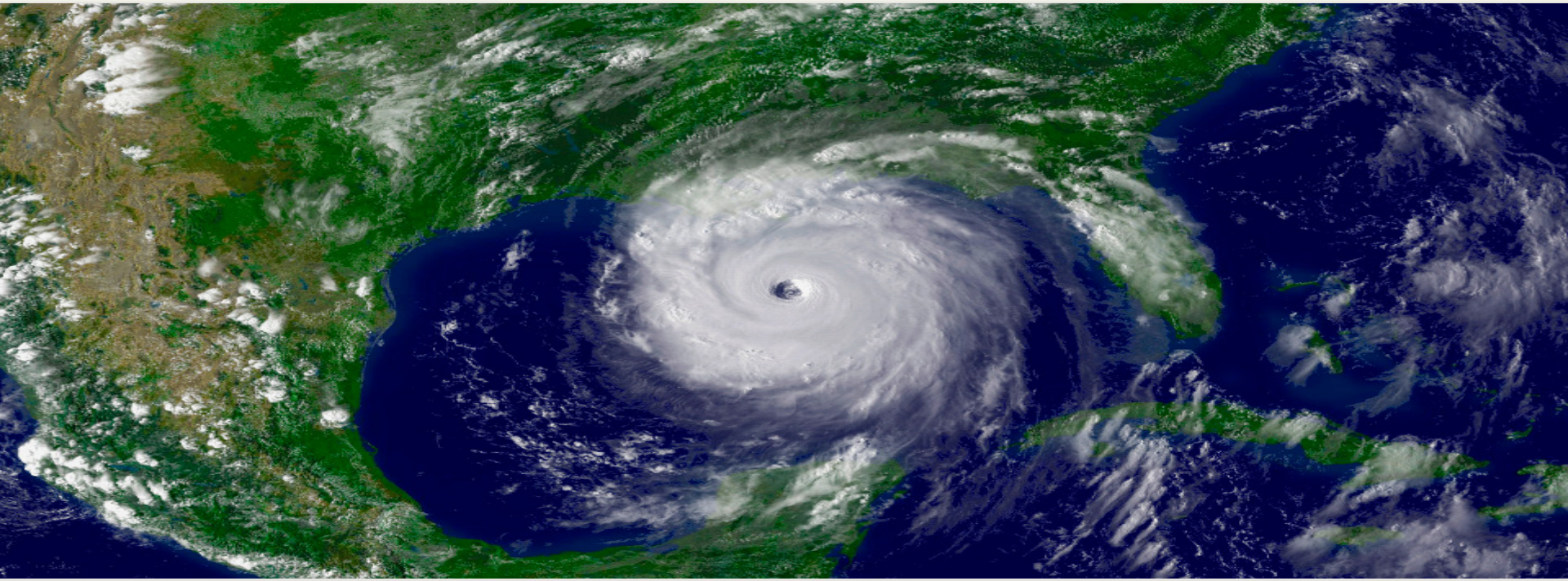
Spectrum and the U.S. Weather Enterprise



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National Oceanic and Atmospheric Administration

May 25, 2016

Increase in Extreme Events

"Average" Year and Trends in the U.S.

