http://cad4nasa.gsfc.nasa.gov

Beta testing commercial data distribution to the LCLUC community

10/06/11
LCLUC Science Team Meeting
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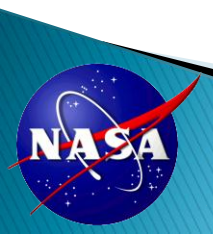
Task Support: Jaime Nickeson and Shaun Quartier
Sigma Space Corporation

Outline

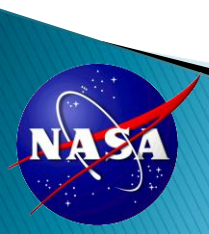
- How much data exists and where?
  - Data volume by sensor and general characteristics
  - Maps of distribution by sensor
- How do I gain access?
  - http://cad4nasa.gsfc.nasa.gov
  - Do's & Don'ts with NextView licensed data
- What are some potential applications?
  - Recent literature examples



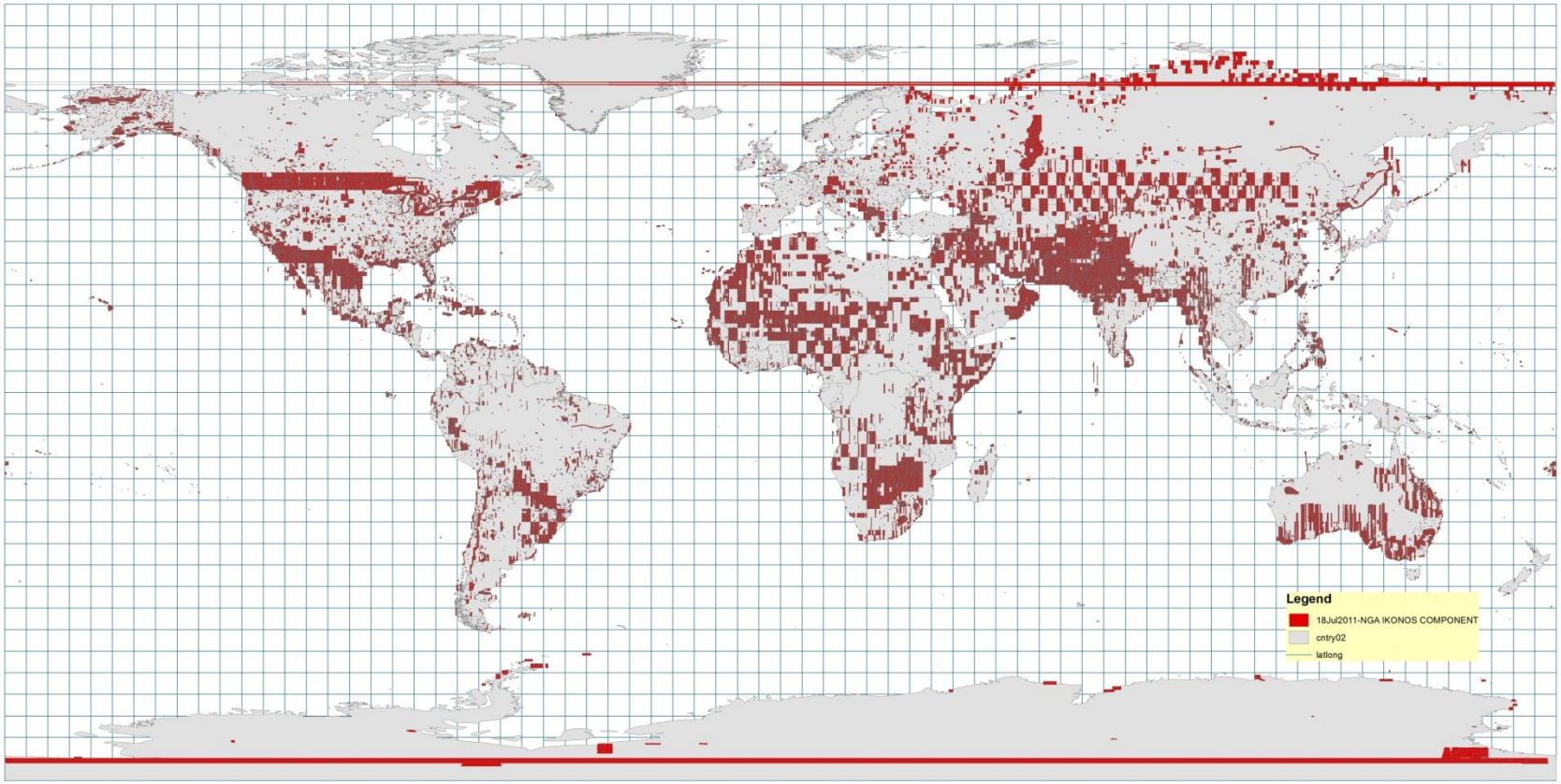
Sensors, Data Volume, & Coverage?

- National Geospatial Intelligence Agency (NGA)
  - All data licensed under the NextView contract
    - Allows for access to commercial remote sensing data from US vendors.

