

NASA Missions and Products: Update

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Land Monitoring at Moderate Resolution: Current Status

- Landsat data are accessible and are free of charge
- Landsat observations from one system are often insufficient for applications, which require more frequent, intra-monthly observations
 - 16-day revisit time is too infrequent
 - Especially with frequent clouds
- Use of 2-3 Landsat systems would solve the problem
 - Landsat-7 is old, still running but has image quality issues
 - Landsat-8 is functioning mostly very well (thermal IR issues)
 - Landsat-9 is not foreseen within at least 5 years (if at all)

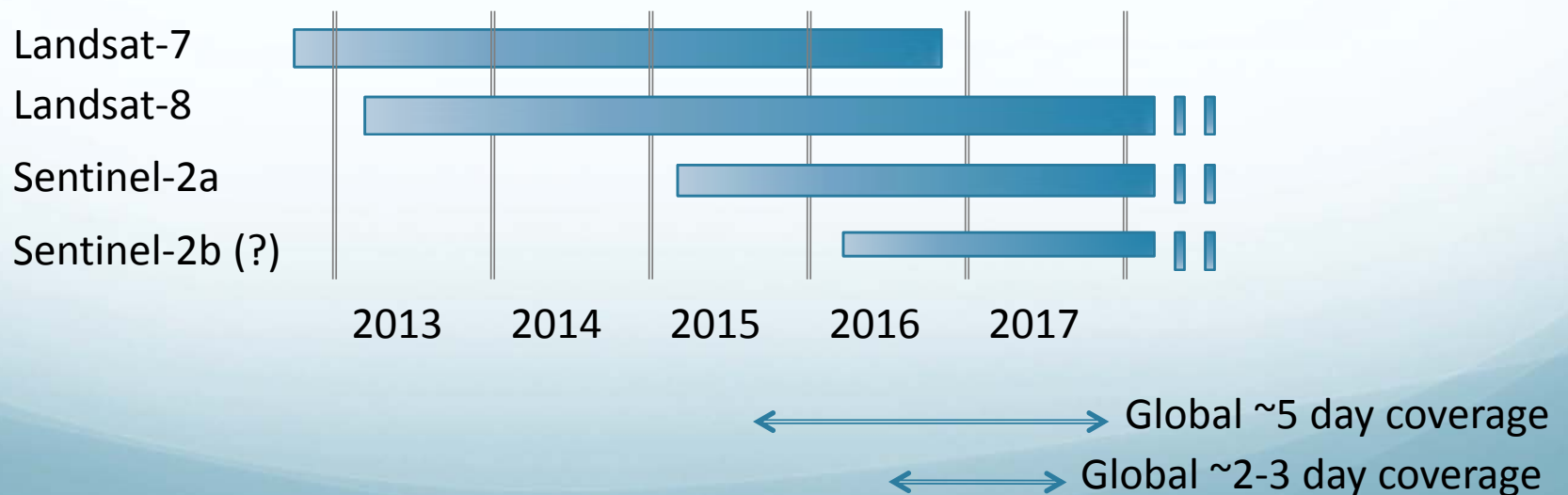
Towards Land Imaging Constellation: Near-Term Solution

- International data cooperation is needed for monitoring on landscape scale (20-30 m)
- Non-US sensor data accessibility issues (CBERS, IRS)
- ESA Sentinel data will be accessible free of charge but other sensors may present challenges
 - Sentinel-1 (radar) is already flying
 - Sentinel-2 is due in late spring of 2015
- NASA Multi-Sensor Land Imaging (MSLI)
 - Solicitation (Proposals due Dec 1, 2014)
 - MSLI Science Team to be formed and will have international collaborators