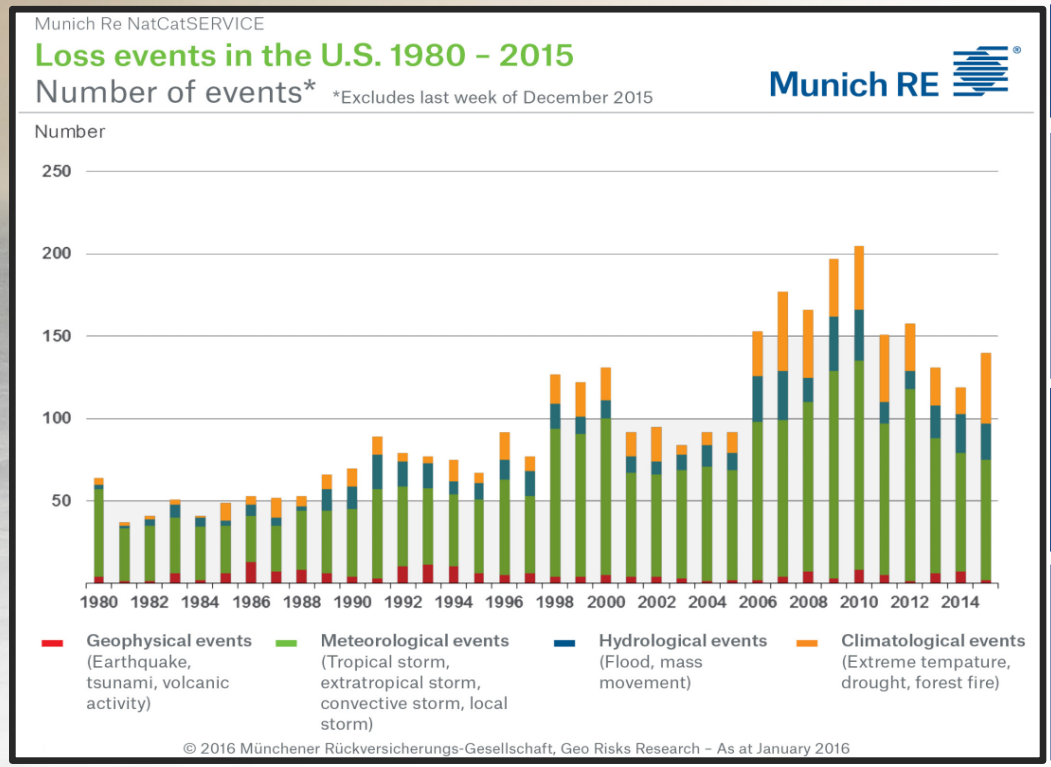
650 Deaths
$15B in Losses

26,000 Severe Thunderstorms

6 Atlantic Basin Hurricanes

1,300 Tornadoes

5,000 Floods



Increasing Vulnerability

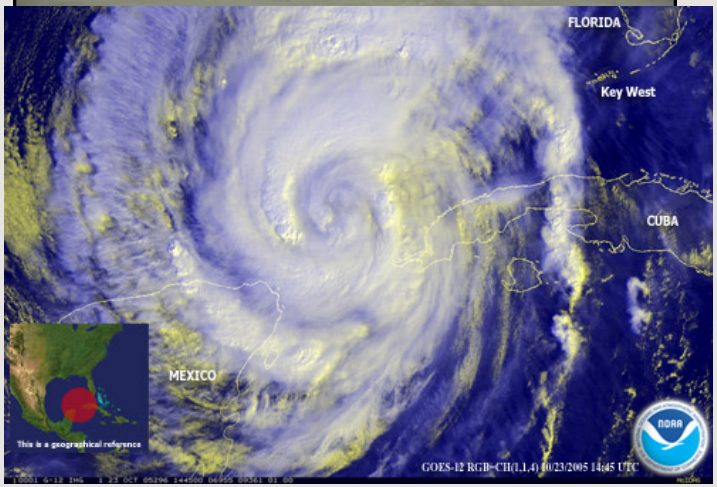
- Increasing population
- More infrastructure at risk
- Signs of sea level rise

- Improve forecasts of extreme events 4-8 days in advance

- Connecting forecasts to decision-makers is basis for building a Weather-Ready Nation

Data from Satellites are Essential to *All Forecasts and Warnings*

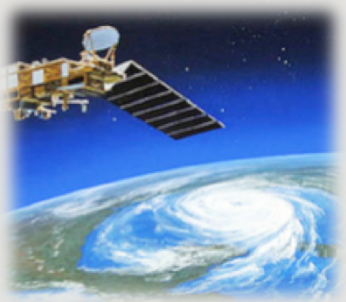
Hurricanes



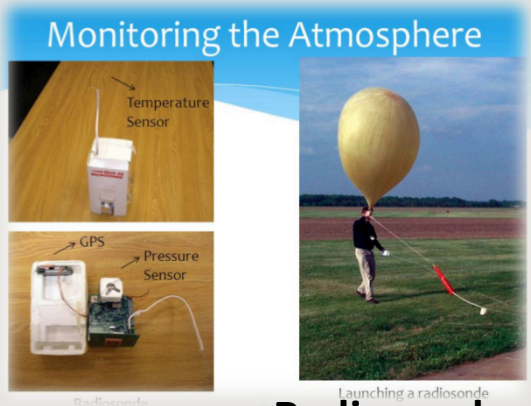
Flooding

Tornados

Access to Spectrum is Critical to NOAA Missions



Command and Control of NOAA satellites



Radiosondes

NOAA Aircraft

Stream Gage

Radar

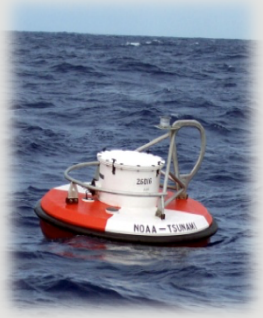
Data critical from remote locations for input into weather forecasts, warnings and numerical weather prediction models

