

Using Deimos-1 & UK-DMC2 to Monitor US Crop Conditions During the 2011 Crop Season



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April 19, 2012

All the space you need



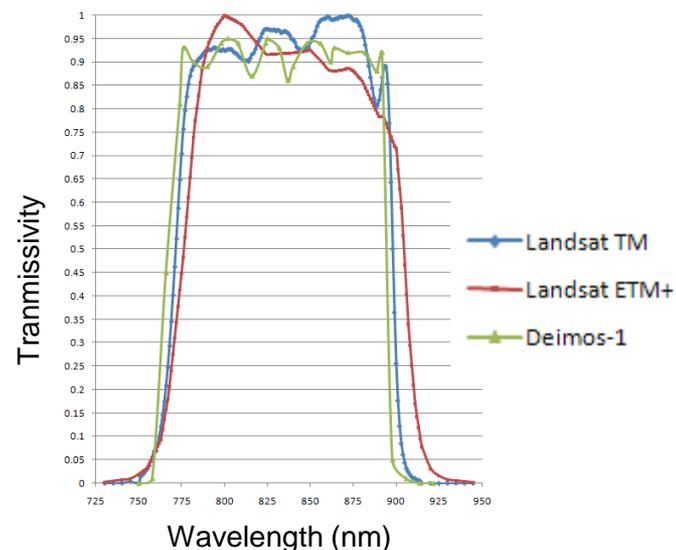
Deimos-1 & UK-DMC2

- **Nearly identical systems**
- **Combination of high spatial and temporal resolution**
 - Spatial resolution of **22m**
 - The wide **620-km swath** allows to have a high frequency of observation of any given point on Earth
 - **Three bands (R,G,NIR)** similar to Landsat to assure continuity with existing tools and harmonization with historical data
 - Radiometric resolution dynamically optimized on-board to 8 or **10 bits**

Deimos -1 (22m)



Landsat 7 ETM+ (30m)



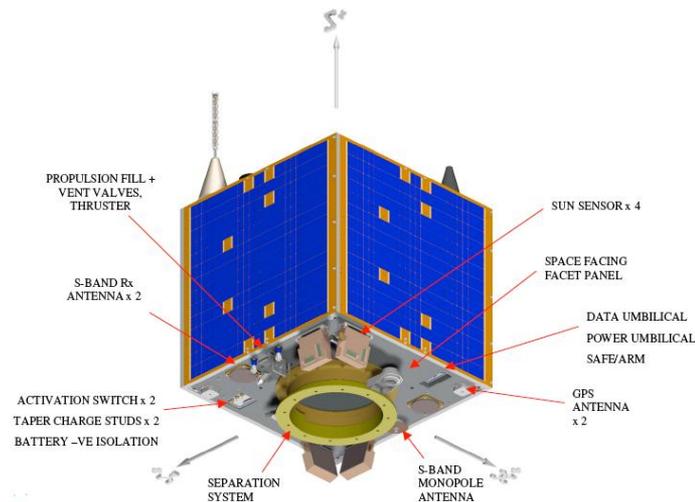
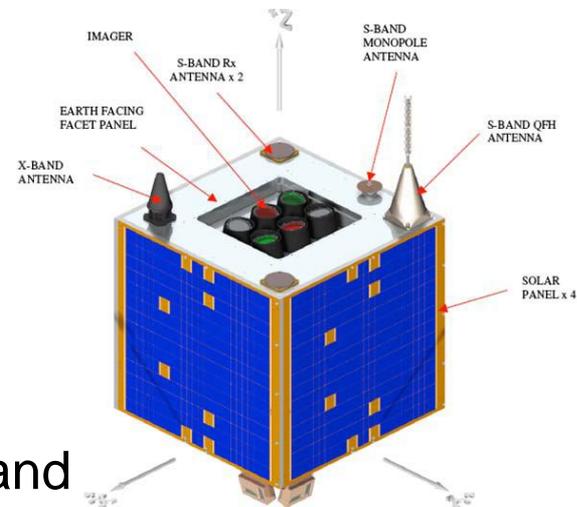
Satellite Overview

■ Satellite System

- Built by SSTL (UK)
- Mass: 100 Kg
- Nadir-pointing platform
- X-band antenna for data transmission
- S-band antenna for telemetry & telecommand
- Multispectral dual-bank camera

■ Satellite Operations

- Elecnor DEIMOS Imaging – Deimos-1
- DMCii – UK-DMC2



Imaging Specifications

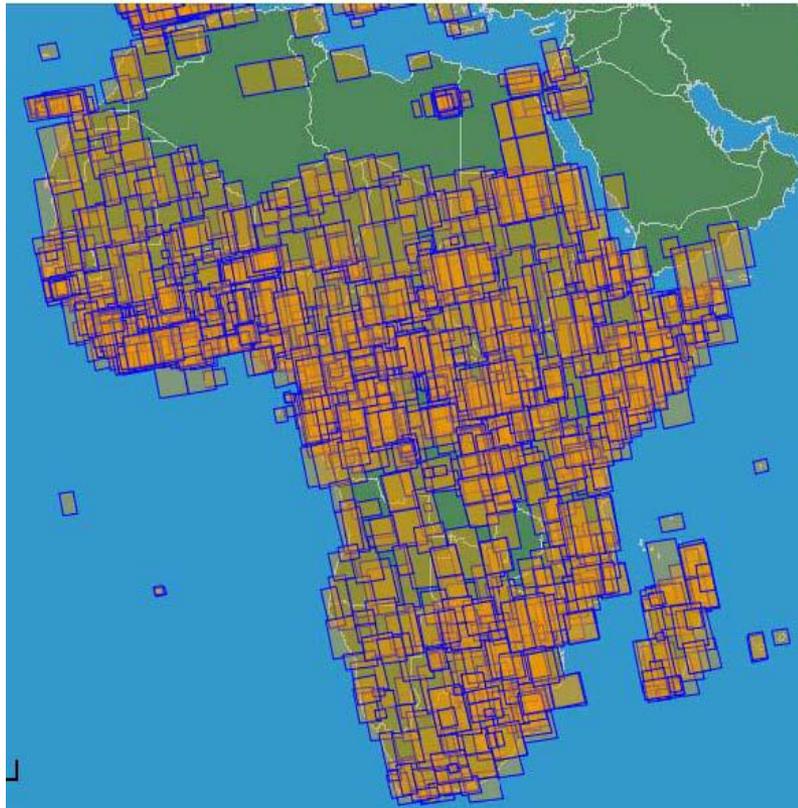


Mode and Resolution	Multispectral (Green, Red, NIR) 22m
Spectral Bands	Green : 0.52 – 0.60 μm Red: 0.63 – 0.69 μm NIR: 0.77 – 0.90 μm
Scene Footprint	620km Swath
Viewing Angles	Nadir Acquisitions
Satellite Tasking	Yes
Dynamic Resolution	8 or 10 bits

