



# The Availability of Near-Real Time Data Products through the LANCE System

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# Overview

- The Land Atmospheres Near-real time Capability for EOS (LANCE) generates and distributes products from 5 instruments:

- *AIRS (Aqua) and MLS (Aura)*
- *MODIS (Aqua and Terra)*
- *OMI (Aura)*
- *AMSR-E (Aqua)*



- LANCE Objectives:

- *Leverage science processing expertise to create high quality NRT products*
- *To provide a variety of Aqua, Terra, and Aura data to a wide applications community within less than 2.5 hours of observation (The standard, science-quality products are typically available with a latency of 20-48 hours)*
- *To provide data products with high reliability using redundant systems*
- *To provide an umbrella environment with uniform high level requirements to foster coordination and cooperation between the individual elements*

- LANCE Web Site: <http://lance.nasa.gov>

# Overview



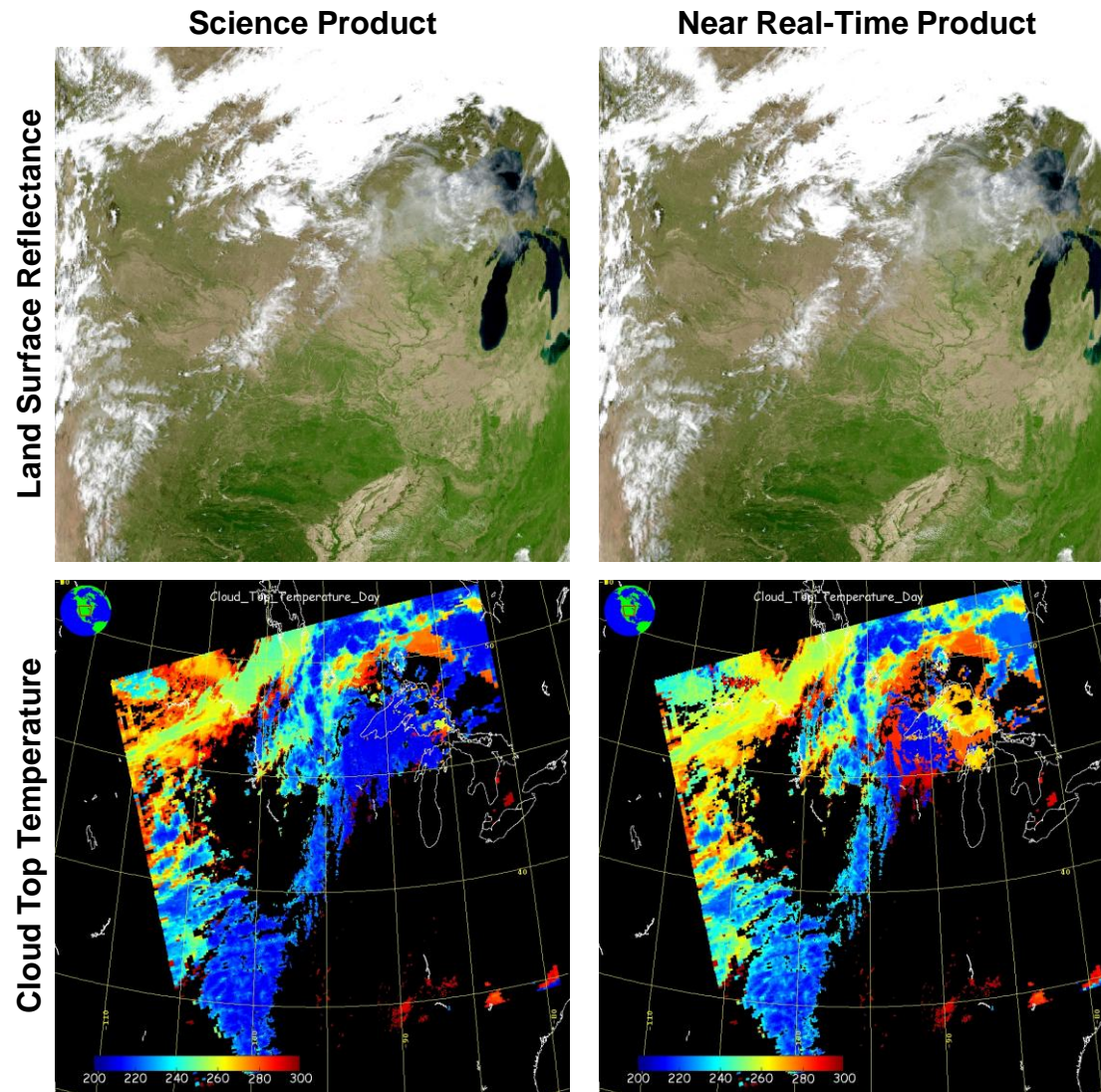
- LANCE is a component of Earth Observing Data and Information System (EOSDIS).
  - *EOSDIS also includes the Distributed Active Archive Centers (DAACs) that are responsible for management and distribution of science quality products.*
- Governance
  - *LANCE operates under the auspices of a User Working Group (UWG) that includes representatives of all segments of the user community as well as members of the instrument Science Teams*
  - *The UWG meets annually and reviews the operational status, the progress made with any development efforts and plans for future development*
  - *Any significant suggestions for LANCE upgrades arising from this meeting will need to be reviewed by the UWG*
- Product Availability
  - *All data products are freely available following registration*
  - *Both data and imagery are available, the former by push or pull*
  - *In order to meet the latency requirements the restrictions on the ancillary data have been relaxed and, in some cases, there are significant differences between the near-real time and standard, science-quality data products. All LANCE products have been approved by the Science Teams*
  - *There are a wide variety of applications users from U.S. and foreign Government agencies, universities, and the private sector investigating such issues as fire, floods, droughts, ash plumes, dust storms, and air quality.*
  - *In excess of 1.3 TB of data products are distributed each day and approximately 50000 images are downloaded daily*



