2006 Civil Commercial Imagery Evaluation Workshop

Access and Availability of Resourcesat-1 AWiFS Data for Agriculture

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Background for USDA-SIA

– USDA’s Satellite Imagery Archive (USDA-SIA)
  • Established in 2000
  • Must spend funds in private sector
  • Affiliated with USGS/EROS
    – Broad MOU for cooperative efforts.
  • Participating agencies: NASS, FAS, FSA, NRCS, RMA, Forest Service, APHIS
    – Based on annual subscription fees.

– Prior to FY2006, used to negotiate directly with prime satellite imagery vendors.

– FY2006 established contract with Artic Slope Regional Corporation (ASRC)
  • Government to commercial (FAR clauses)

– ASRC (prime contractor) established contracts with seven prime satellite imagery vendors
  • Commercial to commercial (Commercial clauses)
Satellite Imagery Vendors under contract with ASRC MS

1. MDA Geospatial Services-Radarsat International
2. Earthsat (MDA Federal)
3. Eurimage
4. Space Imaging (GeoEye)
5. OrbImage (GeoEye)
6. Digital Globe
7. SPOT

750 products and services
- Multipsectral imagery (2.4 to 60 meters)
- Pan imagery (0.6 to 15 meters)
- Radar
- Services
ASRC History

• Artic Slope Regional Corporation (ASRC) is one of the original Alaska Native Corporations (ANC) formed in 1971.
  – The Inupiat Inuit (ASRC) were required to give up rights to all but 5 million of the 56 million acres of the North Slope. Oil was discovered in 1968 in Prudhoe Bay.

• In return for the land and mineral rights, ANCs are entitled to unique privileges under applicable federal regulations.
  – ANCs are entitled to receive sole source contracts of any value. They are not subject to the $3 million limitation applied to other 8(a) entities. 13 C.F.R. 124, 123, 311(b).
  – ANC's may operate multiple 8(a) companies providing that each company operates under a different primary SIC Code or NAICS Code. 108(c) and 112(c)(3).
  – SBA considers only the size of the particular tribal/ANC subsidiary at issue when determining the size of a firm owned by a tribe or ANC. 112(c)(2)(iii).
ASRC History

• Artic Slope Regional Corporation (ASRC) has been the largest Alaskan-owned company for 10 years in a row.
  – $3.25 billion in assets
  – $1.3 billion dollars in annual revenue
  – Over 6,500 employees

• ASRC manages over 5 million acres (remaining from ANCSA)
  – ASRC has over 9,500 Inupiat shareholders

• ASRC Management Services is the USDA-FAS prime contractor.
  – Provides products such as Crop Explorer for Global Crop Production analysis.
  – Procures satellite imagery for USDA agencies and other agencies on an “as-needed” basis.
Resourcesat-1 AWiFS Characteristics

- Broad swath: AWiFS-A, AWiFS-B, each with a swath width of 350 km
- Four Bands: including SWIR
- High revisit rate: 5 to 24 days, depending on scene selection.

<table>
<thead>
<tr>
<th>Payloads</th>
<th>LISS-4</th>
<th>LISS-3</th>
<th>AWiFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial Resolution (m)</td>
<td>5.8</td>
<td>23.5</td>
<td>56</td>
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<tr>
<td>Swath (km)</td>
<td>23.9 (MX mode)</td>
<td>141</td>
<td>740</td>
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<td>Spectral Bands (micron)</td>
<td>0.52-0.59</td>
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<td>Quantisation (bits)</td>
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<td>Square Wave Response (at Nyquist)</td>
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<td>B3 &gt;0.40</td>
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<td>Power (W)</td>
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<td>Weight (kg)</td>
<td>169.5</td>
<td>106.1</td>
<td>103.6</td>
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<td>Data Rate (MBPS)</td>
<td>105</td>
<td>52.5</td>
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</table>
USDA Uses Resourcesat-1 Satellite Data

- Resourcesat-1 launched October 17, 2003
- Sample data to USDA/NASS August, 2004
- Sample data to USDA/FAS December, 2004
- Purchases by USDA/NASS August, 2004
- Purchases by USDA/FAS November, 2005
- First standing order December, 2005
- Current USDA Inventory: 242 scenes
• **Delay in use results from:**
  – Concerns about data quality
    • Geometric and radiometric
  – Applications for 56 meter resolution data.
  – Poor initial delivery terms
Access and Availability

Topics

• **Contract**
  – Prices on a per scene basis or per AOI.
  – Delivery dates and formats
  – Enforceable terms
  – Availability of products and services

• **Coverage**

• **Acquisition Planning**

• **Distribution/Re-distribution**
Access to Resourcesat-1 AWiFS Data: **Contract**

a means of approaching, communicating with, or making use of

- **GeoEye/Space Imaging** is the distributor of Resourcesat-1 and IKONOS data.

**Contract Highlights**

- **Price**
  - AWiFS orthorectified Quad -- $924
  - Scene identification are Path: Row: Quad: Acquisition Date

- **Format**
  - Orthorectified LCC, WGS-84, 8-bit, 4-band, Geo-TIFF

- **Delivery terms**
  - Less than 10 calendar days after acquisition date (non-North America)
  - Less than 5 days for North America

- **License for Distribution/Redistribution**
  - Tier 2 (Federal/Civilian agencies)
Access to Resourcesat-1 AWiFS Data: **Price**

- USDA is a price-sensitive purchaser of satellite imagery.
- Contract prices are lower than vendor’s catalogue prices.
- Prices for LISS3 are higher than Landsat.
- AWiFS prices are lower than Landsat.