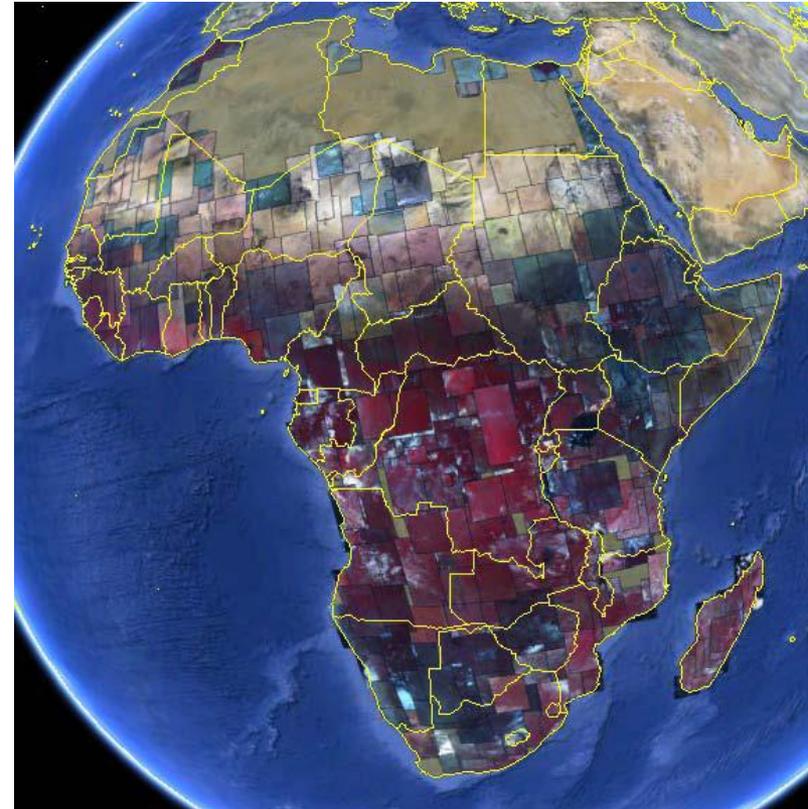
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Collection Capability

- Annual coverage of sub-Saharan Africa
 - 2010 (Deimos -1 & UK-DMC2)
 - 2011 (only Deimos-1)



2010



2011

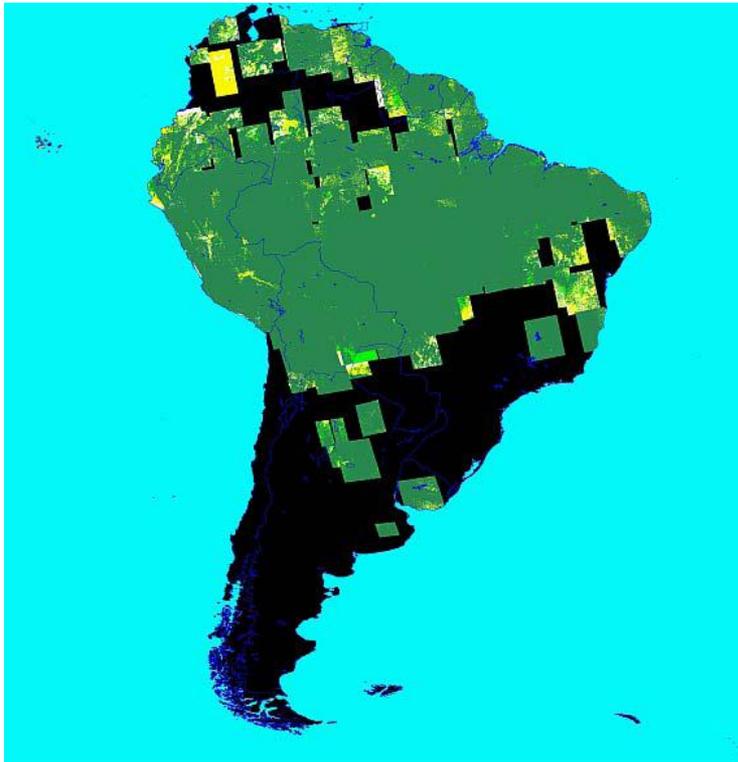
Collection Capacity

- ESA Tropforest Program
- Near complete cloud-free coverage of South-east Asia in 2010

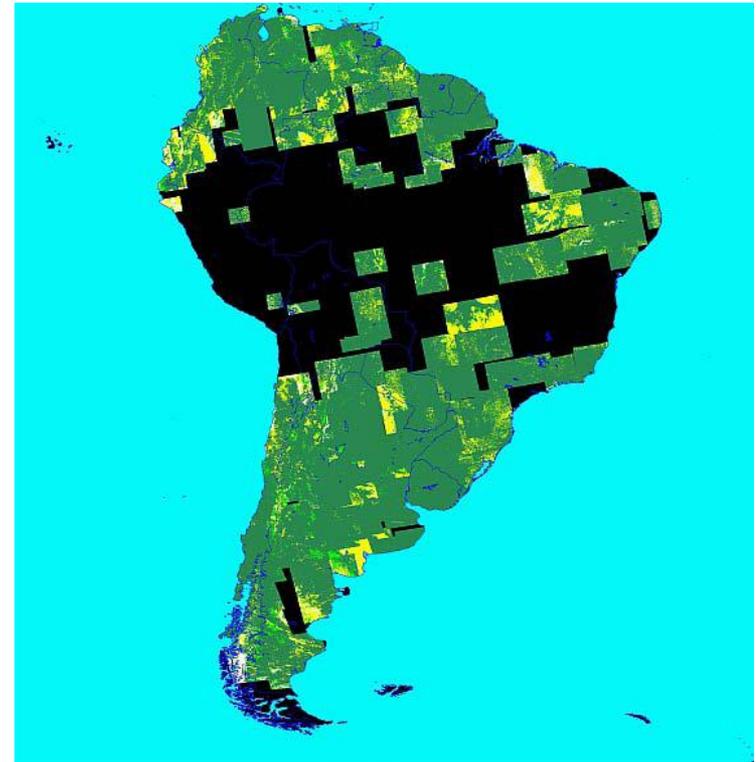


Collection Capacity

- ESA Tropforest Program
- Near complete cloud-free coverage of South America in 2010 - 2011



April 2010 - September 2010



October 2010 - March 2011

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2011 US Crop Season Collection Program