# LANCE Data Products

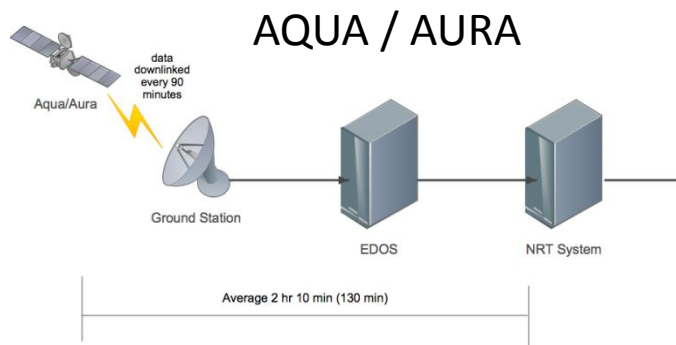
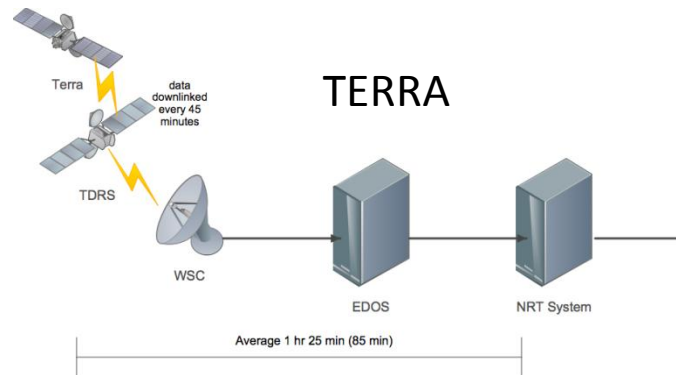
Instrument	Product Categories	Average Latency
AIRS	Radiances, Temperature and Moisture Profiles, Clouds and Trace Gases	1.3 - 2.3 hours
MLS	Ozone, Temperature	1.3 - 2.3 hours
MODIS	Radiances, Clouds/Aerosols, Water Vapor, Fire, Snow, Sea Ice, Land Surface Reflectance (LSR), Land Surface Temperature	1.5 - 2.3 hours excluding the L2G and L3 daily, tiled LSR products
OMI	Ozone, Sulfur Dioxide, Aerosols, Cloud Top Pressure	1.6 - 2.8 hours excluding L3 products
AMSRE	Brightness Temperature, Soil Moisture, Rain Rate, Ocean Products, Snow Water Equivalent, Sea Ice	1.3 - 2.2 hours excluding L3 products