![Price Comparison Graph](image)
Access to Resourcesat-1 AWiFS Data: Delivery

Resourcesat-1 AWiFS Imagery from GeoEye
Delivery Times - Total

AWiFS Delivery for South American imagery has met and exceeded contract specifications
Access to Resourcesat-1 LISS3 Data: *Delivery*

LISS3 Delivery for South American imagery has met and *exceeded* contract specifications.
Access to Resourcesat-1 AWiFS Data: **Coverage**

a means of approaching, communicating with, or making use of

- **Coverage**
  - International Ground Stations
  - Standing Orders
    - Start date
    - End Date
    - Path/Row/Quad
  - South America
  - Russia and Ukraine
  - North Africa
  - Europe
  - North America

*Pending*
Coverage for areas outside of communication cones achieved through new Svalbard, Norway ground ground station.

Access to Resourcesat-1 AWiFS Data: **Coverage**

a means of approaching, communicating with, or making use of

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**Legend**

- International Borders
- Brazil_AWiFS_MatoGrosso
- Brazil_AWiFS_SouthernStates
- Argentina_LISS3
- Argentina_AWiFS_central zone
- Argentina_AWiFS_southern zone

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**Resourcesat-1 AWiFS and LISS3 Coverage for South America**

2005/06 Standing Order

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USDA Satellite Imagery Archive
Foreign Agricultural Service
Production Estimates and Crop Assessment Division
http://www.pecad.fas.usda.gov/

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229 AWiFS
32 LISS3
~$250,000
Availability of Resourcesat-1 AWiFS Data: Planning

present and ready for use; at hand; accessible

• On-board storage
  • Clashes in South America
    – Norway ground station may alleviate many clashes.
  • Can the satellite acquire many scenes?
  • How many?

• Real-time collection mode (collect and downlink simultaneously) alleviates the problem with on-board storage
  • US acquisitions should be OK.
  • Test planned for June through August 2006.
Availability of Resourcesat-1 AWiFS Data: **Planning**

present and ready for use; at hand; accessible

- On-board storage has a capacity of 120GB, which is ~ 9 minutes.
- Same-day / same-path clashes occur for first and last scenes in path.
- Either take Brazil or Argentina
Availability of Resourcesat-1 AWiFS Data: **Planning**

present and ready for use; at hand; accessible

- **Acquisition Planning**
  - Is there a shapefile of path/rows?
    - AWiFS
    - LISS3
    - LISS4
  - Can you predict opportunity dates?
  - Is the satellite “on”? Or is it on only when there is an order?
Availability of Resourcesat-1 AWiFS Data: **Planning**

present and ready for use; at hand; accessible

- **Acquisition Planning**
  - Is there a shapefile of path/rows?
    - AWiFS
    - LISS3
    - LISS4
  - Can you predict opportunity dates?
    - Yes, data from *P6_data_user_handbook.pdf*
  - Is the satellite “on”? Or is it on only when there is an order?
Table 4.2.1 Typical Orbital Calendar of IRS-P6

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Document No.: IRS-P6/NRSA/NDC/HB-10/03
Edition No.: 1 / October - 2003
Availability of Resourcesat-1 AWiFS Data: **Planning**

present and ready for use; at hand; accessible

- **Acquisition Planning**
  - Is there a shapefile of path/rows?
    - AWiFS
    - LISS3
    - LISS4
  - Can you predict opportunity dates?
    - Yes, data from *P6_data_user_handbook.pdf*
  - Is the satellite “on”? Or is it on only when there is an order?
    - Only acquiring when there is an order.
    - Order for AWiFS data results in collects for LISS3 (unless specifically turned off.)
Availability of Resourcesat-1 AWiFS Data: **Distribution**

present and ready for use; at hand; accessible

- **Distribution/Redistribution**
  - USDA-SIA determines which IRS scenes will be bought
    - Input from participating USDA agencies.
    - Mixture of AWiFS and LISS3
    - Limited budget
  - IRS scenes bought through USDA’s contract have Fed/Civil license.
- **Redistribution**
  - Archive Explorer (web-based application)
    - Restricted use to participating agencies
  - Data swapping with USGS/EROS
  - Access to Indian Archive

Pending
Access and Availability of Resourcesat-1 AWiFS Data

- AWiFS data has elements for successful applications in agriculture.
  - Low Prices
  - Rapid Delivery
  - Acquisition Planning
  - Global Coverage
Availability of Resourcesat-1 AWiFS Data: **Purchase**

Present and ready for use; at hand; accessible

**Ordering data through USDA-SIA:**

1. Contact Bob Tetrault (COTR) to place an order
   - robert.tetrault@usda.gov
   - Call Bob Tetrault at 202-690-0130

2. Send detailed requirements (Agency to USDA-SIA)

3. Review bids (Agency and USDA-SIA)

4. Transfer funds via AD-672 (Agency to USDA-SIA)

5. Receive imagery
El Carmen: January 19, 2006
Venado Tuerto Delegation, Santa Fe Province, Argentina
Next Steps
Input into Requirements for Resourcesat-2

• USDA Foreign Agricultural Service will be organizing a workshop on applications of Resourcesat-1 data for agriculture.
  – Participants include
    • ISRO (Indian Space Research Organization)
    • ANTRIX (Marketing and commercial arm of ISRO)
    • GeoEye (worldwide distributor of Resourcesat-1 data)
    • USDA agencies
    • Others?

• If interested, please contact Bob Tetrault at
  – 202 690-0130
  – Robert.tetrault@usda.gov