- Delivery of moderate resolution multispectral satellite imagery to support USDA users
- Complete Coverage of the lower 48 States

Project Team

- Astrium GEO Information services – Prime
- Elecnor DEIMOS Imaging – Subcontractor
 - DMCii - subcontractor to Elecnor DEIMOS Imaging

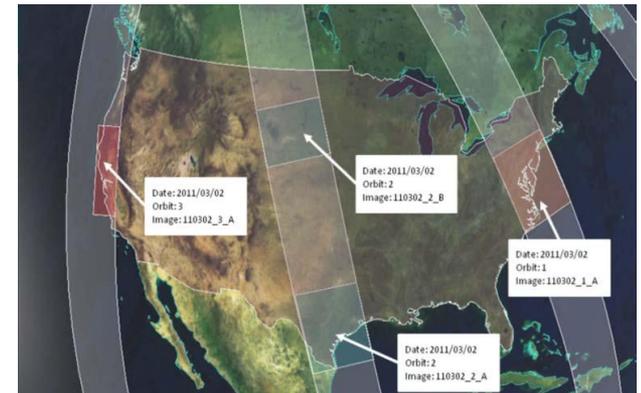
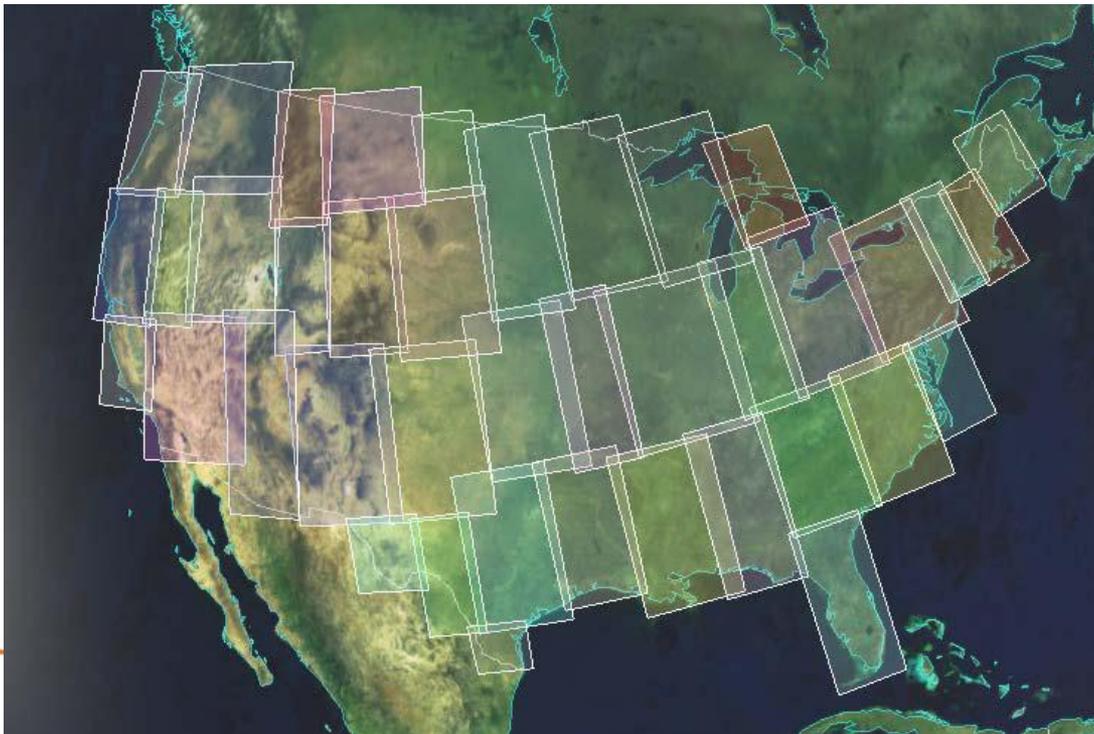
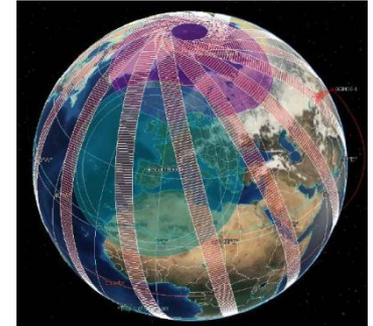


USDA 2011 Crop Land Collection Requirements

- 20m-60m Resolution, 3-band imagery
- Wide swath (>185km)
- Twice a month Coverage of the lower 48
 - May 1, 2011 – October 31, 2011
- 30% or less cloud cover of the defined crop areas
- Orthorectified (within one pixel GSD @ CE90)
- Delivery within 72 hours of acquisition