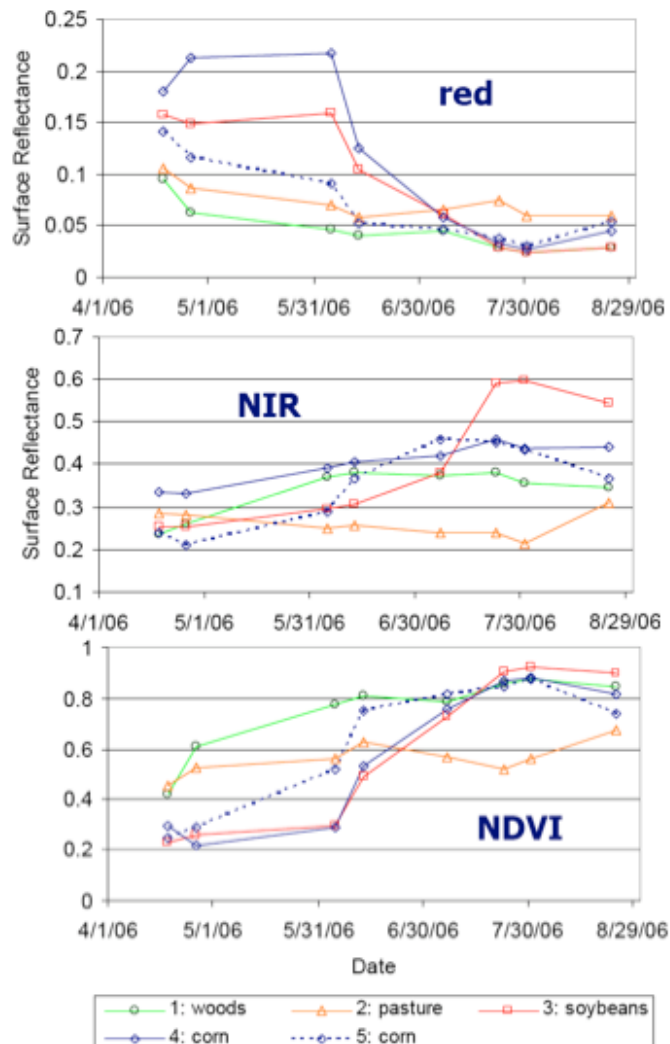
Sentinel-2 and Landsat Fusion

Merging Sentinel-2 and Landsat data streams could provide < 5-day coverage required for Ag monitoring

- Both sensors have 10-30m coverage in VNIR-SWIR
- Satellite orbits complementary
 - Landsat-7 & -8 => 8 days out of phase
 - Sentinel-2a & 2b 5 days out of phase
 - Landsat and Sentinel sun synch orbits precess relative to each other



Studying Land-Cover Phenology at 30 m: Fusing Data with Moderate Resolution



- Red reflectance, near-infrared (NIR) reflectance, and NDVI values for individual fields from central Illinois during the first half of the 2006 growing season.

- Data were combined from Landsat-5, Landsat-7, ASTER, and IRS Resourcesat imagery.

Mid-Resolution (30m) Global Maps of 21st-Century Forest Cover Change

NASA-funded researchers have produced the *first* high-resolution (30m) global map of forest cover change for 2000 – 2012 using data from Landsat.

- Previous efforts were either sample based or had coarser resolution

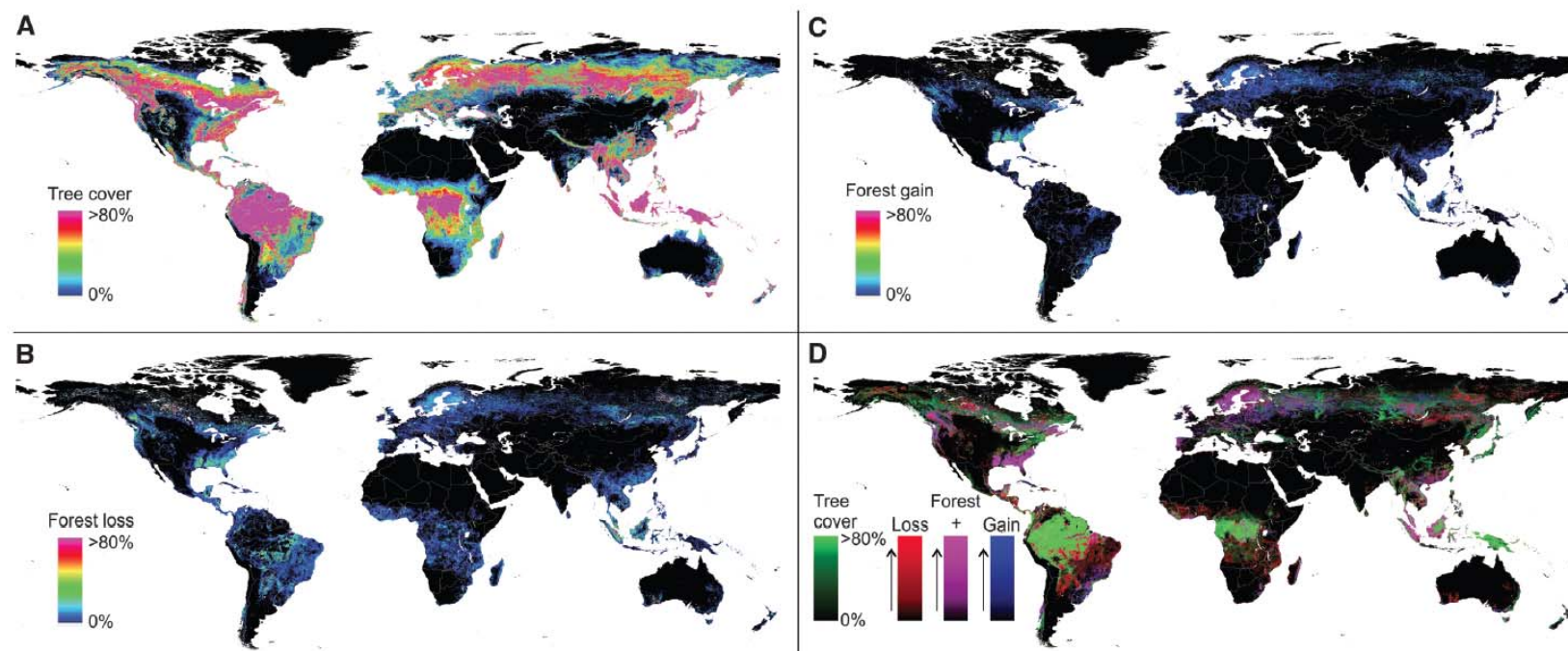


Fig. 1. (A) Tree cover, (B) forest loss, and (C) forest gain. A color composite of tree cover in green, forest loss in red, forest gain in blue, and forest loss and gain in magenta is shown in (D), with loss and gain en-

hanced for improved visualization. All map layers have been resampled for display purposes from the 30-m observation scale to a 0.05° geographic grid.