Seismic station

Tracking endangered wildlife

EMWIN

Ships



Tsunami Buoy

GOES–R
Huge Strides in Capabilities

3X MORE CHANNELS

Improves every product from current GOES Imager and will offer new products for severe weather forecasting, fire and smoke monitoring, volcanic ash advisories, and more.

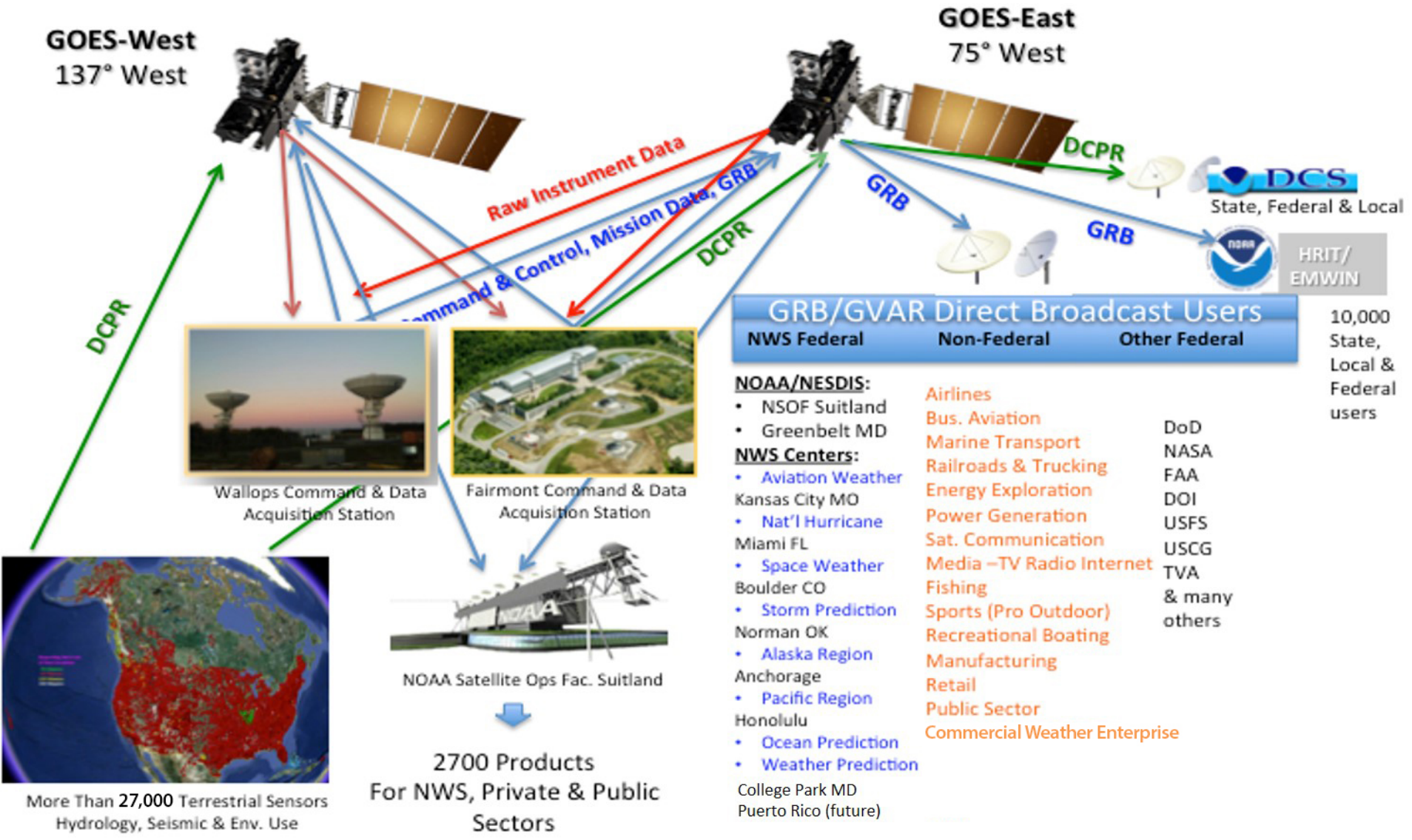
4X BETTER RESOLUTION

The GOES-R series of satellites will offer images with greater clarity and 4x better resolution than earlier GOES satellites.