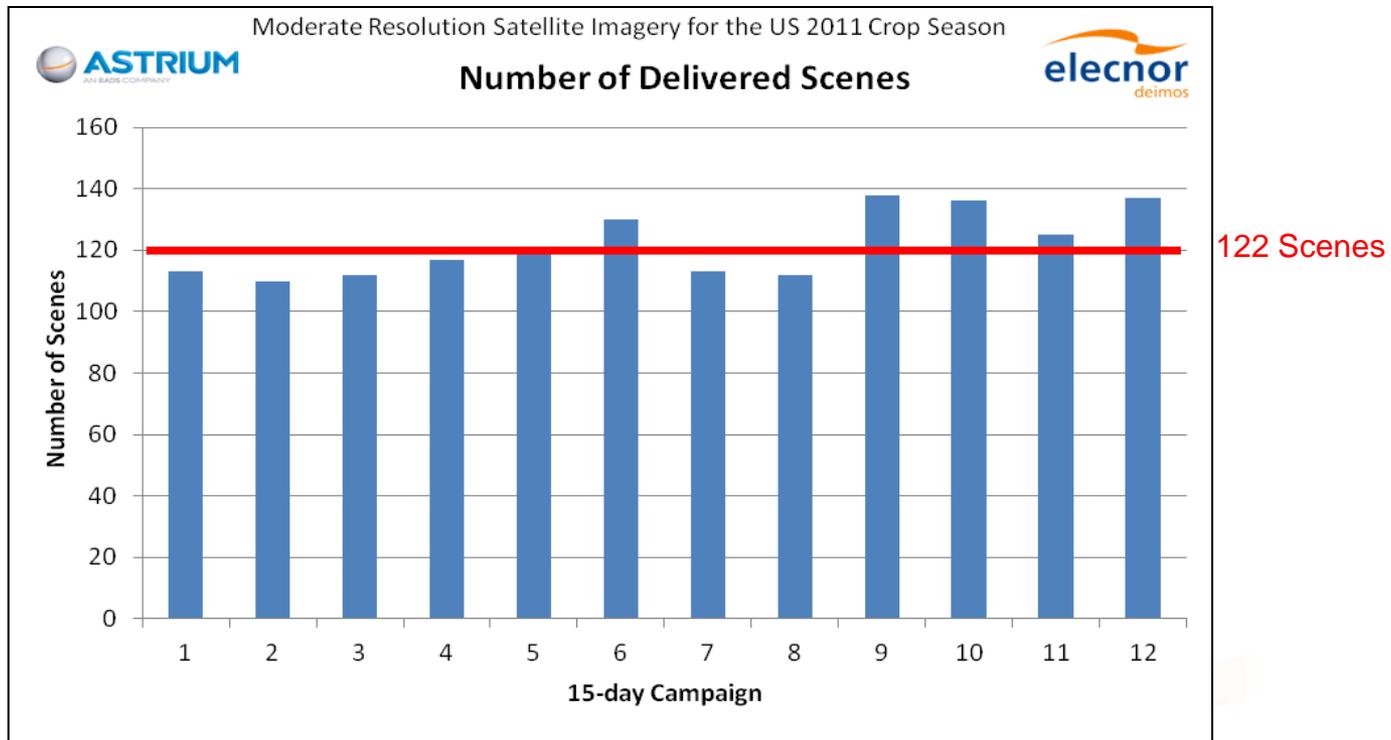
Collection

- Two 15 day collection campaigns per month
 - 12 collection campaigns for the project
- Deimos-1 used for primary collection
 - UK-DMC2 used to fill gap and recollect cloudy areas
 - Collection distribution was 80% Deimos-1, 20% UK-DMC2



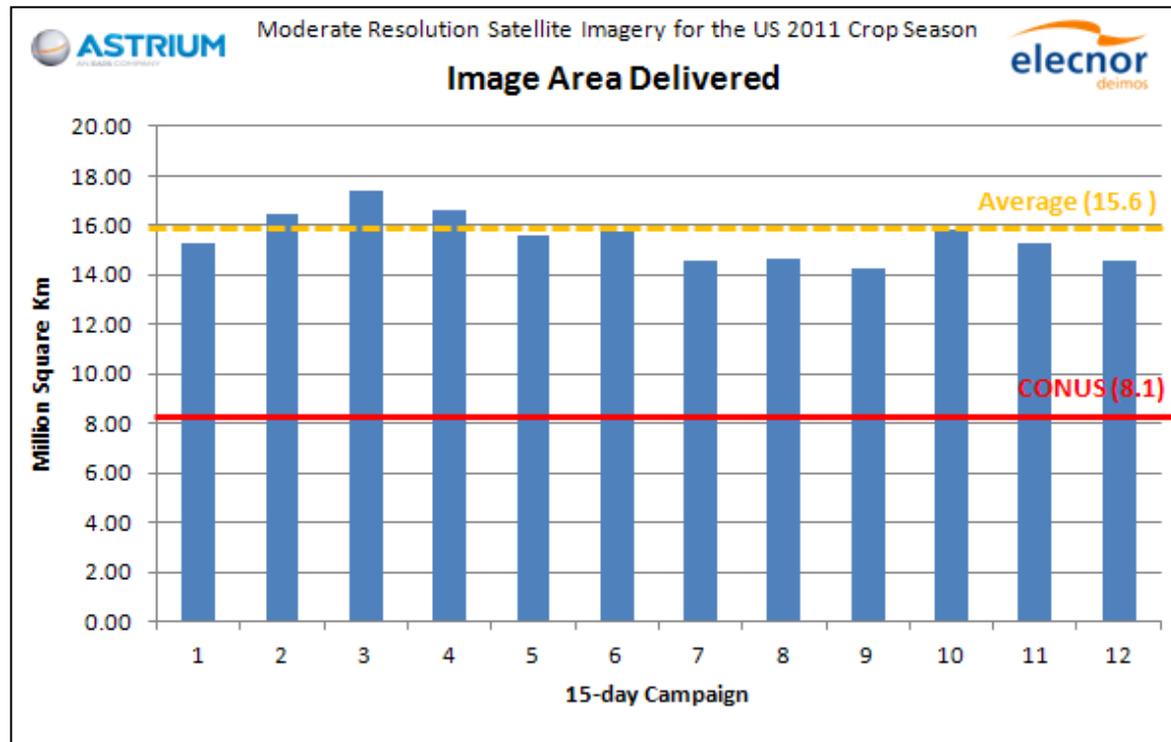
Collection Results

- A total of 1,578 scenes were collected
- 1,462 scenes were delivered to the USDA
 - On average 122 scenes were delivered for each 15 day campaign