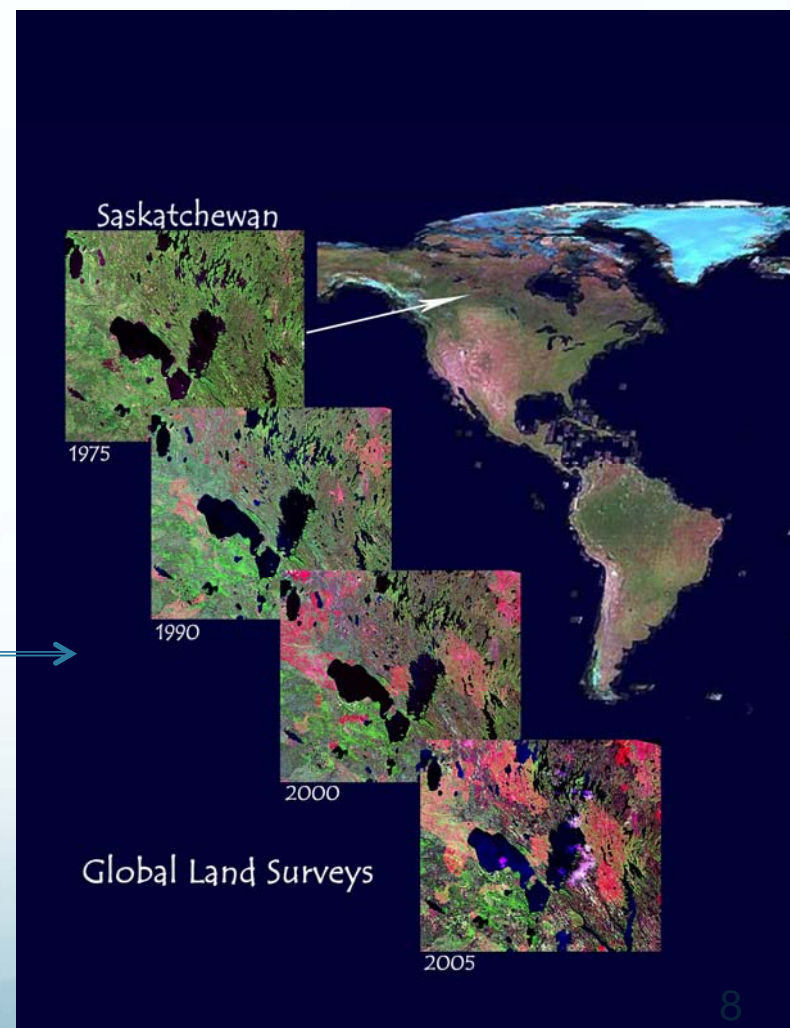
- 2.3 million km² of forest were lost
- 0.8 million km² of forest were gained
- 0.2 million km² land experienced loss and subsequent gain

Hansen, MC, Potapov, PV, Moore, R, Hancher, M, Turubanova, SA, Tyukavina, A, ... Townshend, JRG. (2013). High-Resolution Global Maps of 21st-Century Forest Cover Change. *Science*, 342(6160), 850–853. doi:10.1126/science.1244693

NASA-USGS Landsat-based Global Land Survey (GLS) Data Sets

Global cloud-free, geocorrected Landsat-based datasets centered on 1975, 1990, 2000, 2005, and 2010. EO-1 ALI data were used for mosaics over small islands.

- 1 scene per epoch at the peak of vegetation
- 30-m global mosaic
- For global assessments of long-term land-cover change (not good for seasonality)
- Paper describing GLS-2005 published in P&RS Journal (2008) with a cover image
- GLS datasets are complete and available for download via GLOVIS/EarthExplorer at USGS free of charge
- Remote Sensing of Environment, 2013, **Assessment of the NASA-USGS Global Land Survey (GLS) datasets**, Gutman et al.
- GLS-2015 is planned to be developed using NEX and WELD



Progression of fires scars in central Canada

Available at 2008 CONUS monthly, seasonal, annual composited mosaics

Landsat Missions - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://landsat.usgs.gov/WELD.php

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Web-enabled Landsat data (WELD) Project <http://landsat.usgs.gov/WELD.php>

The WELD project is systematically generating 30 m composited Landsat ETM+ mosaics at weekly, monthly, seasonal and annual time periods for the conterminous USA (CONUS) and Alaska. The composited mosaics are designed to provide consistent Landsat data that can be used to derive land cover and geo physical products for regional assessment of surface dynamics and to study Earth system functioning.