5X FASTER SCANS

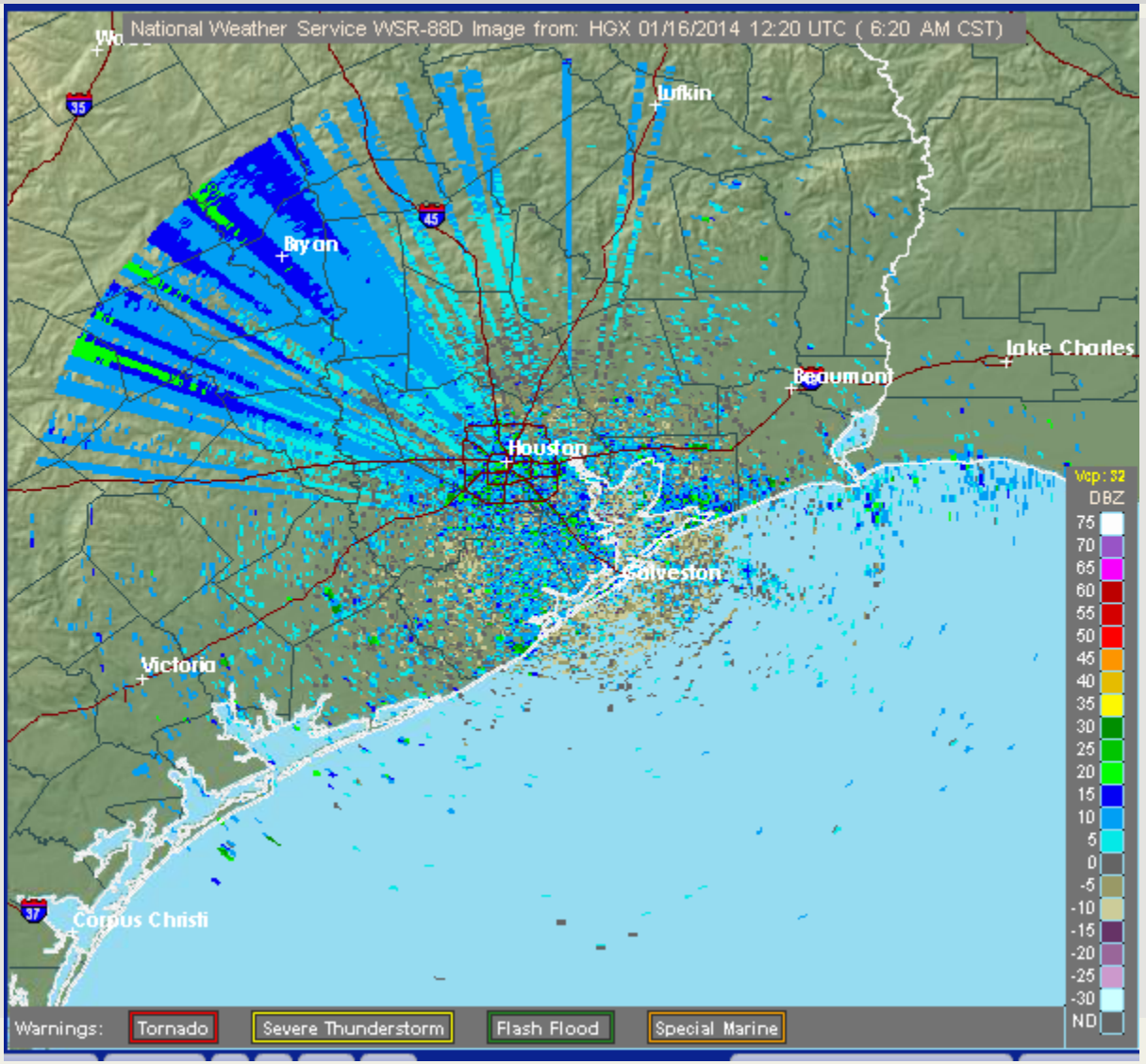
Faster scans every 30 seconds of severe weather events and can scan the entire full disk of the Earth 5x faster than before.