Sensor/Vendor	# Images in NGA Archive
IKONOS – GeoEye	162,000
GeoEye 1 – GeoEye	315,000
Quickbird – Digital Globe	1,061,000
Worldview 1– Digital Globe	2,185,000
Worldview 2 – Digital Globe	415,000



IKONOS



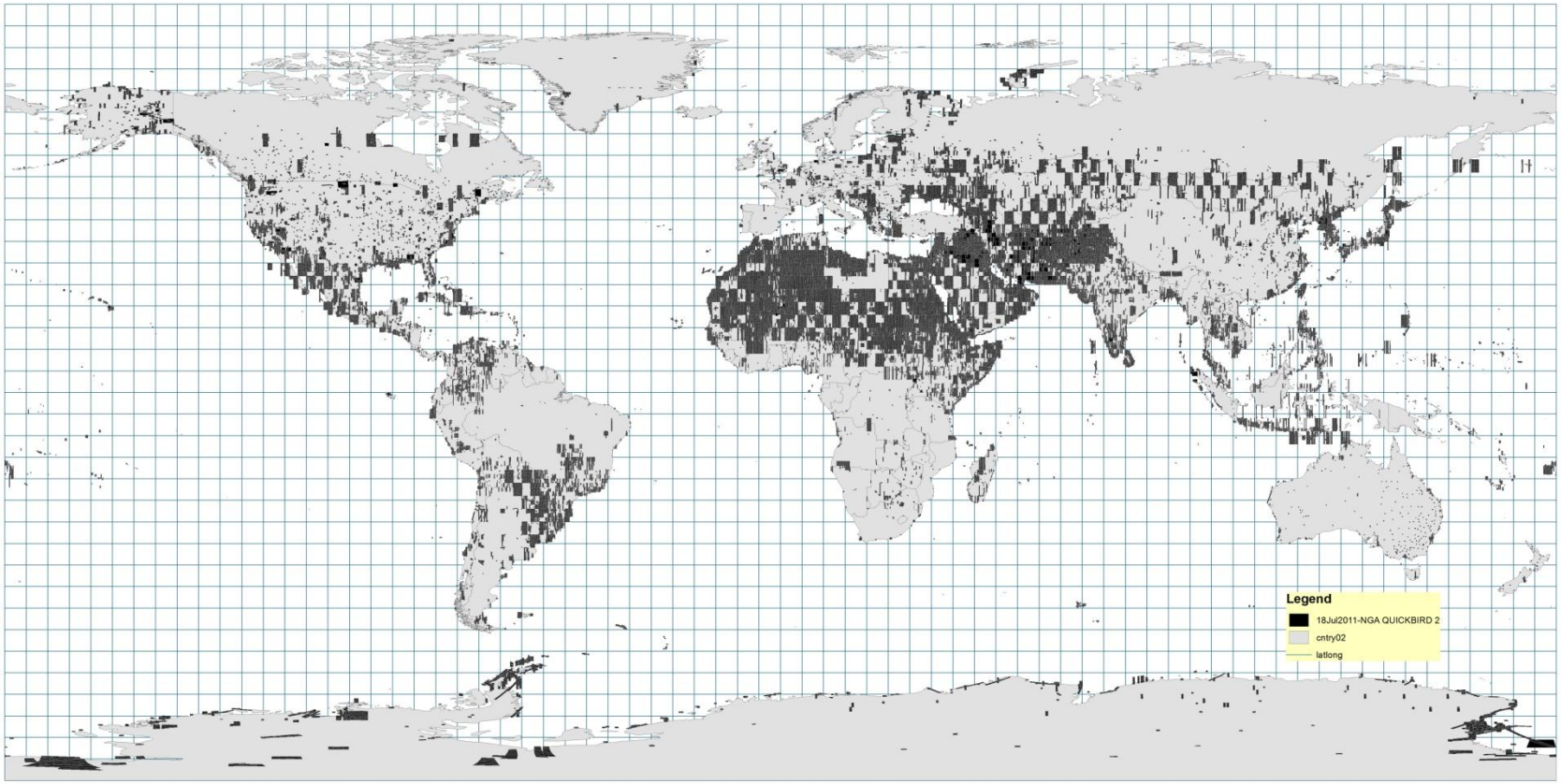
Band	1m Panchromatic	4m Multispectral
1 (Blue)	0.45–0.90 µm	0.445–0.516 µm
2 (Green)	*	0.506–0.595 µm
3 (Red)	*	0.632–0.698 µm
4 (Near IR)	*	0.757–0.853 µm

GeoEye 1

Band	0.41m Panchromatic	1.65-m Multispectral
1 (Blue)	0.45-0.80 µm	0.45-0.51 µm
2 (Green)	*	0.51-0.58 µm
3 (Red)	*	0.655-0.69 µm
4 (Near IR)	*	0.78-0.92 µm