Version 1.3 of the WELD monthly, seasonal and annual products generated from Landsat ETM+ terrain corrected (Level 1T) data with cloud cover $\leq 80\%$ sensed December 2007 to November 2008 are available here.

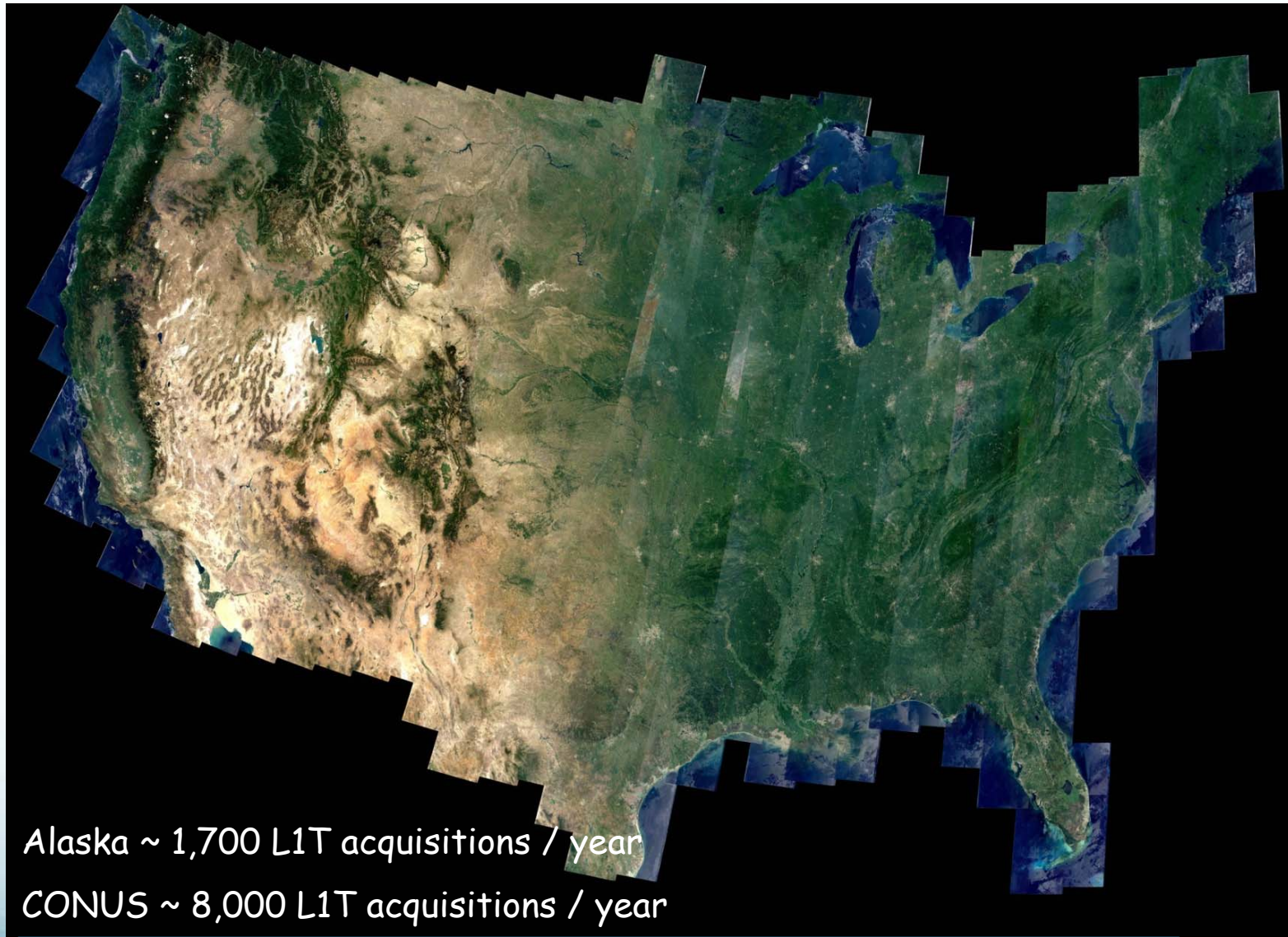
WELD Browse Imagery

The thumbnail images below illustrate the currently available Version 1.3 WELD data products, please click on them to see a higher resolution version. These true color browse images show the Landsat ETM+ red, green and blue wavelength bands at approximately 500 m resolution.

CONUS Annual 	Winter 	December 2007 	January 2008 	February 2008
Spring 	March 2008 	April 2008 	May 2008 	
Summer 	June 2008 	July 2008 	August 2008 	
Autumn 	September 2008 	October 2008 	November 2008 	