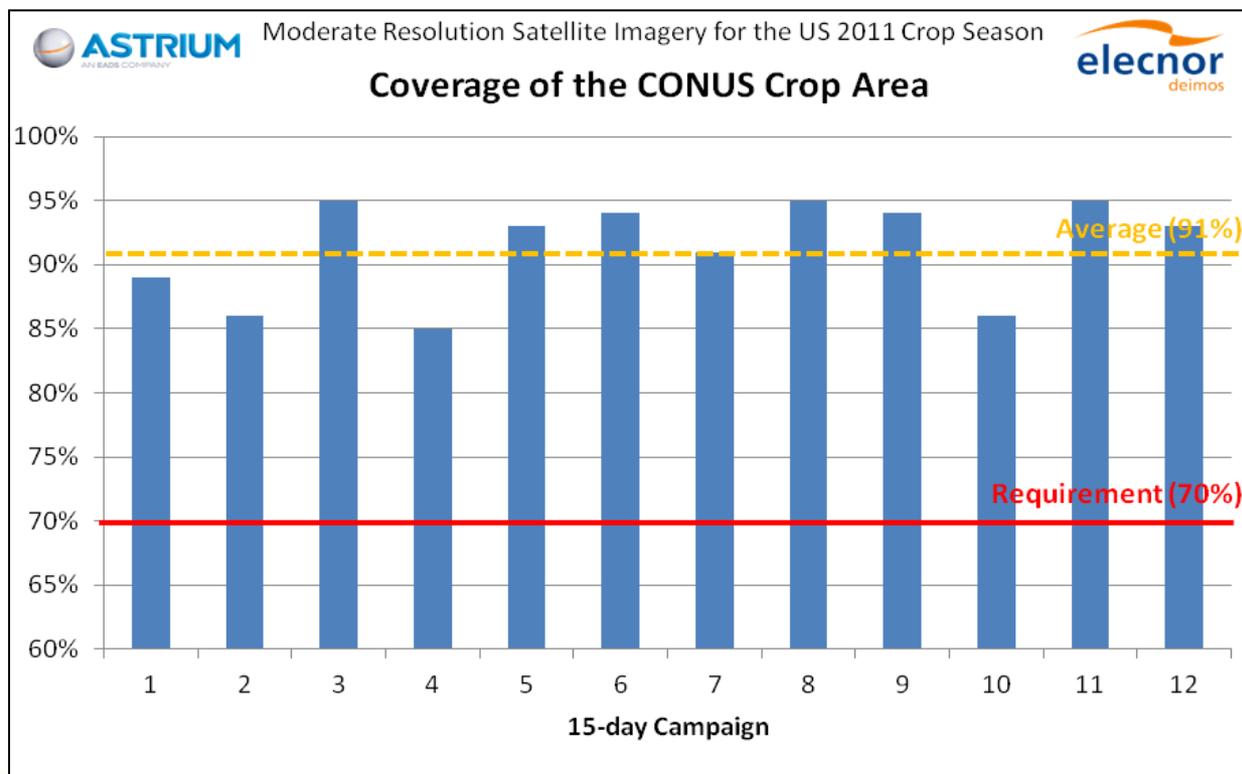
Collection Results

- Astrium delivered more than 186M km² of data to the USDA
 - 150M km² of cloud-free data
- On average 15.6M km² of imagery was delivered every 15 days
 - CONUS is 8.1M km²



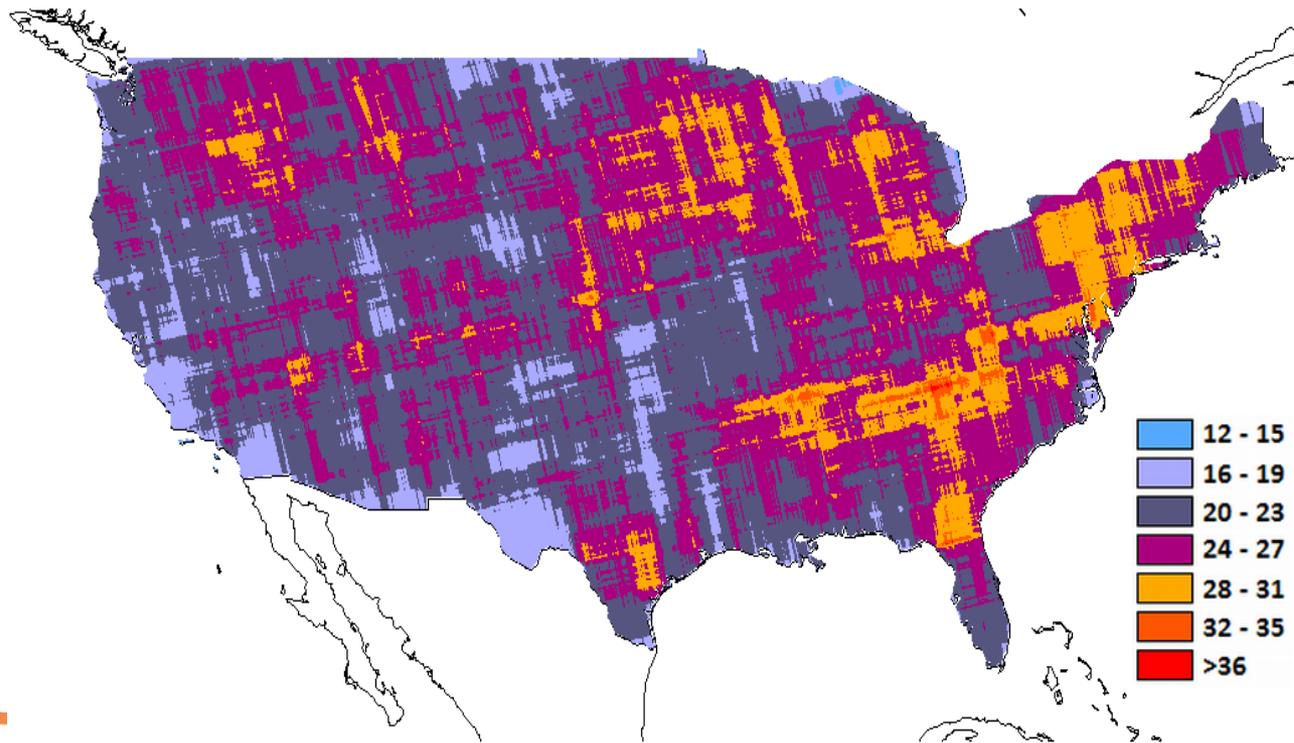
Collection Results

- On average 91% cloud-free data was delivered per campaign
 - Requirement was 70% cloud-free
- On average 95% of the AOI was delivered cloud-free each month