# Comparison of NRT and Science Products



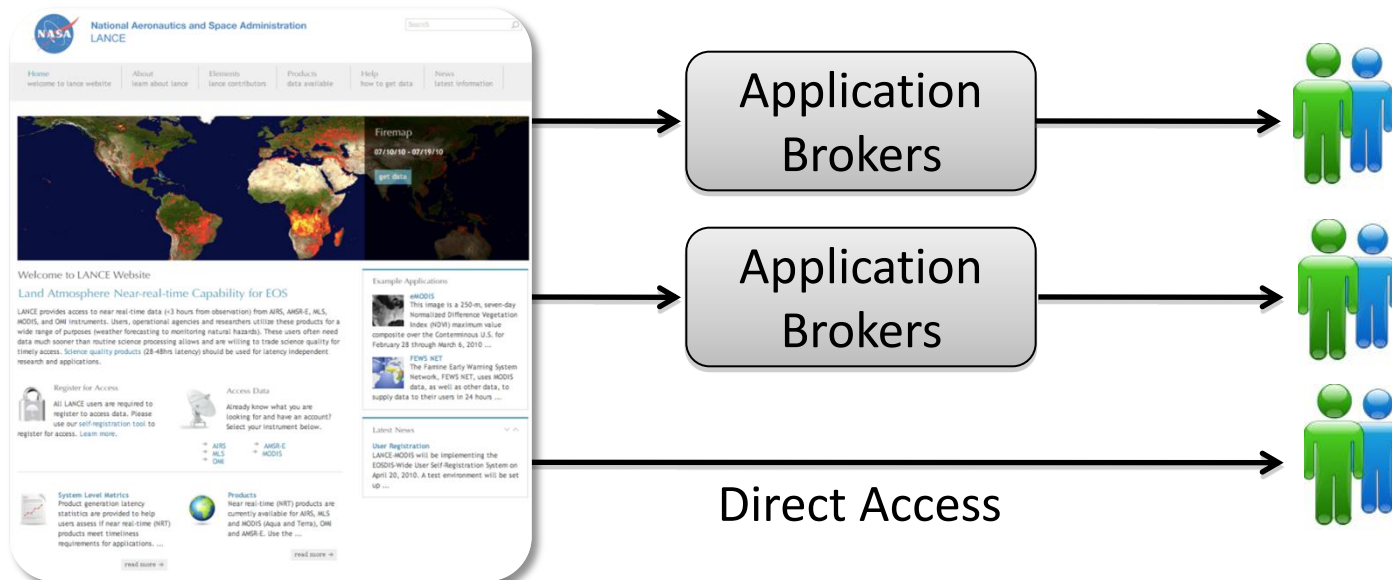


# LANCE System Architecture



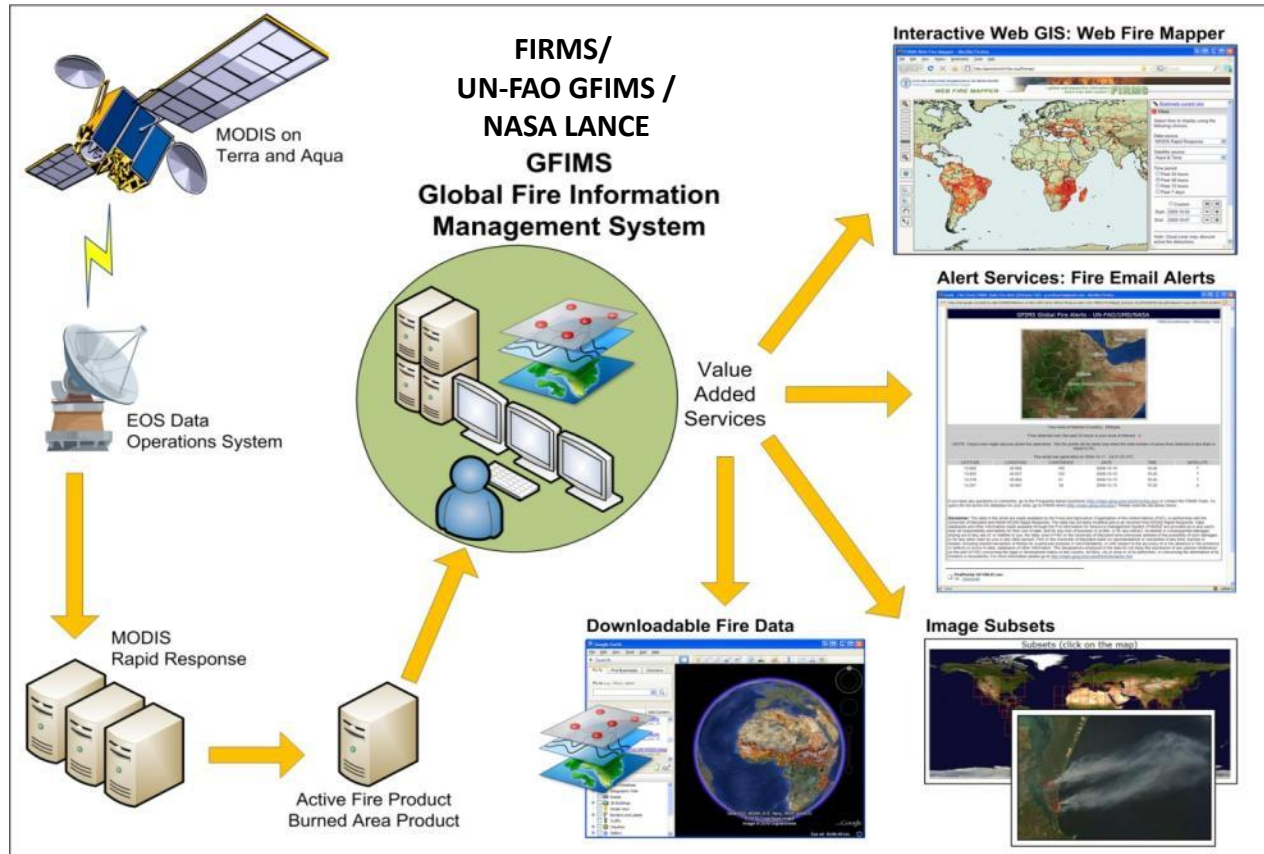
- Leverages existing EOS processing and distribution capabilities at multiple locations, collocated with science expertise.
- Provides users with a 'one-stop-shop' for EOS near real-time products through the LANCE web portal.
- Primary driver of latency is in the spacecraft to ground transmission. New approaches and capabilities are being evaluated to effect latency improvements.

# Brokerage and Direct Access



- LANCE focuses on providing data to brokers who perform value added processing and services for downstream users.
- LANCE provides limited services that enable brokers to quickly create products for hazard, forecasting and disaster response
- All requests for LANCE enhancements are reviewed by the user working group to ensure enhancements are coordinated with LANCE capabilities and resources

FIRMS provides the following tools for accessing fire information in easy to use formats:



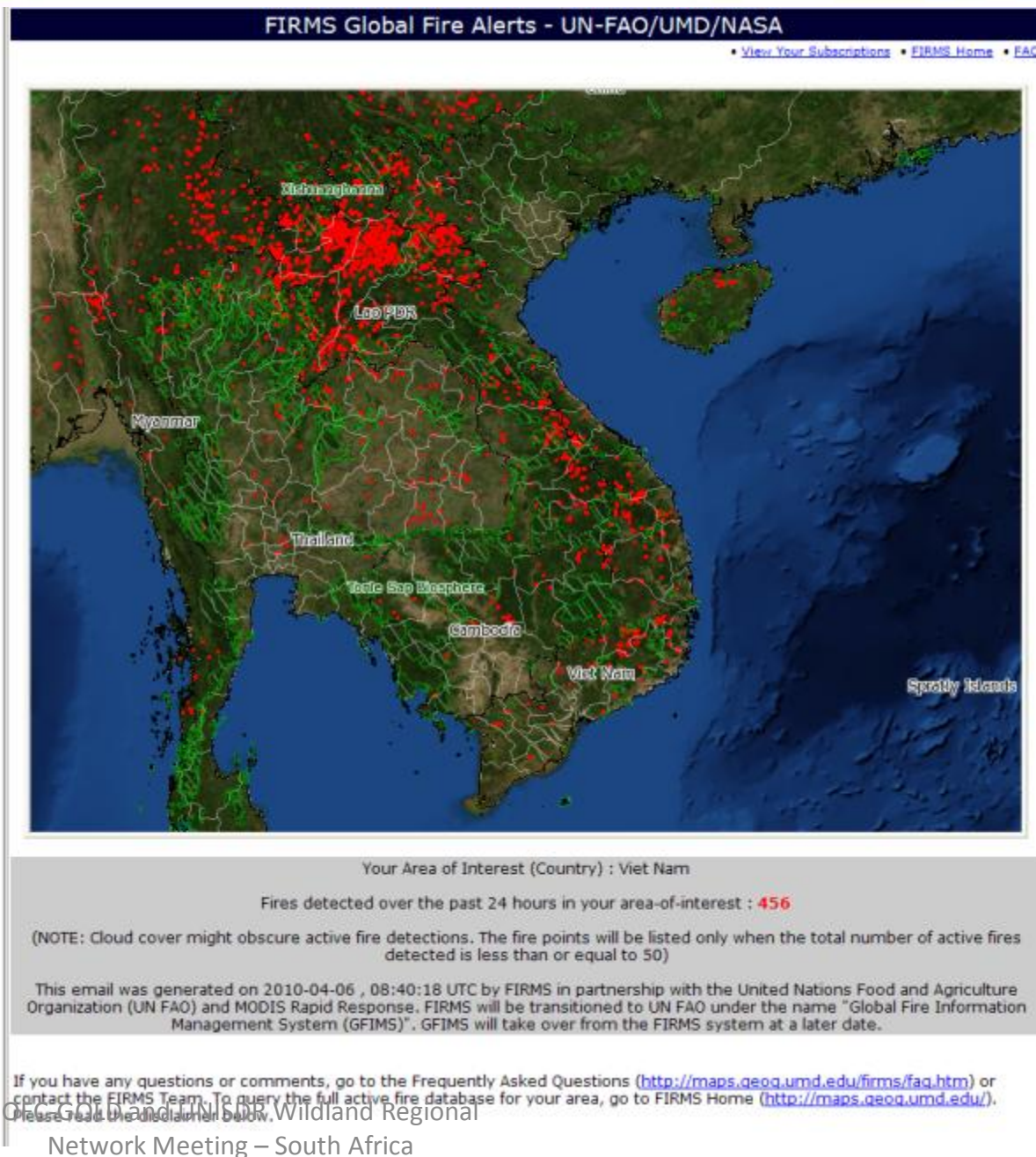
- Interactive Web GIS
- Email alerts
- Subsets of MODIS images
- Active fire data downloads (KML, Shape, Text files and plug-ins for Google Earth and NASA World-Wind)
- Fire Archive Download Tool



## FIRMS Email Alerts

- Customized alerts for subscribers area of interest (country, protected area, bounding box coordinates)
- Choice of daily, weekly, or near-real time alerts
- Available in English and Spanish
- At the end of January 2011 FIRMS had 4731 subscriptions, of these 3902 were English, 795 Spanish and 34 French.