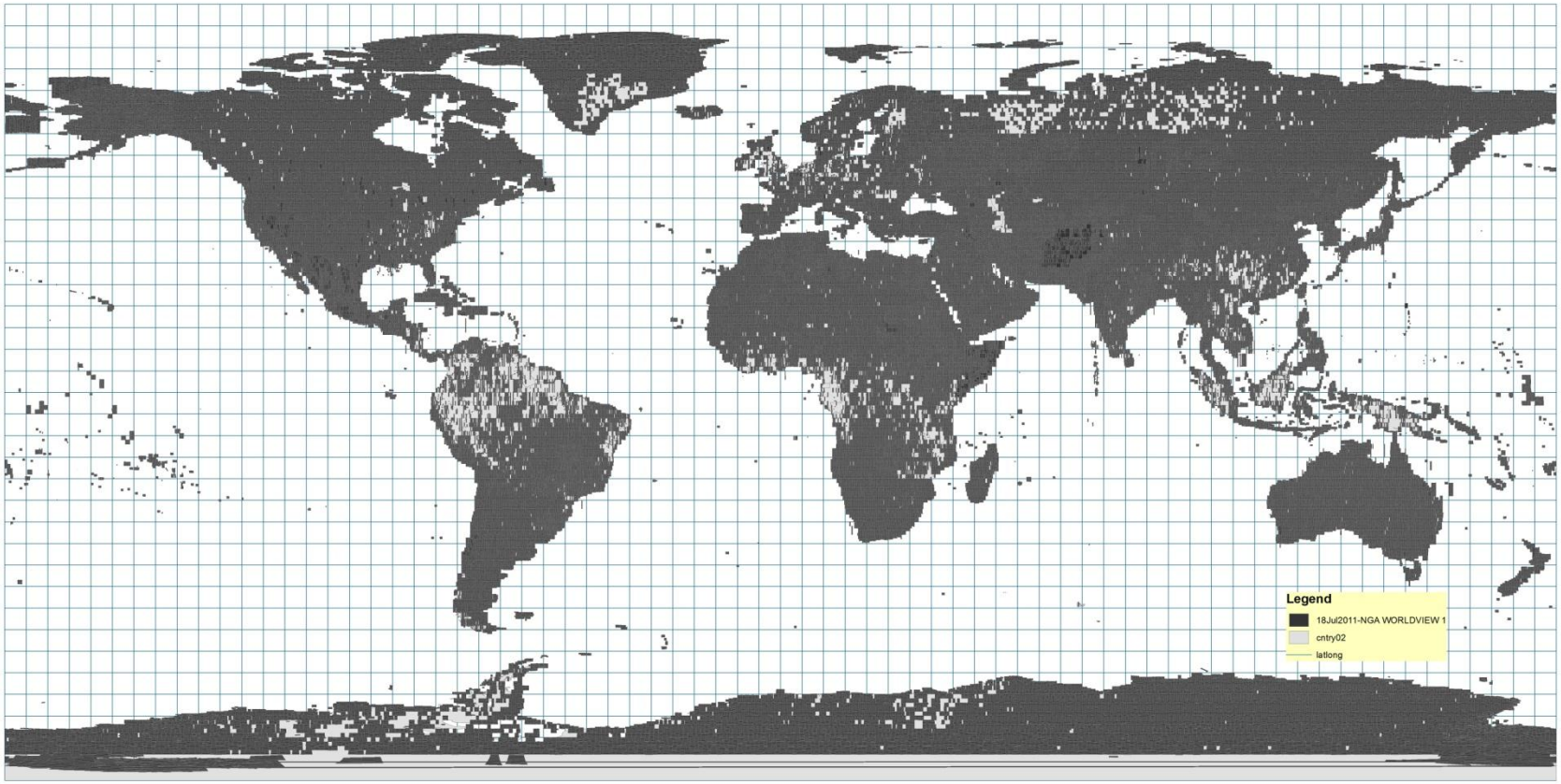
QuickBird

DIGITALGLOBE®



Band	0.60-m Panchromatic	2.62-m Multispectral
1 (Blue)	0.45-0.90 µm	0.445-0.516 µm
2 (Green)	*	0.506-0.595 µm
3 (Red)	*	0.632-0.698 µm
4 (Near IR)	*	0.757-0.853 µm

