http://cad4nasa.gsfc.nasa.gov

Beta testing commercial data distribution to the LCLUC community

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LCLUC Science Team Meeting
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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.

<table>
<thead>
<tr>
<th>Sensor/Vendor</th>
<th># Images in NGA Archive</th>
</tr>
</thead>
<tbody>
<tr>
<td>IKONOS – GeoEye</td>
<td>162,000</td>
</tr>
<tr>
<td>GeoEye 1 – GeoEye</td>
<td>315,000</td>
</tr>
<tr>
<td>Quickbird – Digital Globe</td>
<td>1,061,000</td>
</tr>
<tr>
<td>Worldview 1 – Digital Globe</td>
<td>2,185,000</td>
</tr>
<tr>
<td>Worldview 2 – Digital Globe</td>
<td>415,000</td>
</tr>
</tbody>
</table>
IKONOS

<table>
<thead>
<tr>
<th>Band</th>
<th>1m Panchromatic</th>
<th>4m Multispectral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Blue)</td>
<td>0.45–0.90 µm</td>
<td>0.445–0.516 µm</td>
</tr>
<tr>
<td>2 (Green)</td>
<td>*</td>
<td>0.506–0.595 µm</td>
</tr>
<tr>
<td>3 (Red)</td>
<td>*</td>
<td>0.632–0.698 µm</td>
</tr>
<tr>
<td>4 (Near IR)</td>
<td>*</td>
<td>0.757–0.853 µm</td>
</tr>
</tbody>
</table>
GeoEye 1

<table>
<thead>
<tr>
<th>Band</th>
<th>0.41m Panchromatic</th>
<th>1.65–m Multispectral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Blue)</td>
<td>0.45–0.80 µm</td>
<td>0.45–0.51 µm</td>
</tr>
<tr>
<td>2 (Green)</td>
<td>*</td>
<td>0.51–0.58 µm</td>
</tr>
<tr>
<td>3 (Red)</td>
<td>*</td>
<td>0.655–0.69 µm</td>
</tr>
<tr>
<td>4 (Near IR)</td>
<td>*</td>
<td>0.78–0.92 µm</td>
</tr>
</tbody>
</table>
QuickBird

<table>
<thead>
<tr>
<th>Band</th>
<th>0.60–m Panchromatic</th>
<th>2.62–m Multispectral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Blue)</td>
<td>0.45–0.90 µm</td>
<td>0.445–0.516 µm</td>
</tr>
<tr>
<td>2 (Green)</td>
<td>*</td>
<td>0.506–0.595 µm</td>
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<td>0.632–0.698 µm</td>
</tr>
<tr>
<td>4 (Near IR)</td>
<td>*</td>
<td>0.757–0.853 µm</td>
</tr>
</tbody>
</table>
WorldView 1

| Band 1 | 0.55–m Panchromatic only | 0.45–0.90 μm |
WorldView 2

<table>
<thead>
<tr>
<th>Band</th>
<th>0.46m Panchromatic</th>
<th>1.85m Multispectral</th>
<th>Band</th>
<th>1.85m Multispectral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Blue)</td>
<td>0.400–0.900 µm</td>
<td>0.450–0.510 µm</td>
<td>5 (Red Edge)</td>
<td>0.705–0.745 µm</td>
</tr>
<tr>
<td>2 (Green)</td>
<td>*</td>
<td>0.510–0.580 µm</td>
<td>6 (Yellow)</td>
<td>0.585–0.625 µm</td>
</tr>
<tr>
<td>3 (Red)</td>
<td>*</td>
<td>0.630–0.690 µm</td>
<td>7 (Coastal)</td>
<td>0.400–0.450 µm</td>
</tr>
<tr>
<td>4 (Near IR)</td>
<td>*</td>
<td>0.770–0.895 µm</td>
<td>8 (NIR 2)</td>
<td>0.860–1040 µm</td>
</tr>
</tbody>
</table>
WorldView 1
0.5 m res
(Pan Only)
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 be 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 Request

NGA Retrieval
- Small Orders <25 (WARP)
- Large Orders >50+ = Data Brick, External Hard drive

HTTPS link sent to you
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 website 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 email 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

- **Sensor Fusion – Biomass Validation**
  - Biomass Mapping – BRDF Modeling
  - Biomass Density Validation – Uncertainty Estimation
Mountain pine beetle red attack damage individual tree counts to monitor population growth and spread dynamics critical to management efforts.
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.
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$<0.05$).
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!