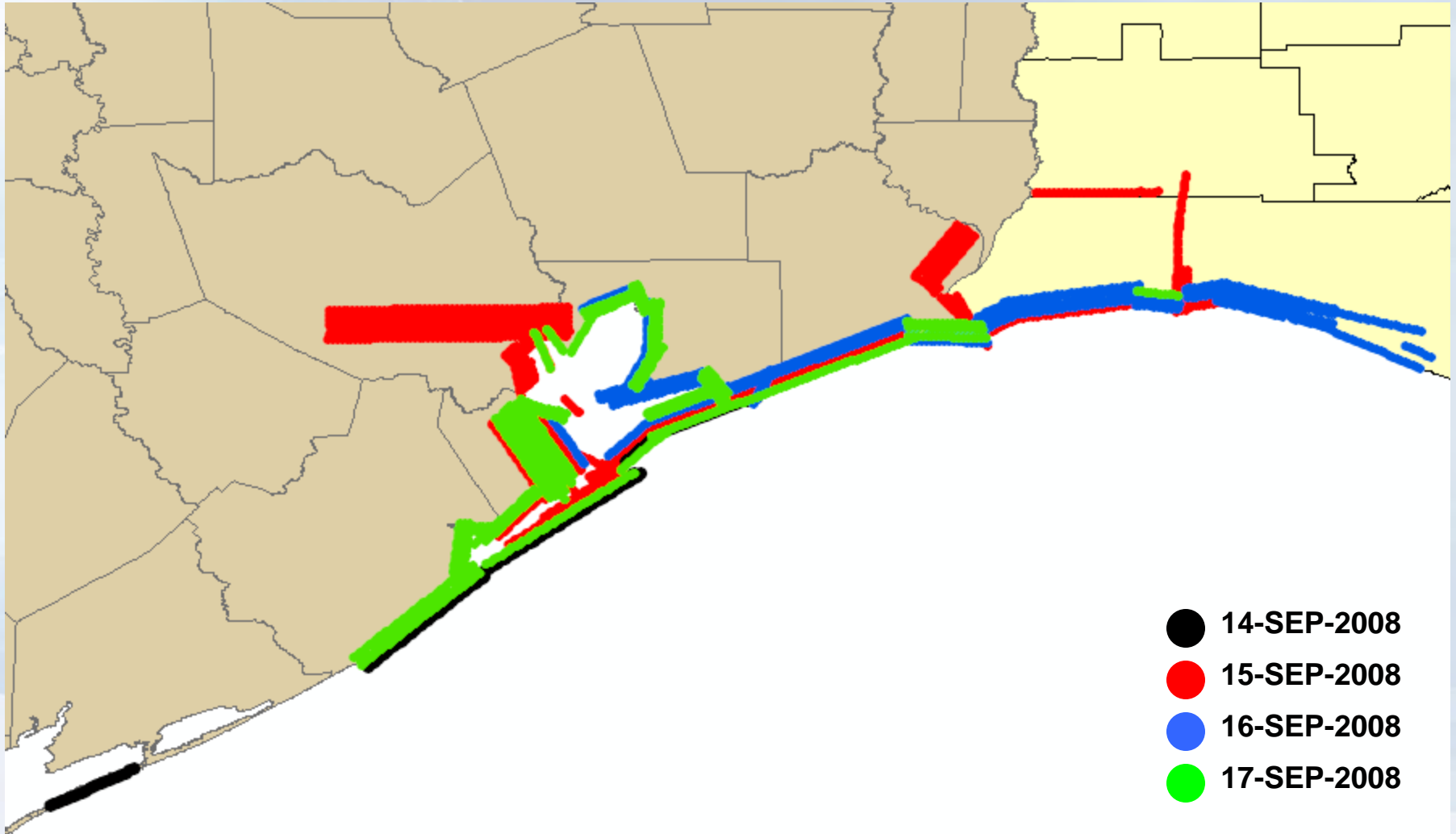
- Applanix 439 Digital Sensor Sensor system (DSS)
- Applanix 439 Dual Cam DSS