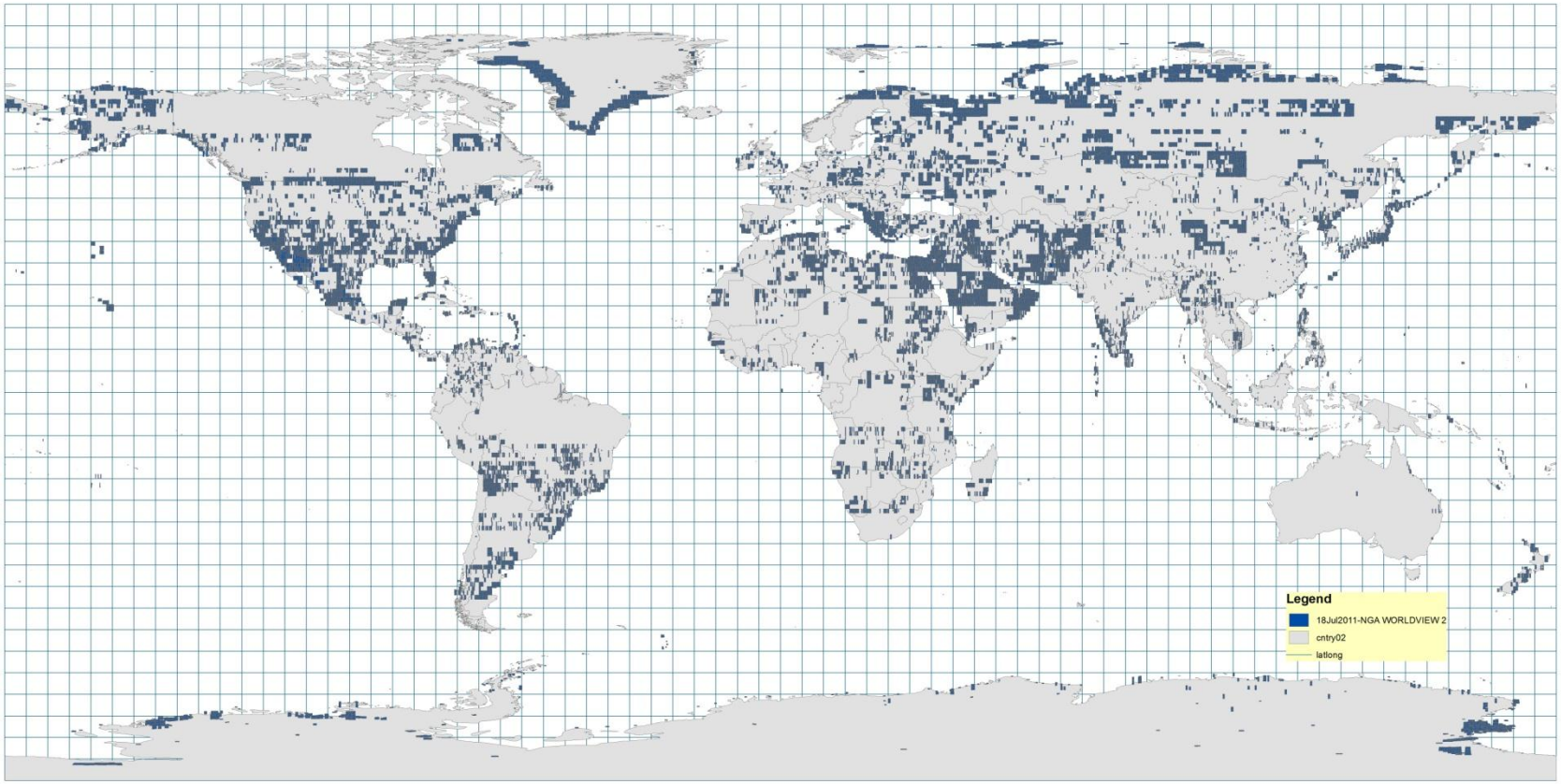
WorldView 1



Band 1	0.55-m Panchromatic only	0.45-0.90 µm

WorldView 2

DIGITALGLOBE®

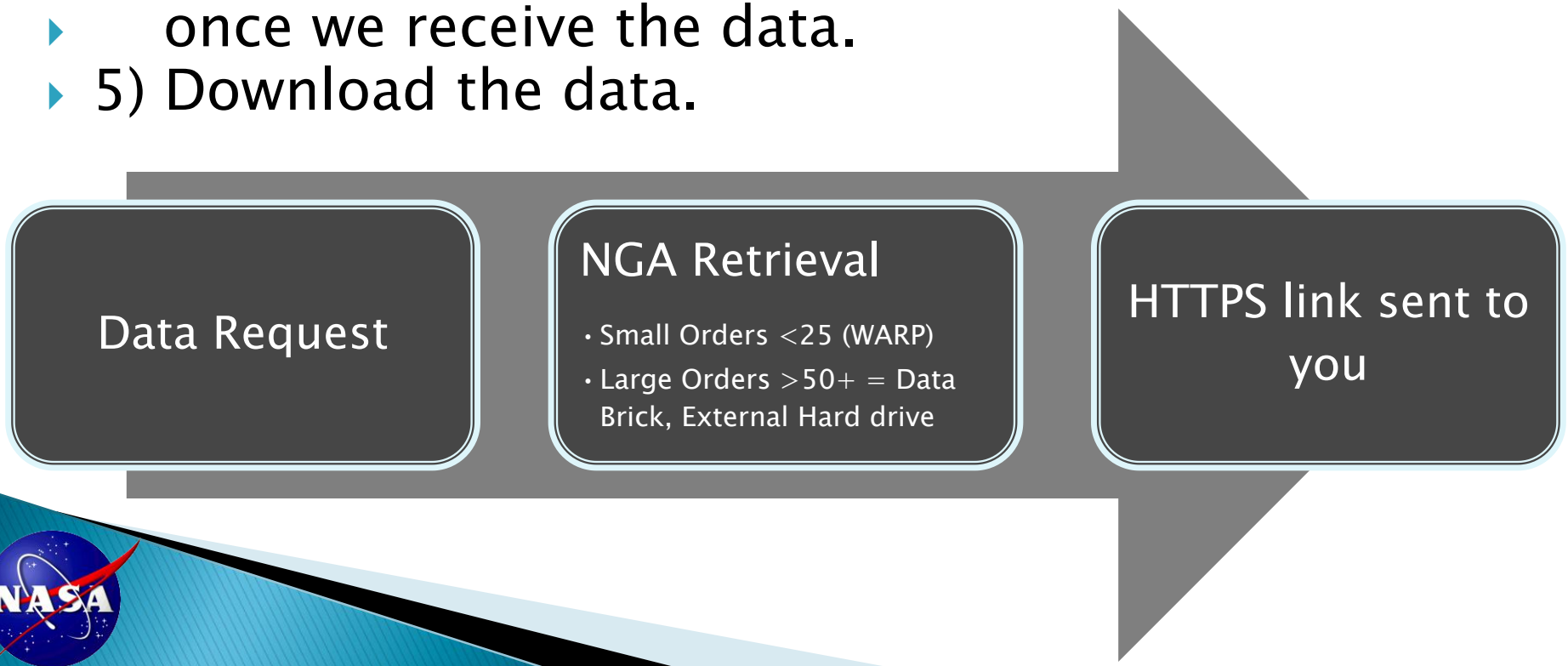


Band	0.46m Panchromatic	1.85m Multispectral	Band	1.85m Multispectral
1 (Blue)	0.400–0.900 µm	0.450–0.510 µm	5 (Red Edge)	0.705–0.745 µm
2 (Green)	*	0.510–0.580 µm	6 (Yellow)	0.585–0.625 µm
3 (Red)	*	0.630–0.690 µm	7 (Coastal)	0.400–0.450 µm
4 (Near IR)	*	0.770–0.895 µm	8 (NIR 2)	0.860–1040 µm

WorldView 1
0.5 m res
(Pan Only)

How do I access the Archive?

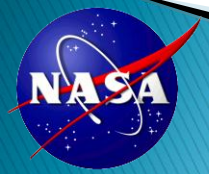
- 1) Register: http://cad4nasa.gsfc.nasa.gov
- 2) Once your registration is complete define your area and time period of interest.
- 3) Submit a request, you will placed in a queue.
- 4) A https link and password will be sent to you once we receive the data.
- 5) Download the data.



Data Format?

- NITF (National Imagery Transit Format)
  - Compressed for easy transfer
  - Imbedded metadata information
    - Rational Polynomial Coefficients
    - Sun/Sensor information
    - Calibration Coefficients

- Conversion to other formats available upon request, software for conversion also available upon request