Done

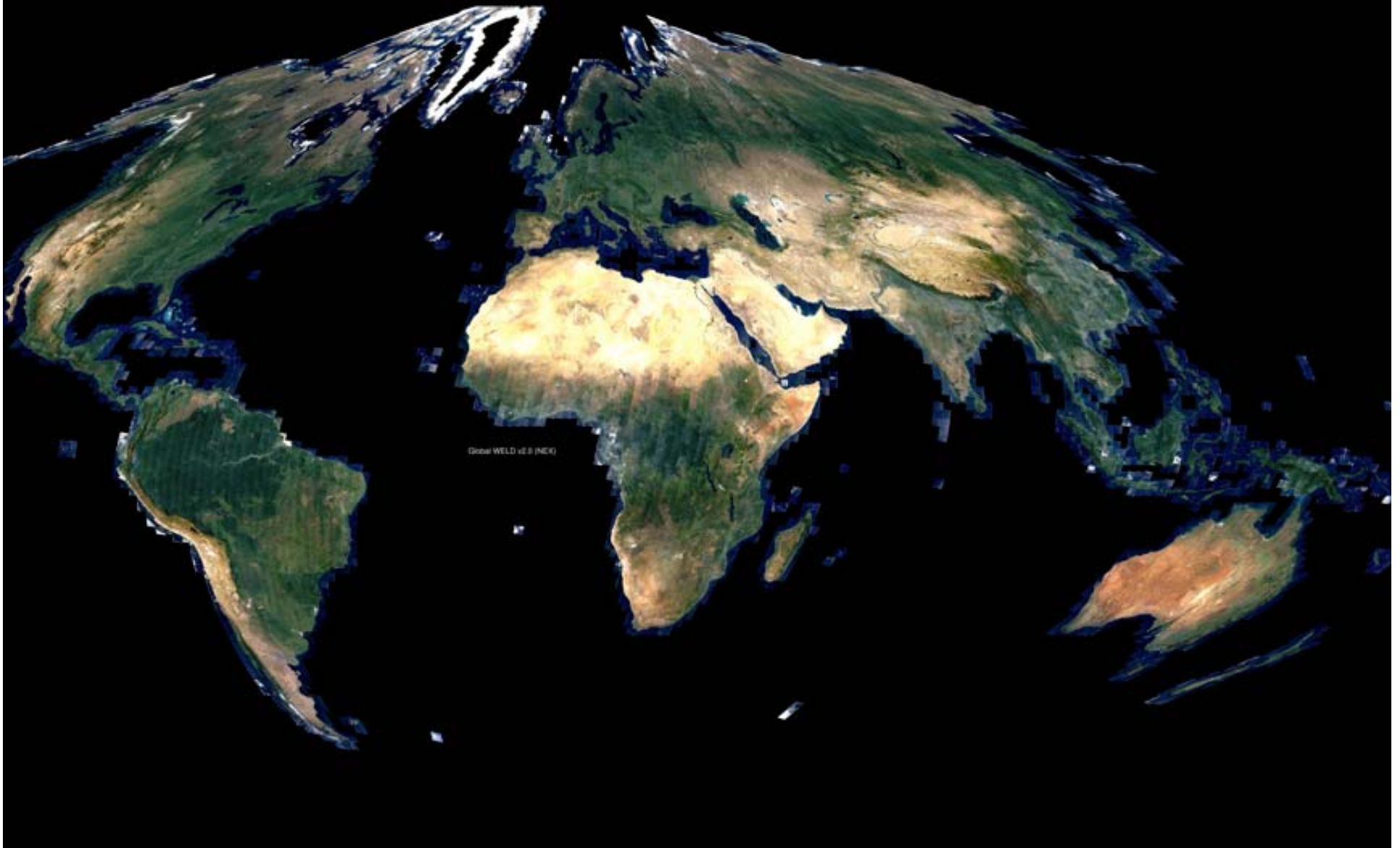
Web-Enabled Landsat Data (WELD). Year: 2009