NOAA's Jet-Prop Commander



# Hurricane Ike Imagery





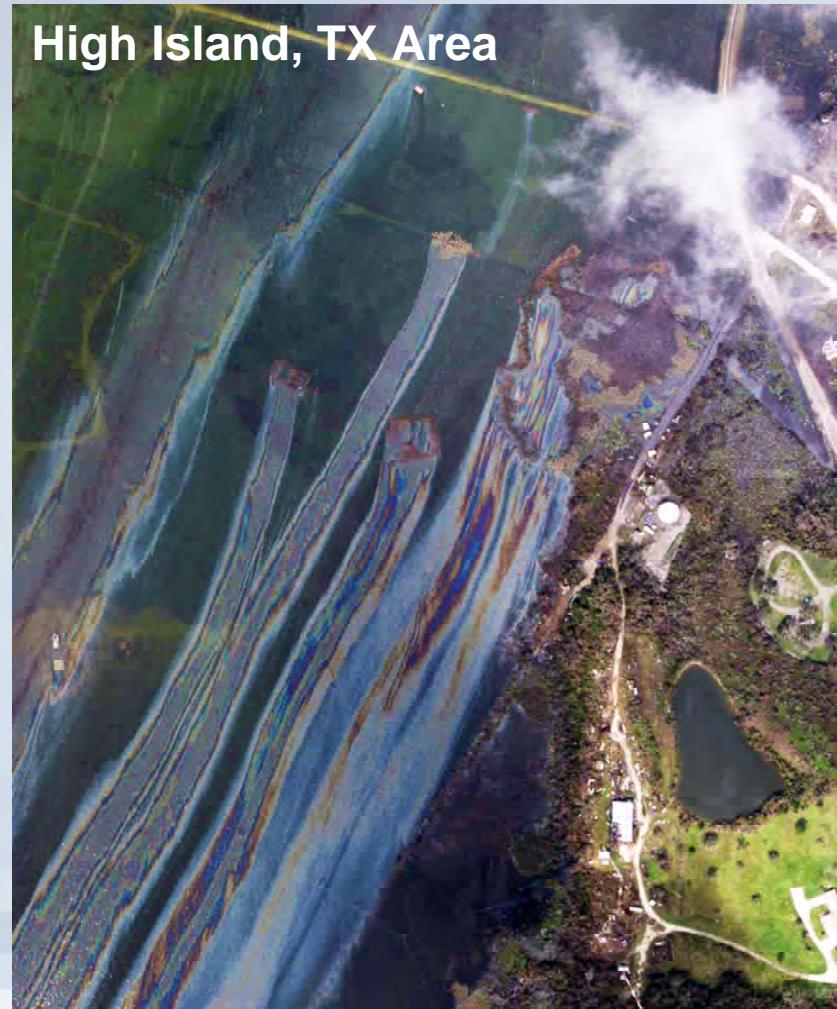
# Imagery Examples



**Bolivar Peninsula, TX**

**14-SEP-2008 – 474 Images**  
**15-SEP-2008 – 2112 Images**  
**16-SEP-2008 – 1432 Images**  
**17-SEP-2008 – 1528 Images**

**5546 Total Images**



**High Island, TX Area**



National Oceanic and Atmospheric Administration

# Hurricane Ike Web Statistics

**16,085,208** Total Hits for September 2008

**3,865,827,195** Total KB Transferred

## Locations:

96% United States

1% Unknown

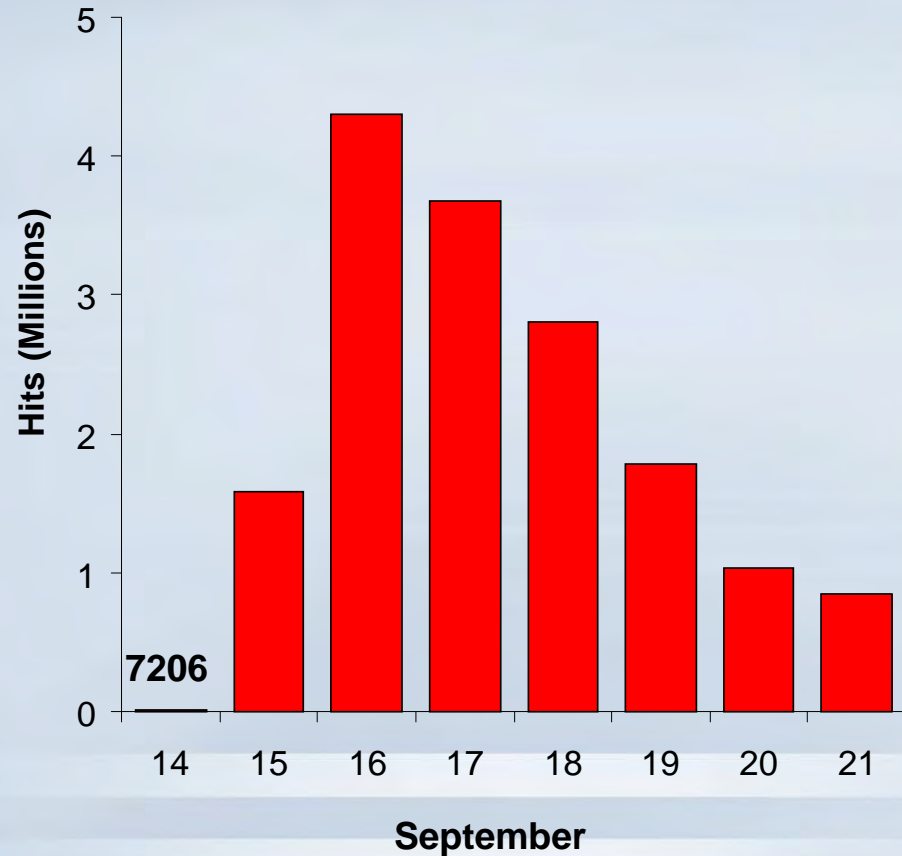
1% Canada

2% Other

Qatar (2378 Hits)

Vanuatu (35 Hits)

Zambia (9 Hits)



National Oceanic and Atmospheric Administration

# NOAA's Emergency Response Improvements

- Image Geo-referencing
- Image Mosaics
- Google Earth Partnership
- Vendor based web-based map servers
- Less than 24 hour web delivery





# Lessons Learned

- Internet connections can be unreliable.
- Large volume of data may require:
  - Additional computers.
  - Additional field personnel.
- Better control of camera settings.