NextView Licensing: Do's and Don'ts

Do:

- Attribute the source in the imagery or caption. (Copyright 2001 DigitalGlobe, Inc.)
- Share imagery or derived products with USG, or State/Local Gov'ts, NGOs supporting USG interests.
- Post attributed reduced-resolution derived products on websites.

Do Not:

- Provide/share imagery or products with anyone planning to sell it $$$.

Check with us before:

- Sharing imagery with institutions or companies that might profit from shared imagery.
- Publicly sharing data and metadata.
- Allowing imagery to be shared with a third party.
- Posting imagery to a web site w/o access control

Search Request Protocol: Do's & Don'ts

Do:

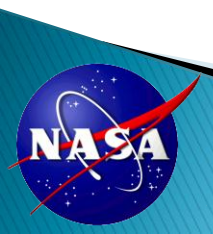
- Contact Jaime if you have a unique request or problem.
- Be as specific as possible in defining your imagery needs.
- Inform us if the interface does not meet your needs.
- Make suggestions for improving the process.

Do Not:

- Make requests for large amounts of data that includes scenes you 'might' want.
- Expect an data link emailed to you in a day.
- Expect direct access to searching the archive.

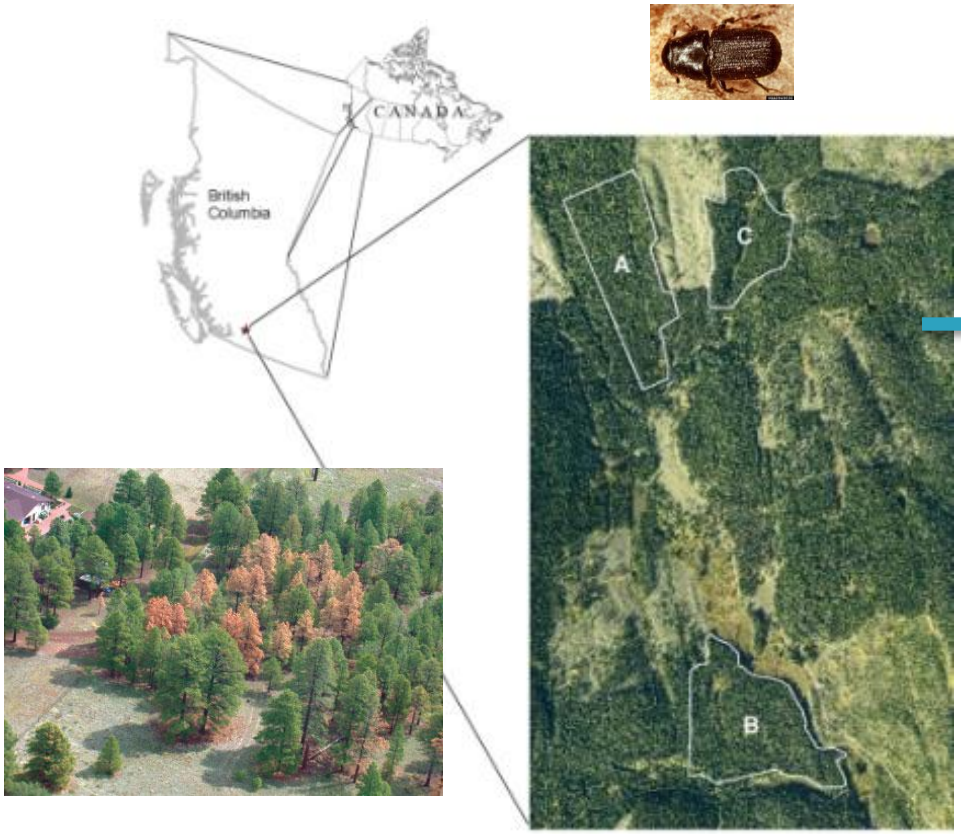
How can this data be applied?