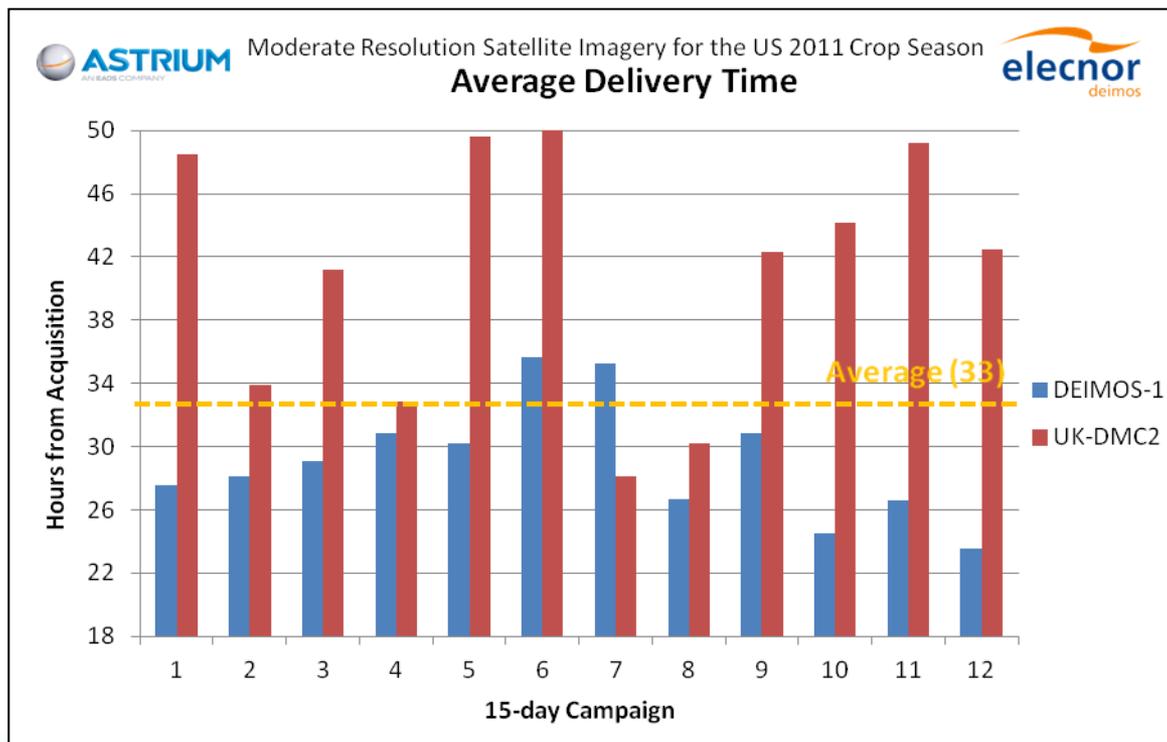
Temporal Coverage

- Maximum coverage 36 times
- 100% - covered 12 times
- 45% - covered 20 -23 times



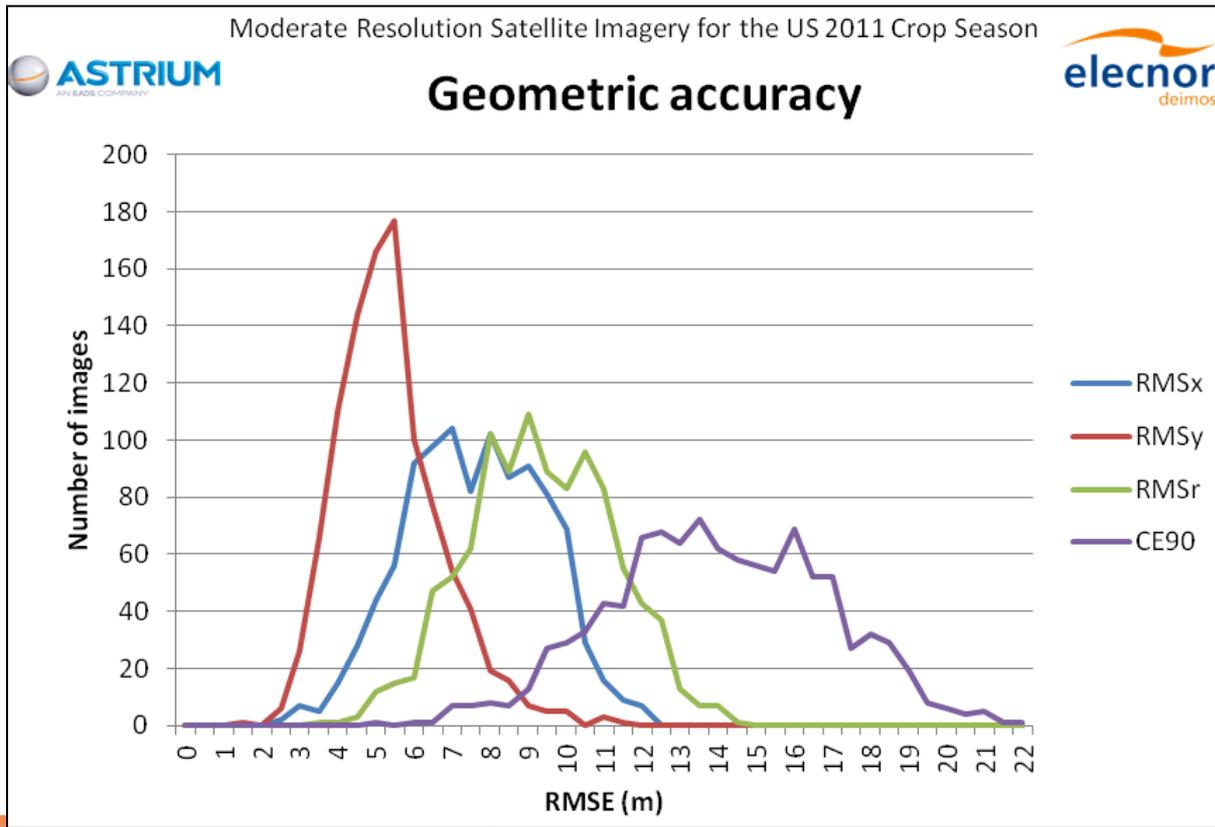
Data Delivery

- Averages delivery time was 33 hours from acquisition
 - Deimos-1 Data – 29 hours
 - UK-DMC2 Data – 41 hours
- Only 4 images out of 1462 exceeded 72 hours



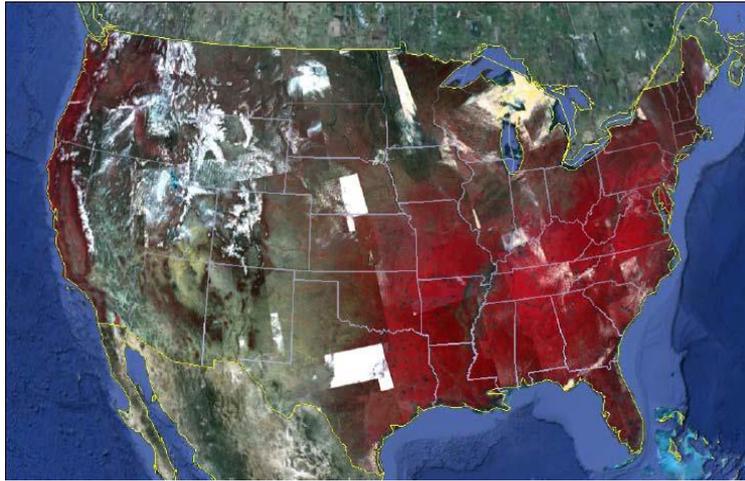
Data Accuracy

- All data meet the requirement (within one pixel GSD @ CE90)
 - w.r.t. Landsat reference dataset
- Statistics for all Deimos-1 images delivered