**New tools and methods to process
large data volumes from Landsat**

Roy SDSU

Prototype of Global Composite Using Landsat-5 and -7



NASA/ESD Applied Sciences Program

Applications Themes



Health



Water



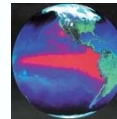
Disasters



Ecosystems



Agriculture



Climate



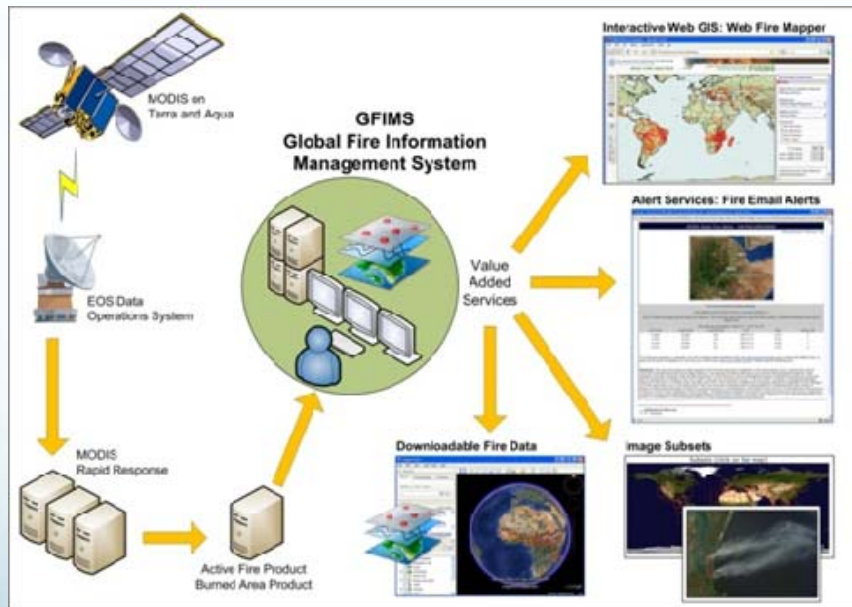
Energy



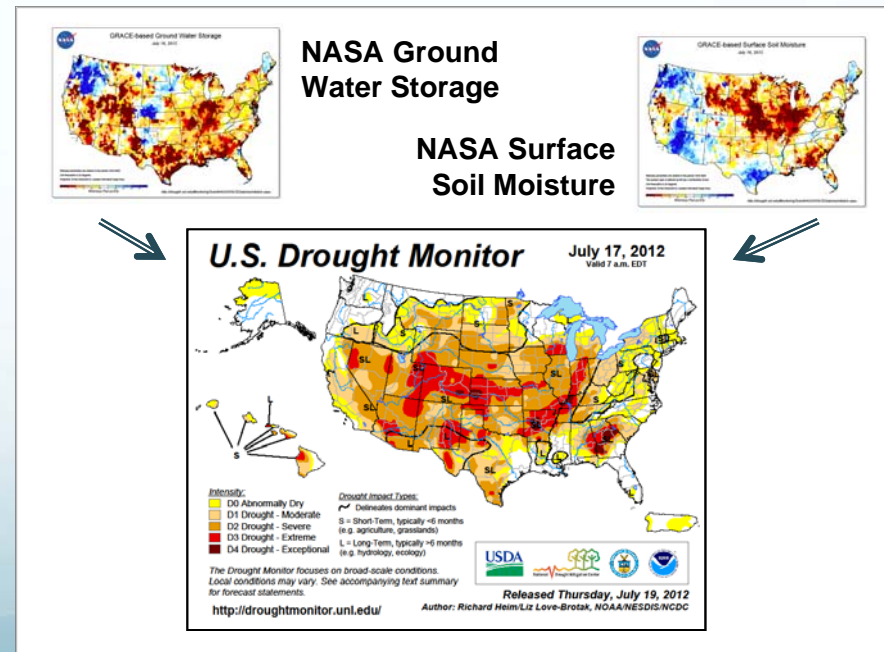
Oceans



Weather



United Nation's system now using data from NASA's Terra and Aqua satellites to identify fires and send alerts to remote areas via SMS and text messages.



USDA/NOAA managed weekly U.S. Drought Monitor now using NASA GRACE data as part of analysis in creation of national and state-level maps..