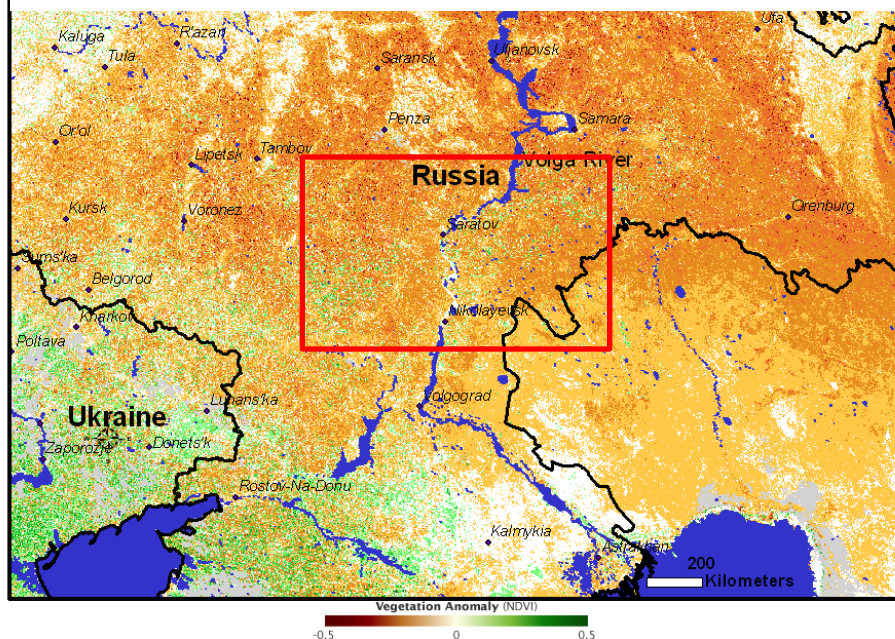
<http://lance.nasa.gov>



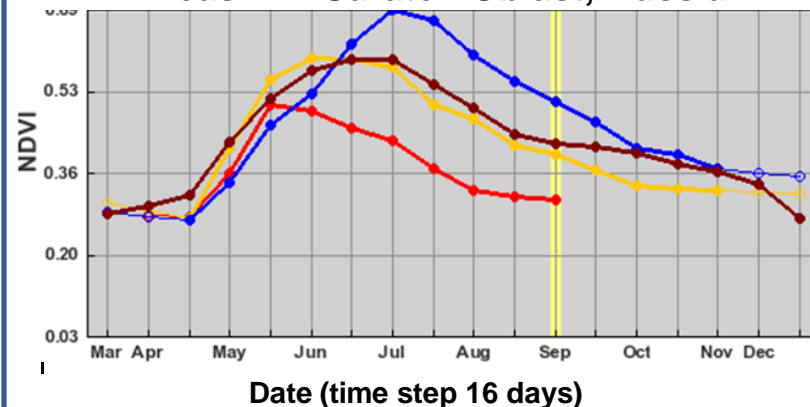
# Drought Monitoring



NDVI Anomaly Image, Volga District, Russia ; June 26- July11, 2010



Vegetation Index Time Series for Cropped Areas in Saratov Oblast, Russia



Near Real Time Data from LANCE has been integrated into the GLAM (Global Agricultural Monitoring) system which enables timely monitoring of agricultural areas by USDA crop analysts. LANCE products are used until the MODIS Science Products are released.



# Flood Mapping



Current Flooding  
MODIS data obtained  
Sep 11-13 2010

Previous Flooding  
(This Year)