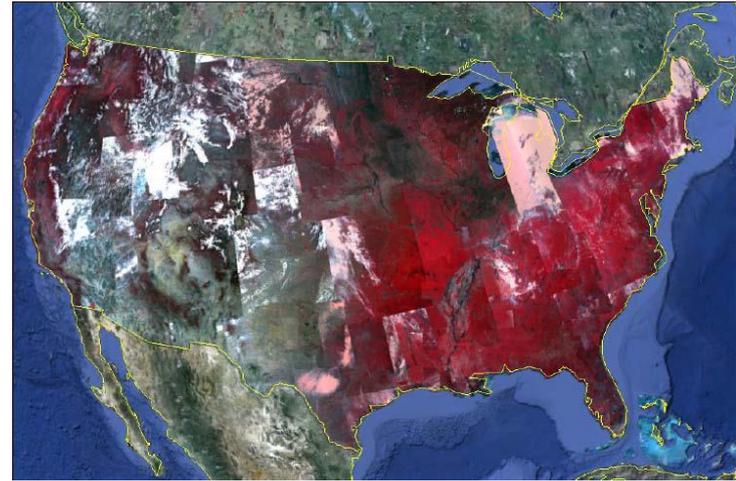


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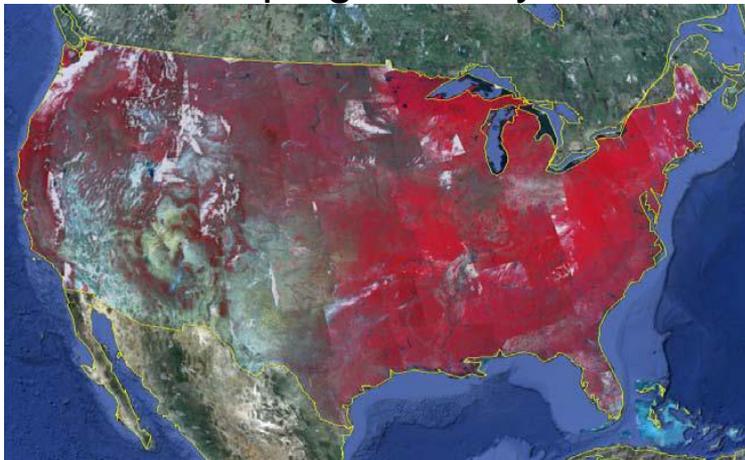
May- June Collections



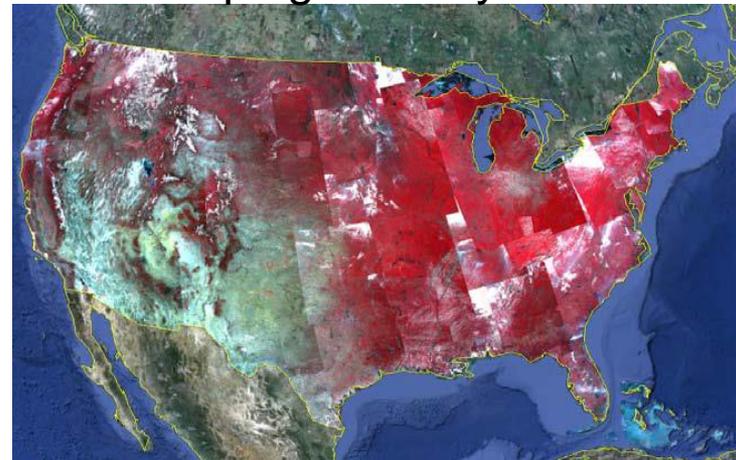
Campaign 1: May 1 - 15



Campaign 2: May 16 - 31



Campaign 3: June 1 - 15

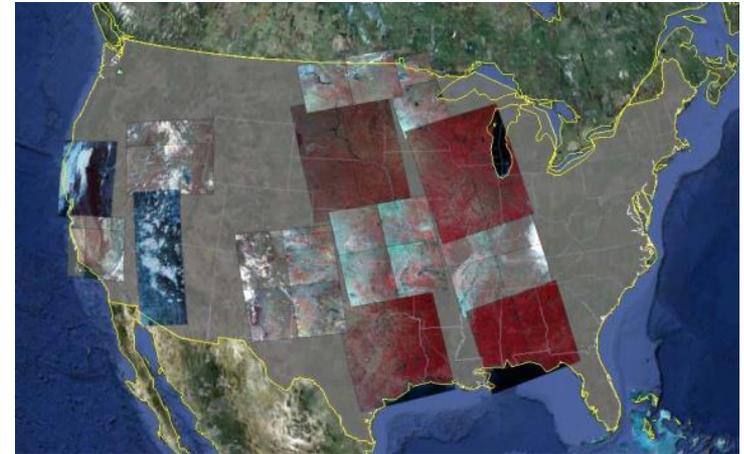


Campaign 4: June 16 - 30

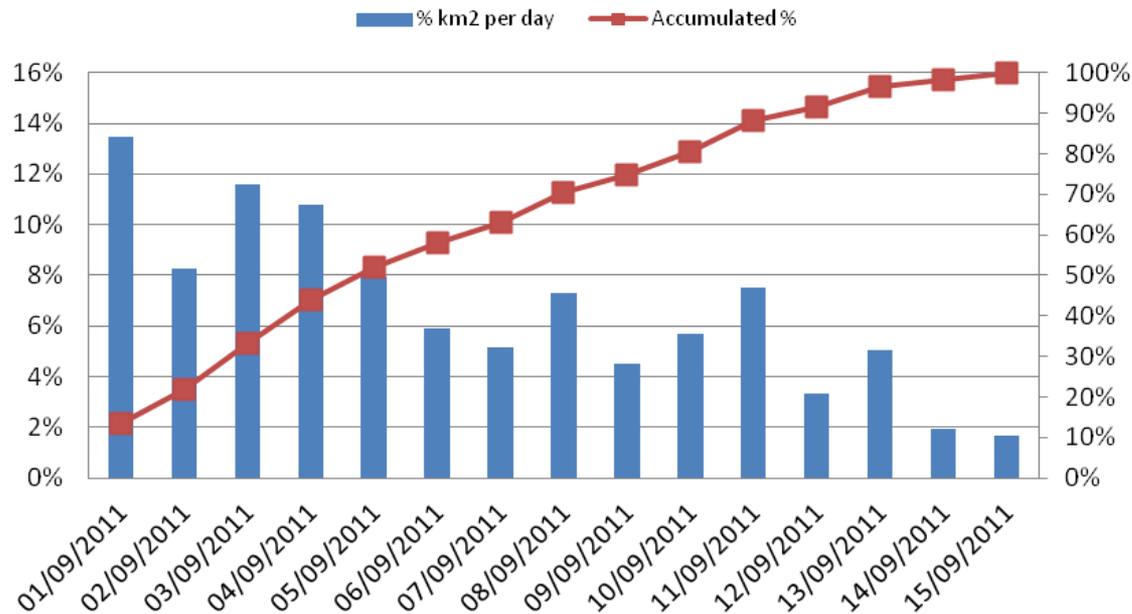
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Collection

- Largest collection volume at the start of each campaign
 - 33% of the CONUS is collected in the first 3 days of collection
 - 50% in 5 days
- Increased flexibility
 - Recollection of cloudy regions
 - Increased revisits