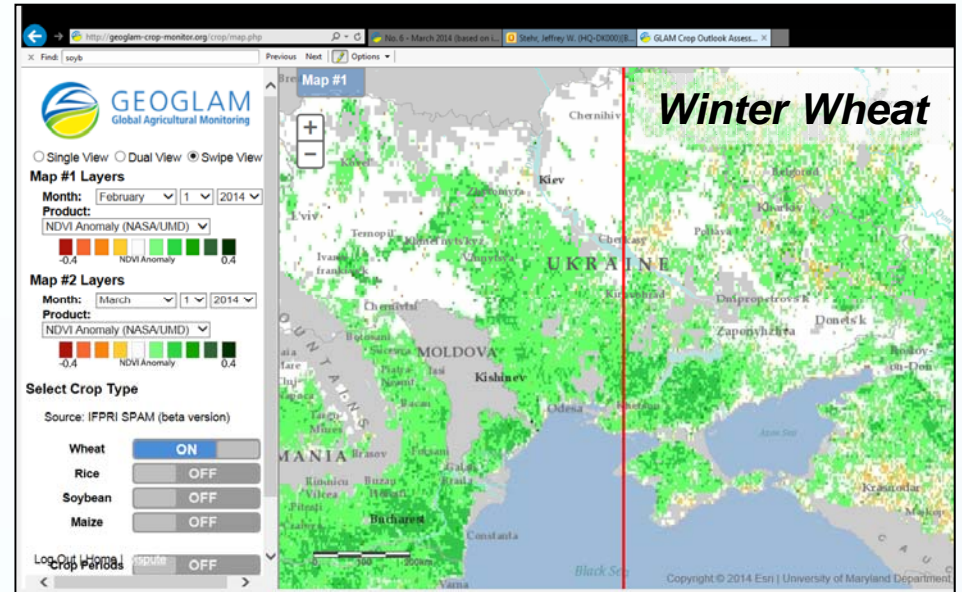
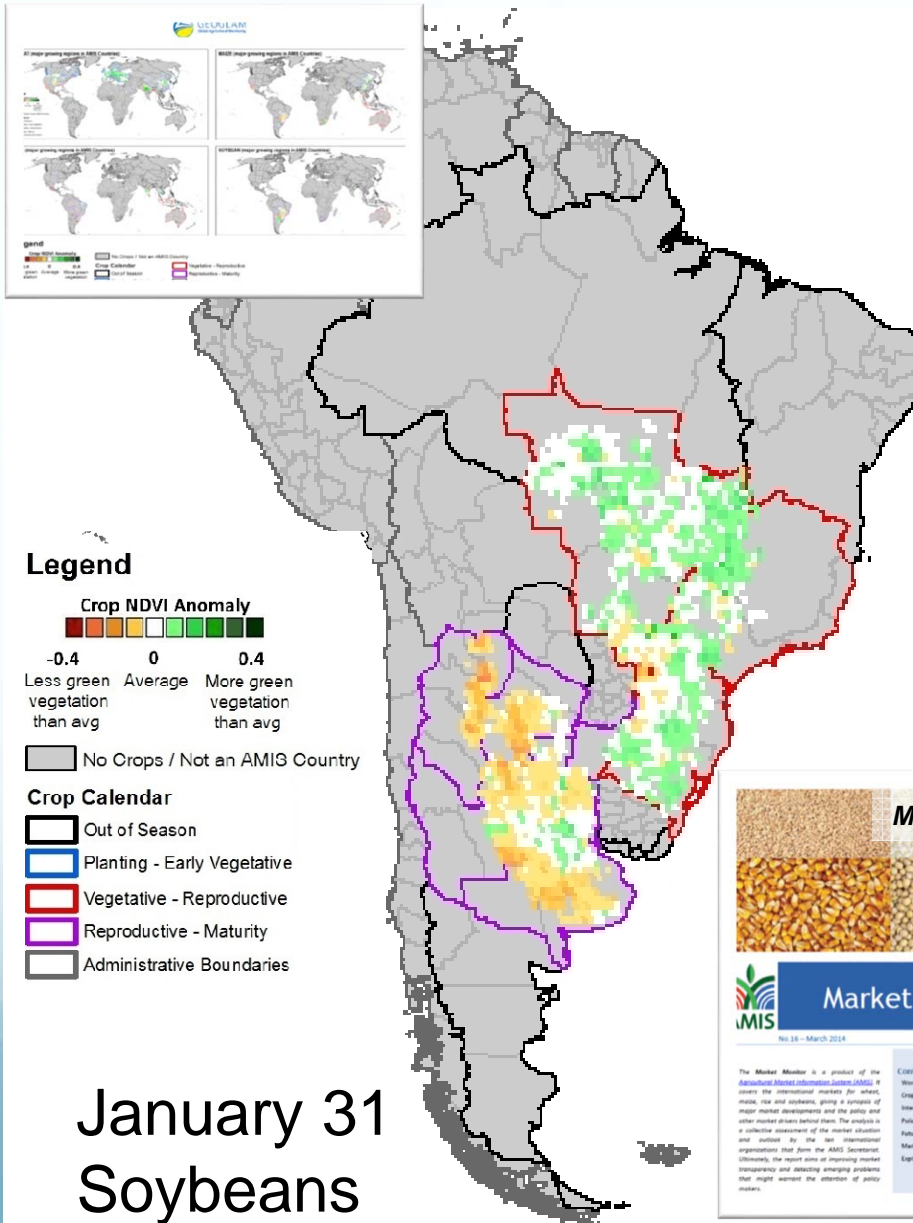


NASA/ESD Applied Sciences Program

- **Applications**
 - Enables identification of applications early in satellite mission lifecycle and facilitates effective ways to integrate end-user needs into satellite mission planning and throughout the mission lifecycle
- **Capacity Building**
 - Builds U.S. and developing countries' capacity, including human, scientific, technological, institutional, and resource capabilities, to enhance the ability to make decisions informed by Earth science data and models