GOES-R Architecture



Current RF Interference Challenges

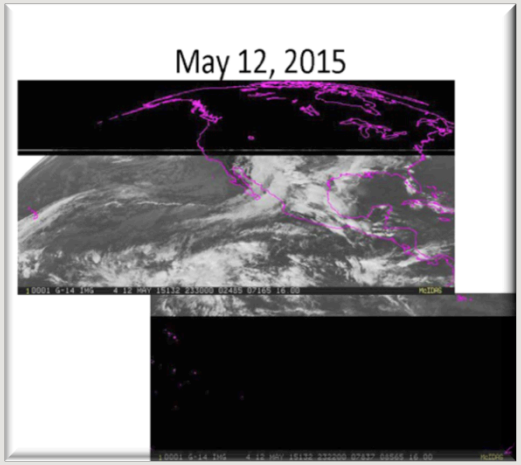
NEXRAD Radar

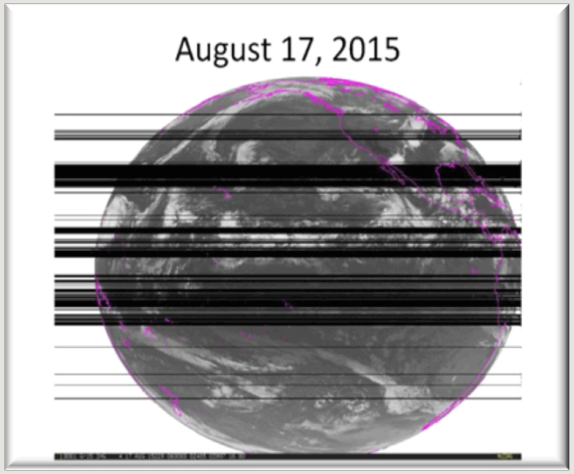


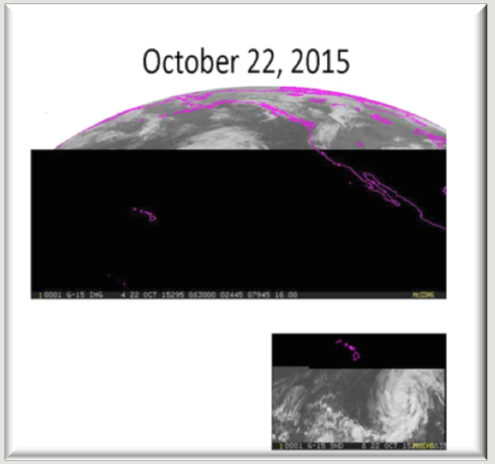
Current RF Interference Challenges

GOES Satellite

Recent Examples of Satellite Data Loss Due to Interference







Loss of any one of these images will impact the entire suite of products and users

Potential operational impacts include:

- Weather forecasting nation-wide
- Tornado warnings – flash flood warnings
- Shipping industry
- Airlines, including domestic and international routes
- Satellite dropout affects US & foreign weather and aviation services
- Tropical cyclone forecasting in the Atlantic and Pacific oceans

Potential Impacts of 1675-1680 MHz Sharing

- **GOES-N,O,P satellites deliver critical Sensor Data:**
  - Sensor Data downlink contains the raw imagers and sounder data that are transmitted to NOAA data acquisition stations in the 1675-1680 MHz band
  - These data are the basis for many of the satellite products that NOAA provides to public and the weather enterprise
  - Loss of these data will result in the loss of images required to track hurricanes and monitor the rapid development of severe storms that may develop into destructive tornados

- **Federal and non-federal users of Data Collection Platform rebroadcast (DCPR) outside protection zones will be subject to interference**
  - Reception of hydrological data from sensors deployed nationwide required for flood prediction and warnings
  - Reception of sensor data required for wildfire management

Summary

- NOAA's National Weather Service relies on accurate, timely and reliable satellite observations to provide better information to save lives and property – as it builds a Weather-Ready Nation
- NOAA satellite operations have experienced interference in the 1670-1675 MHz for the past several years
- Federal and non-federal users Data Collection Platform outside protection zones cannot be protected and will be subject to interference
  - Potential impacts to emergency management, weather warnings, aviation, and wildfire management capability
- These data are the basis for satellite products provided by NOAA to the public and other government agencies, and further used by the weather enterprise
- Additional studies required prior to any auction of NOAA frequencies