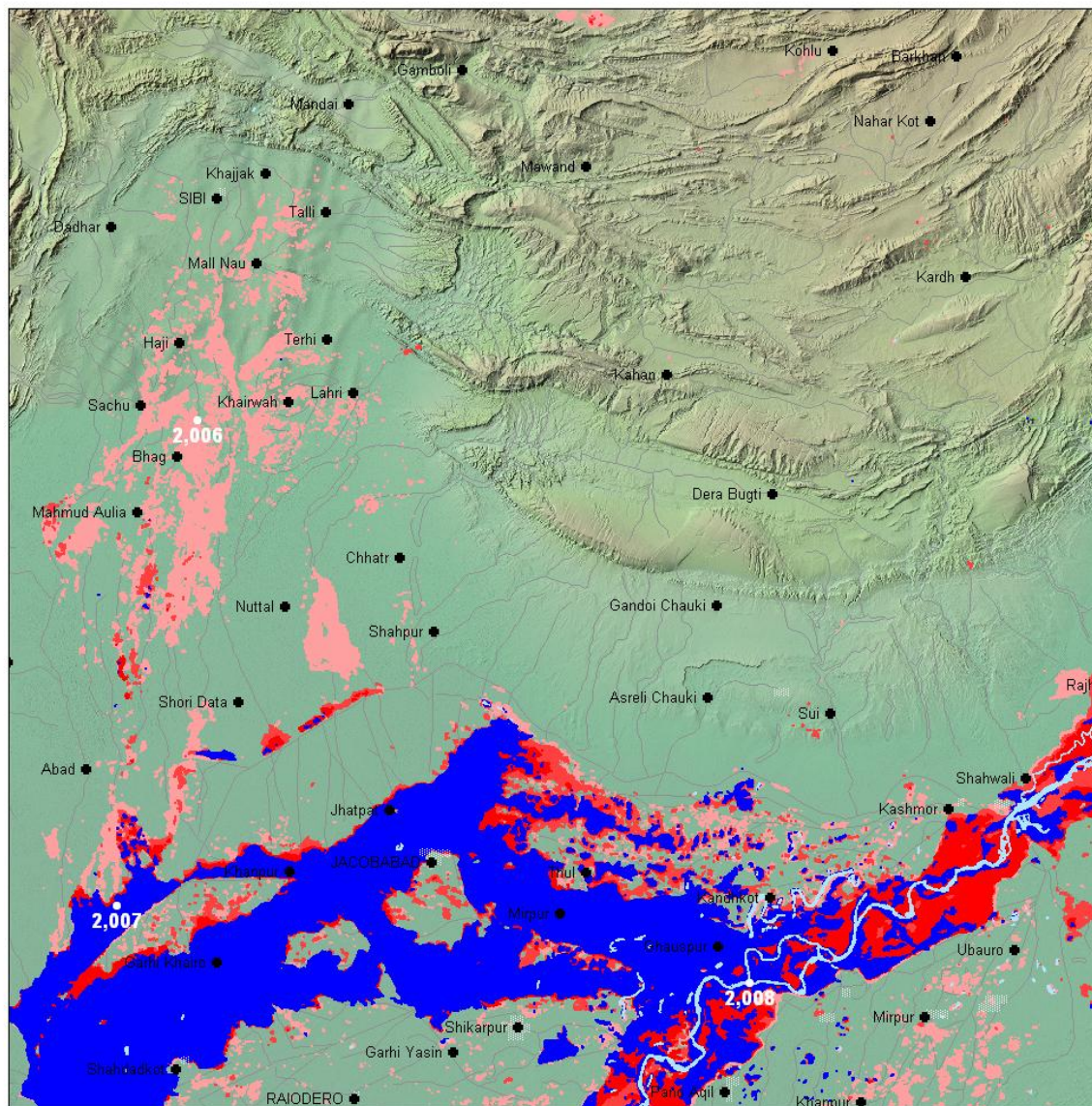
Post-1999 Flooding

Surface Water (SRTM)  
February 17, 2000

Urban Areas

G. R. Brakenridge  
CSDMS, University of Colorado

UTM Zone 43 North; WGS 84  
Graticule: 2 degrees



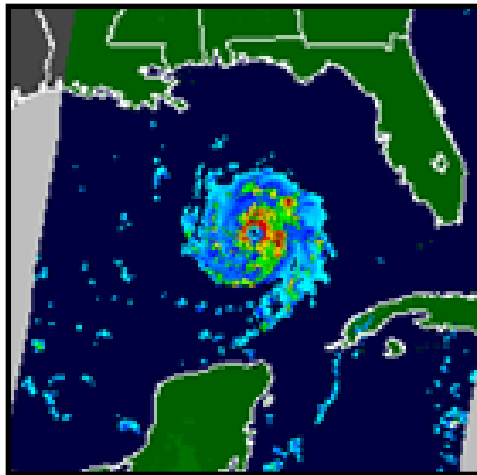
# LANCE Enabling Weather Forecasters



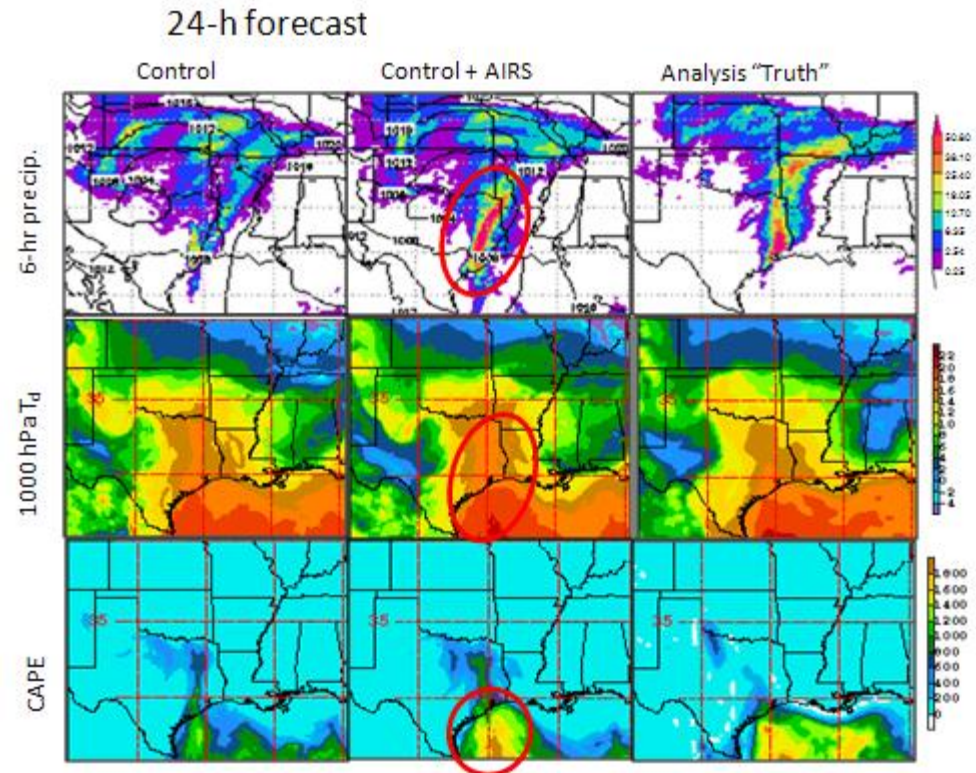
SPoRT: Short-term Prediction Research and Transition Center

Products used to improve situational awareness of weather events, and short term weather forecasts

- off shore weather processes
- improved forecasts of clouds, fog, precipitation , and temperature in coastal regions



AMSR-E Rain Rate



*AIRS profiles improve model initial conditions in data void regions producing improve analyses and forecasts*





# LANCE Tools

- Present
  - *A number of the LANCE elements, notably LANCE-MODIS, provide a number of tools for the end user that allow the generation of different product formats (GeoTiff, netCDF, and BUFR), product sub-setting (band, parameter, and geographic), re-projection, and mosaicing*
  - *The Rapid Response component of LANCE-MODIS allows images to be downloaded for user-specified geographic subsets*
- Planned Functionality for 2011
  - *Substantial content and presentation improvements will be made to the LANCE web site*
  - *The FIRMS will be integrated into LANCE-MODIS*
  - *The LANCE Rapid Response system will be expanded to include 2-3 products from each instrument to support users with specific instruments such as fires, floods, dust storms, etc.*
  - *A Web Mapping Service will be added to expedite user access to imagery*
  - *The presentation of image data through Google Earth will be added*
  - *Datacasting will be added to expedite user access to data and image products*





# The Way Forward

- A major consideration for 2012 and later will be incorporating additional mission and instrument data into LANCE. While NASA HQ has made **no commitment**, potential examples include:
  - *The NPP/VIIRS and OMPS are follow-on instruments for MODIS and OMI and there is a considerable applications community interested in near-real time data. CrIS is also a possibility*
  - *Aerosol data from CALIPSO, soil moisture data from SMAP, and SST and precipitation data from AMSR-2 on GCOM-W are also of significant value to the user community*
- It is expected that additional products and services will be requested by the user community
  - An example is the addition of rolling multi-day products such as MODIS burnscar, NBAR
  - A UWG meeting will be held in Fall of 2011 to review potential upgrades
  - Are there any suggestions from this audience ?