MODIS Feeds Monthly Global Crop Report

Market Monitor Covers First Southern Hemisphere Harvest



MODIS NDVI in standardized crop health assessments

- NASA-developed benchmark
- Reported monthly by AMIS in the *Market Monitor*

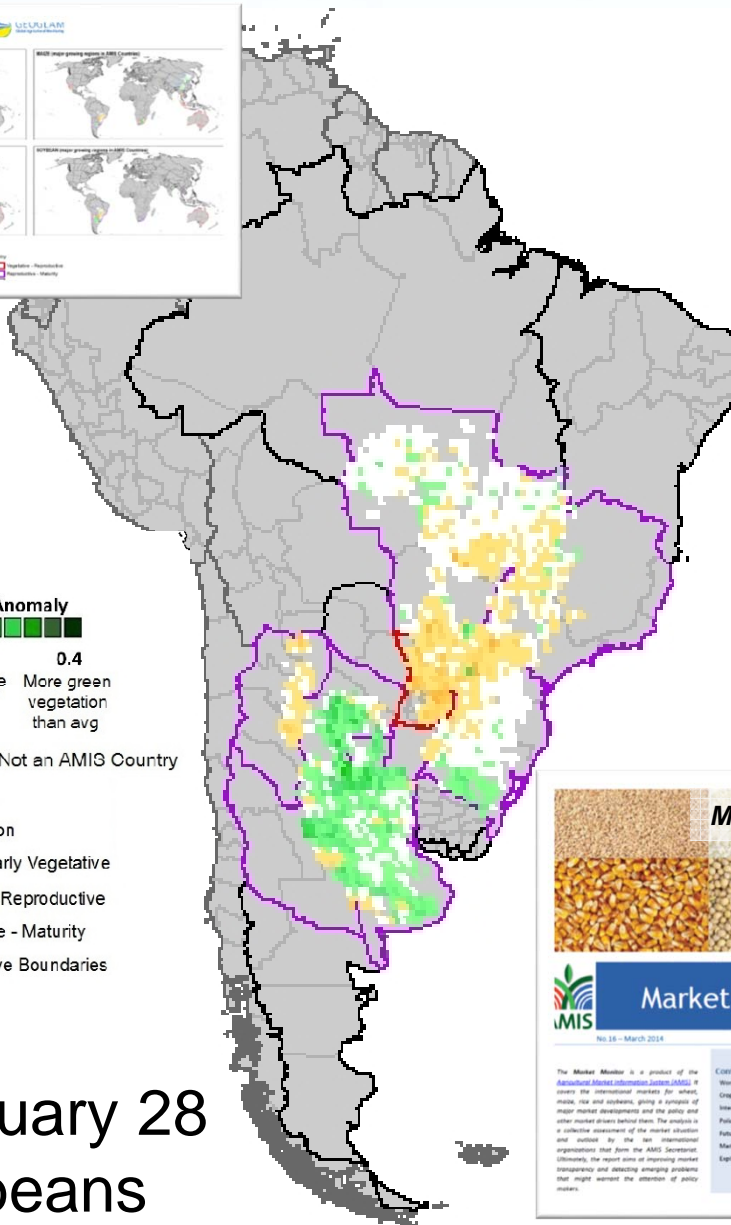
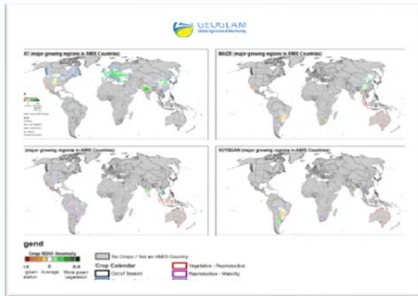
Contributes to more timely, routine assessments

Transparency and fewer price spikes stabilize markets

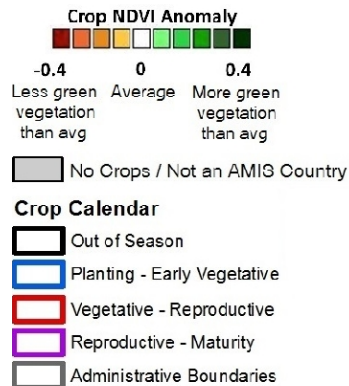
Lower food prices

MODIS Feeds Monthly Global Crop Report

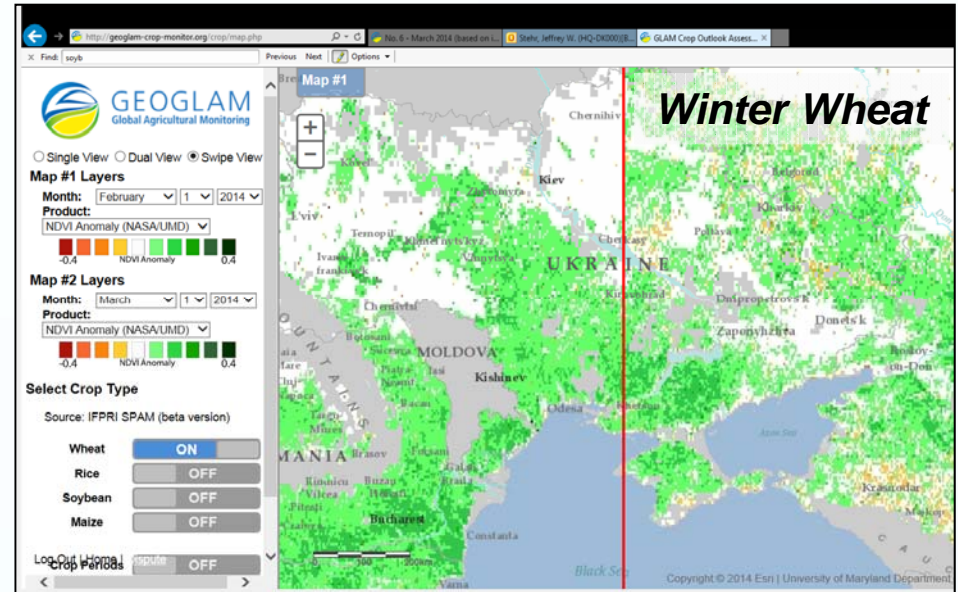
Market Monitor Covers First Southern Hemisphere Harvest



Legend



February 28
Soybeans



2014 S. Hemis. Soybean Harvest:

Argentina: Soybeans rebounded.

Brazil: Soybeans declined due to excessive rains in last month and drought in the south.

Harvest underway but delayed due to wetness.

Bumper crop still expected; estimate down from Jan. but above last year.

Next planting (maize) is delayed.



Köszönöm!