- Disturbance Mapping
  - Bark Beetle Insect Infestation
    - Wulder M. et al, 2008 "Multi-temporal analysis of high spatial resolution imagery from disturbance monitoring", *Remote Sensing of Environment*, 112, 2729-2740.
- Sensor Fusion – Biomass Validation
  - Biomass Mapping – BRDF Modeling
    - Chopping M. et al, 2011 "Forest structure and aboveground biomass in the southwestern United States from MODIS and MISR", *Remote Sensing of Environment*, 115, 2751-2974.
  - Biomass Density Validation – Uncertainty Estimation
    - Gonzalez P. et al, 2010 "Forest carbon densities and uncertainty from Lidar, QuickBird, and Field measurements in California", *Remote Sensing of Environment*, 114, 1561-1575.

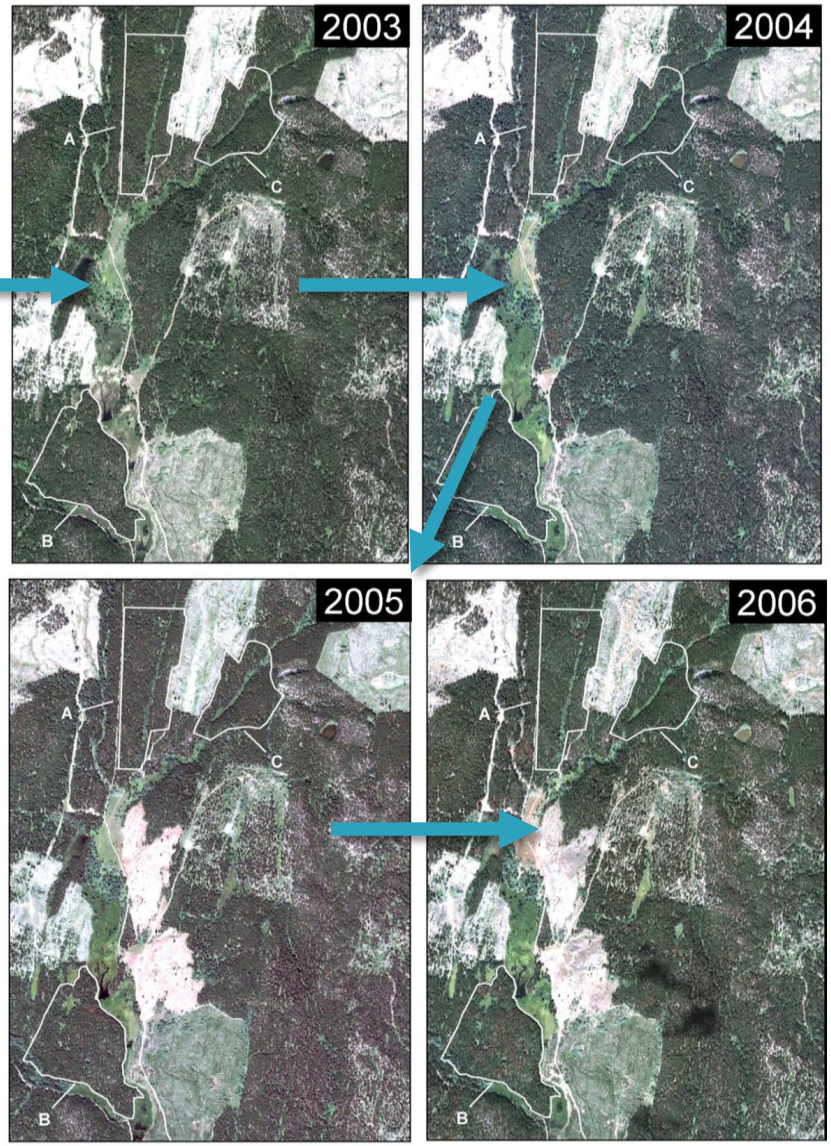


Forest Insect Disturbance Detection

M. Wulder et al. 2008 RSE



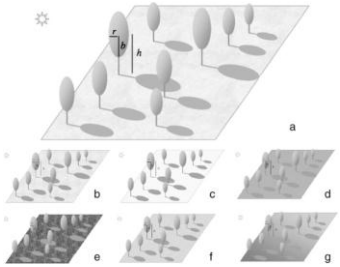
Quickbird ΔRGI (Red-Green)



Mountain pine beetle red attack damage individual tree counts to monitor population growth and spread dynamics critical to management efforts.

