RSAC Update on NI ROPS-Related Activities

NI ROPS 2012 Closeout Meeting

November 7, 2012

USDA Forest Service, Remote Sensing Applications Center, FSWeb: http://fsweb.rsac.fs.fed.us
WWW: http://www.fs.fed.us/eng/rsac/
Presentation Outline

• Sensor Status Update
  – AMS
  – WAI

• NIROPS Website

• 2012 Firehawk Support Summary

• Active Fire Mapping Program Update
  – VIIRS
  – R&D
Autonomous Modular Sensor (AMS)

- 16 band sensor (VIS/NIR/SWIR/IR)
  - Multi-mission potential for USFS

- Transition from NASA to USFS ongoing
  - Interagency agreement signed

- Fit checks on 144Z conducted Sept 2012

- NASA Ames/NI ROPS technical meeting Nov 2012
  - Installation details
  - Flight test planning

- Availability of AMS to USFS in early CY2013
  - Transfer delay requested to support NASA mission in Jan 2013
  - Testing & implementation spring/summer 2013
Wide Area Imager (WAI)

• 5 band sensor (VIS/NIR/TIR)
  - Multi-mission potential for USFS

• Developed by Xiomas under NASA SBIR
  - Currently in SBIR Phase 3

• FS contract let for WAI demo/eval mission
  - Fall 2012/Summer 2013 over western U.S. fires
  - 3 day mission
  - One 4 hour operational period per day
  - WAI installation/testing on aircraft ongoing
  - Costs split 50/50 between NIICD and RSAC

• Project aviation safety plan reviewed by R4 RAO/RASM
NATIONAL INFRARED OPERATIONS

HOME  ABOUT  REPORTS  IMAGERY  LINKS  TRAINING  IRIN AREA  IR SCANNER ORDERS  SOCAL WORKSHOP  CLOSEOUTS

Serving the fire management community with Infrared Imagery since 1964.

Download the NIROPS KML

NIROPS 3833 S Development Ave. Boise, ID 83705

NIROPS Website and IR Ordering Page

• Modifications for 2012 season
  – Forgotten password link on Login page
  – Additional ways to review scan box coordinates and info
  – Clean up of PDF legacy issues

• Issues during 2012 season
  – Email notification for new and updated orders did not work initially
  – Forgotten password link was erratic initially
  – The usual assortment of broken links and hiccups

• Modifications for 2013 season?
  – Submit your requests ASAP so we can compile a list for the programmer
NIROPS Website

Download the NIROPS KML

Username or password is incorrect

Username
Password
Login
Sign up for an account
Forgot username / password

How To Order IR

How much is this IR flight going to cost?

What IR products will I receive?

NIROPS KML

National IR Program Manager
Tom Mallin
Office: 505-842-3845
Cell: 505-301-8167

NIROPS 3833 S Development Ave. Boise, ID 83705

NEW: After saving your scan box(s) form now displays a preview of what was entered.

Preview displays for both manual entry or Google Map entry of coordinates.
• Generate a PDF of your order from the Queue to check scan box coordinates and other information

NEW: Simple graphic of scan box on PDF
NIROPS Website Usage Summary for 2012
March 1 – October 30, 2012

- 22,051 visits to the website; 8,039 unique visitors
- 299,976 page views; Request Queue was 69.7% of views
- 8% of visits were from mobile platforms (tablets, smartphones)
NIROPS Brochure 2012 Edition

- Minors changes to text and format from 2011 brochure
- Sent out 440 brochures this spring
  - GACC IR Liaisons
NIROPS KMZ Tool

- Python scripts for both Arc 9x and Arc 10x
- "Vanishing Isolated Heat Source"
  - Occurred with Arc 10x version
  - Isolated would disappear when zooming in Google Earth
  - Python scripts modified to "force" isolated to maintain size regardless of scale
Firehawk 2012 Summary

- Incident support started on July 1
  - Utah fires
- Incident support ended on October 8
  - Washington and Idaho fires
- Continuous from August 9
Firehawk 2012 GACC Support