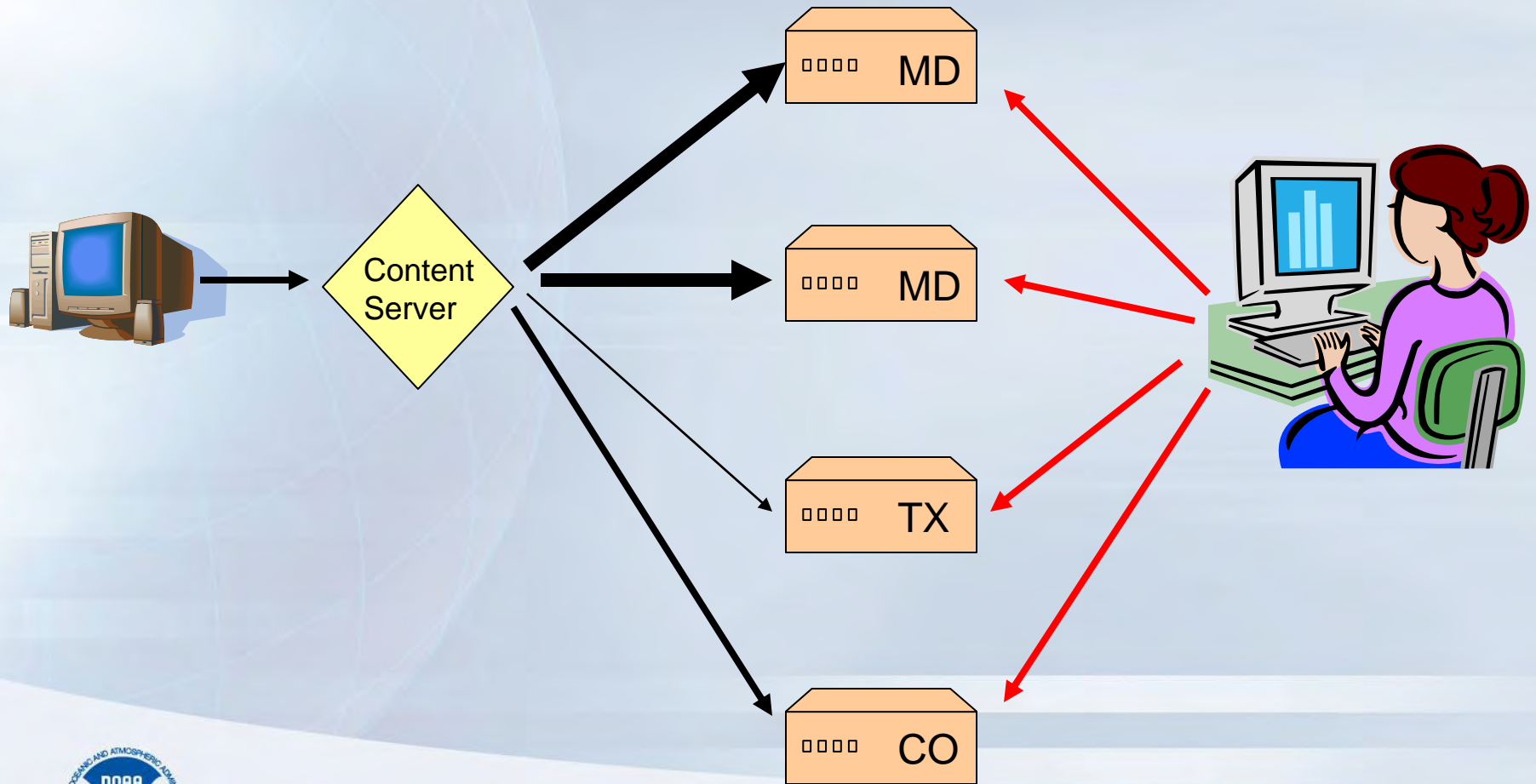


# Frequently Asked Questions

1. Where is my house?
2. How do remove the white background surrounding the image?
3. What is the projection/coordinate system of the images?
4. Why do I get an error message when I try to load an image?



# Image Hosting





# Summary

- Users of this data include NOAA's Office of Coast Survey, National Marine Sanctuary Program, Office of Response and Restoration, Department of Defense/NORTHCOM, National Guard Bureau, U.S. Army Corps, DHS, FEMA, U.S. Coast Guard, the State of Texas, Harris County, and the Red Cross.
- One of the biggest improvements has been the ability to precisely geo-reference and ortho-rectify individual images.
- To date, there have been over 16 million website hits and over 3.6 terabytes of data downloaded for Hurricane Ike.