Data Fusion BRDF Modeling for Biomass Mapping

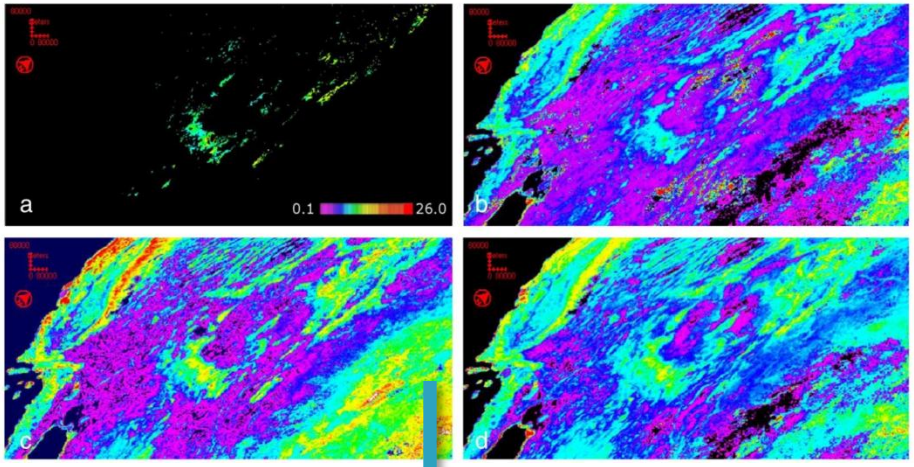
M. Chopping et al. 2011 RSE

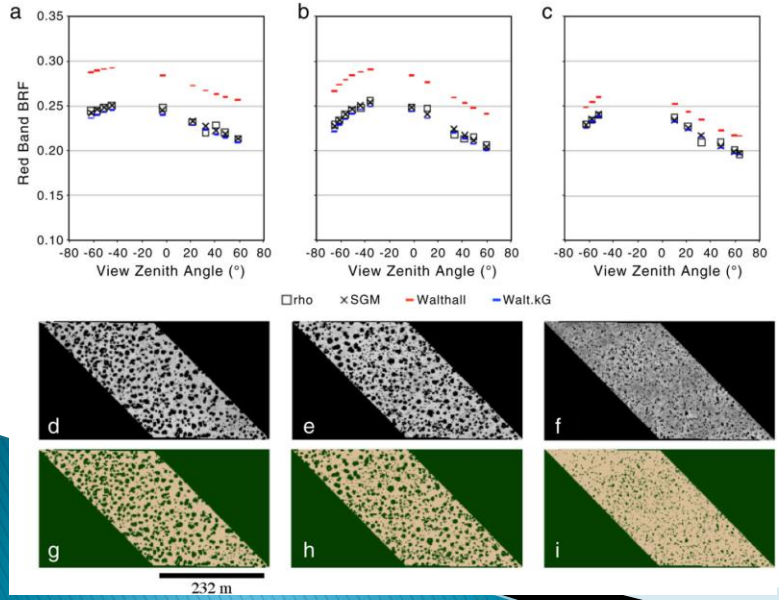


GO Rad. Trans. Model

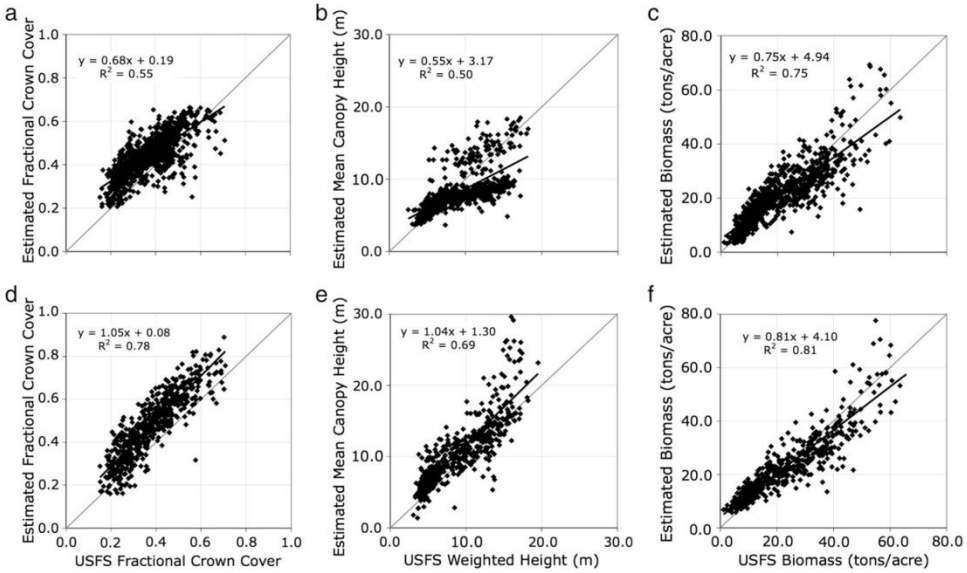
For accurate retrievals of upper canopy parameters (fractional crown cover and aspect ratio) it is critical to provide a priori estimates of the contribution of the **background to Bidirectional Reflectance Factors** (BRFs) at the viewing and illumination angles of the observations. This information was derived from IKONOS for the GO model.