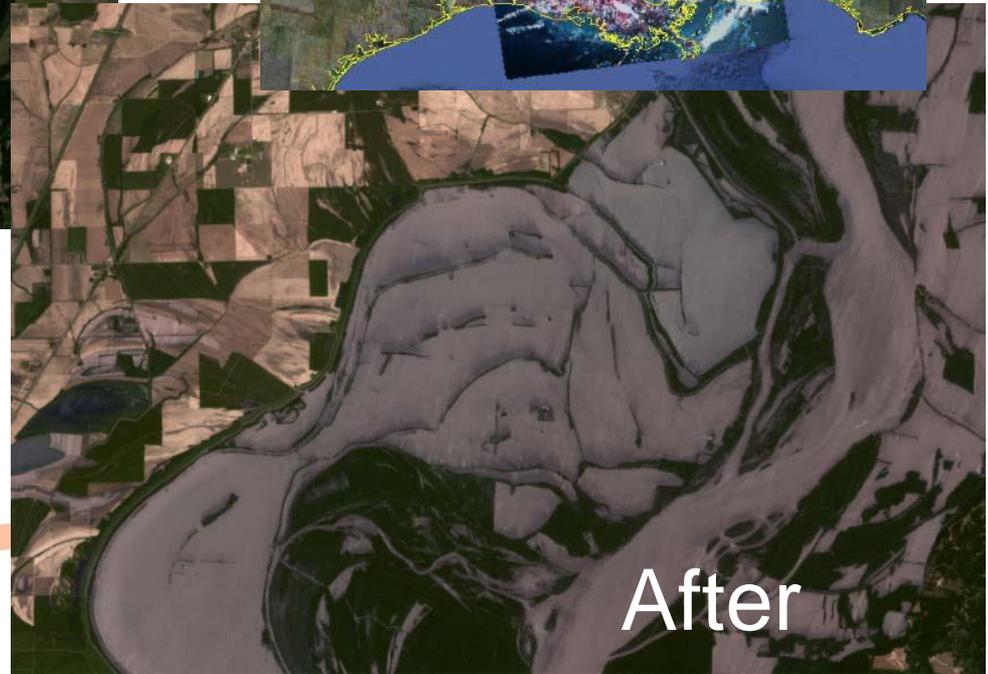
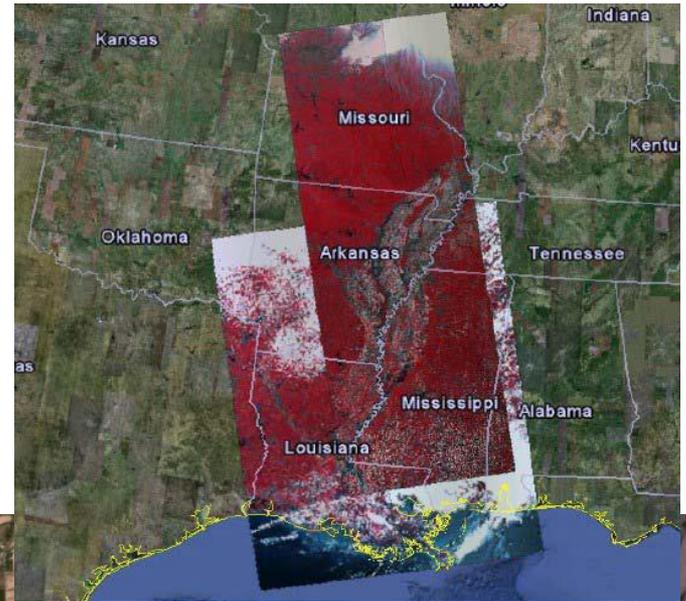


Example of coverage capability in just in 3 days (Oct 1st - 3rd)



Mississippi River Floods (May 2011)

Before



After

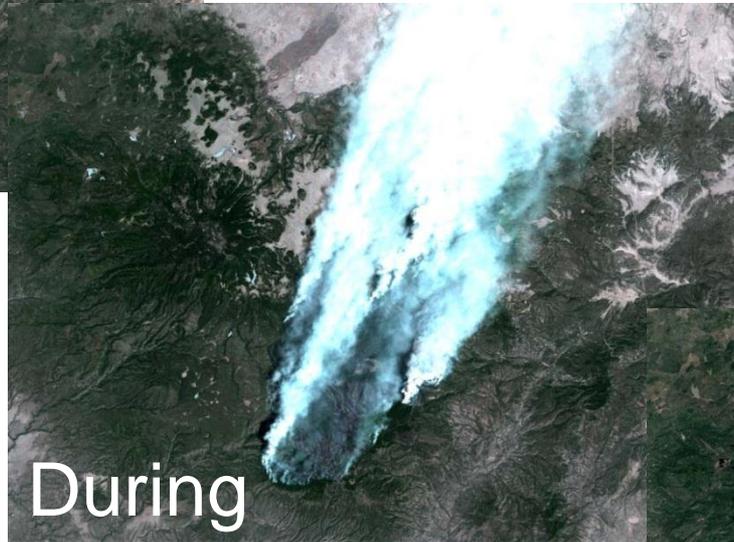
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Arizona Wildfires (June 2011)

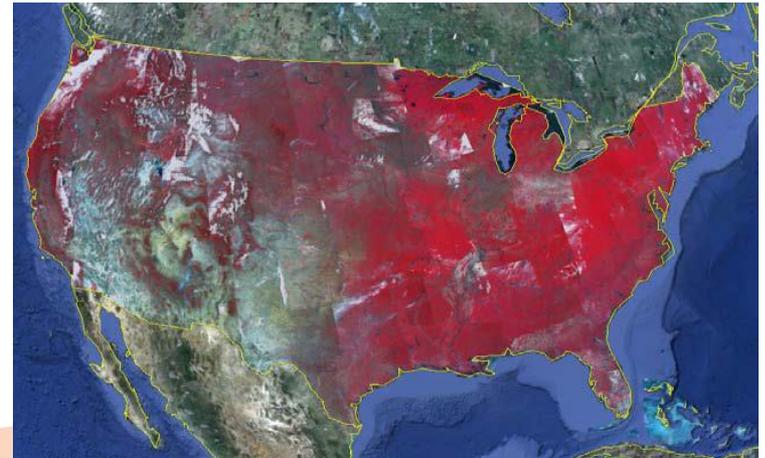


- Three images acquired on May 25th, June 4th and June 13th, 2011



Project Summary

- 1,578 Images Acquired
- 150 Million square kilometer of cloud-free imagery delivered
 - 186M km² delivered total
- 100 % of data Orthorectified within one pixel @ CE90
- 99.7% delivered with 72 hours
- Additional Disaster Support



Questions???

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