MODIS – MISR Vegetation Height



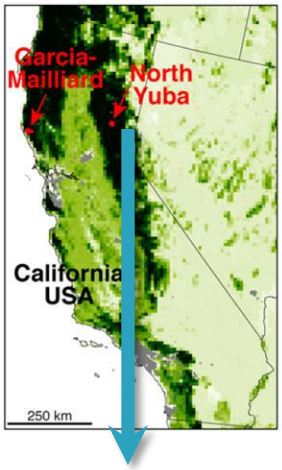


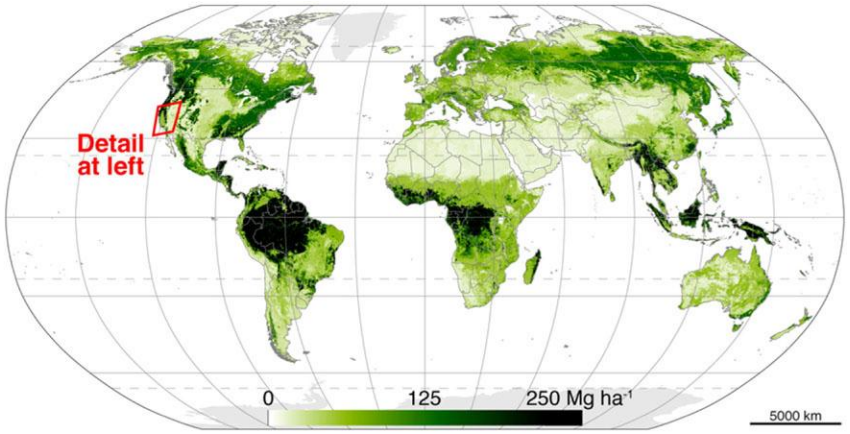
MODIS/MISR vs. FIA Crown Cover/Height/Biomass R^2 >0.55

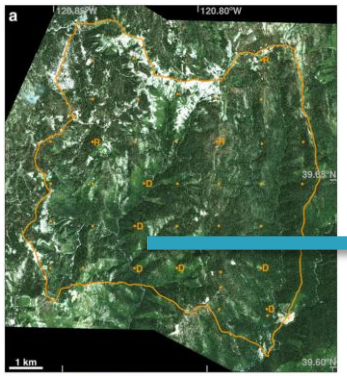


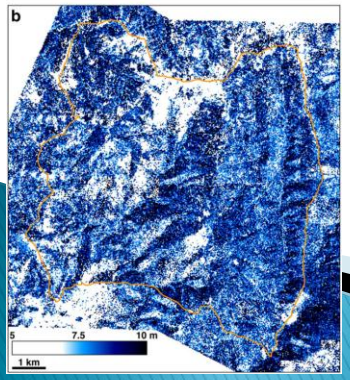
Estimating Crown Density for Biomass Mapping

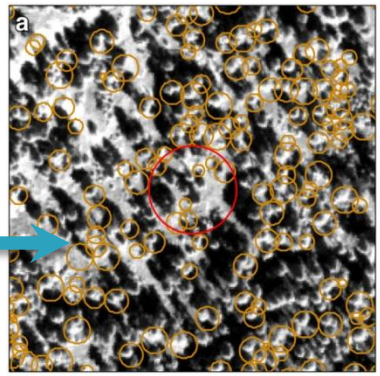
P. Gonzales et al. 2010 RSE

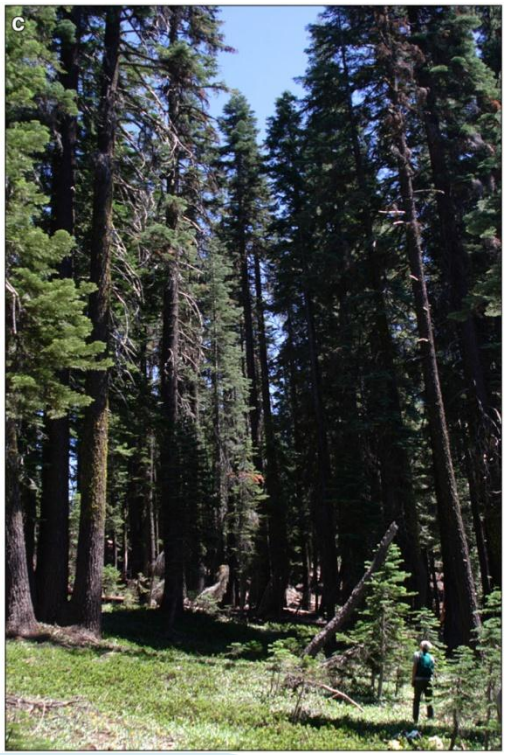












Forest carbon estimates from Lidar data and QuickBird images were compared, calibrated and validated by field measurements of individual trees. Regressions of field measurements, against Lidar height metrics and against QuickBird-derived tree crown diameter generated equations of carbon density as a function of the remote sensing parameters with Monte Carlo analysis.

Validation of QuickBird crown diameters against field measurements of the same trees showed significant correlation ($r=0.82$, $p<0.05$).

http://cad4nasa.gsfc.nasa.gov

Register at the web site:
You will receive your password shortly thereafter and you can get started. Contact
Jaime.nickeson@nasa.gov
with any questions.
Thank You!