<table>
<thead>
<tr>
<th>GACC</th>
<th>No. of Fires</th>
<th>No. Days Support</th>
<th>UTF-Weather</th>
<th>UTF-Tech. Issue</th>
<th>Acres</th>
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<tbody>
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<td>EGB</td>
<td>8</td>
<td>19</td>
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<td>901,373</td>
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<tr>
<td>NOPS</td>
<td>19</td>
<td>138</td>
<td>7</td>
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<td>NR</td>
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<td>25</td>
<td>15</td>
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<tr>
<td>NW</td>
<td>13</td>
<td>27</td>
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<td>8</td>
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<td>15</td>
<td>28</td>
<td>10</td>
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<td>58,180</td>
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<tr>
<td>SW</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td>5,220</td>
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<tr>
<td>Total</td>
<td>80</td>
<td>270</td>
<td>5</td>
<td>50</td>
<td>2,254,118</td>
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</table>

(Through October 30, 2012)
17 % of the support requests in 2012 were assigned to Firehawk.
## Forest Service Active Fire Mapping (AFM) Program

Currently Leveraged Satellite Sensor Assets w/Thermal Capabilities

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Platform Type</th>
<th>Spatial Resolution (Reflectance/TIR Bands)</th>
<th>Temporal Resolution (per instrument)</th>
<th>Fire Algorithm</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODIS</td>
<td>Polar orbiting</td>
<td>250m, 500m, 1km/1km</td>
<td>2 times daily</td>
<td>MOD14/MYD14</td>
<td>Direct Readout; NASA Rapid Response System</td>
</tr>
<tr>
<td>AVHRR</td>
<td>Polar orbiting</td>
<td>1.1km/1.1km</td>
<td>2 times daily</td>
<td>FIMMA</td>
<td>NOAA Direct Readout via NOAA NESDIS</td>
</tr>
<tr>
<td>GOES Imager</td>
<td>Geostationary</td>
<td>1km/4km</td>
<td>4 times hourly</td>
<td>WF-ABBA</td>
<td>NOAA NESDIS</td>
</tr>
<tr>
<td>VIIRS</td>
<td>Polar orbiting</td>
<td>375m/750m</td>
<td>2 times daily</td>
<td>VIIRS Active Fire</td>
<td>Direct Readout; Rapid Response</td>
</tr>
</tbody>
</table>

[http://activefiremaps.fs.fed.us](http://activefiremaps.fs.fed.us)
Visible Infrared Imager Radiometer Suite (VIIRS)

- Suomi National Polar-orbiting Partnership (S-NPP)
  - NOAA-NASA mission

- Orbit configuration
  - 1:30PM afternoon pass
  - Ascending node
  - 3,000 km swath

- NPP VIIRS and Aqua MODIS observations times are similar

- Data latency
  - NRT data available via X-band direct readout
  - RSAC X-band station is collecting MODIS and VIIRS

- Only one VIIRS sensor currently
  - JPSS-1 (2015)
  - JPSS-2 (2019)
VIIRS and Aqua MODIS

NPP VIIRS Oct 18, 2012
2012 UTC

Aqua MODIS Oct 18, 2012
2012 UTC

NPP VIIRS Oct 18, 2012
1917 UTC

Aqua MODIS Oct 18, 2012
2055 UTC
**VIIRS Fire Product**

- **NOAA operational fire product**
  - 750 meters
  - Based on MODIS C4 algorithm
  - Available from NOAA CLASS
  - Validation ongoing
  - Effects of sensor specifications TBD

- **NASA direct readout fire product**
  - 750 meters
  - Based on MODIS C6 algorithm
  - Available from RSAC
  - Validation/feedback back to NASA

- **375m fire product**
  - Development by UMD
  - USFS PSW and RSAC providing support

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**Comparison of 22-band NPOESS VIIRS with MODIS bands**

<table>
<thead>
<tr>
<th>NPOESS VIIRS</th>
<th>MODIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band number</td>
<td>Band number</td>
</tr>
<tr>
<td></td>
<td>Central wavelength (μm)</td>
</tr>
<tr>
<td>M1</td>
<td>0.412</td>
</tr>
<tr>
<td>M2</td>
<td>0.445</td>
</tr>
<tr>
<td>M3 (blue)</td>
<td>0.488</td>
</tr>
<tr>
<td>M4 (green)</td>
<td>0.555</td>
</tr>
<tr>
<td>M5 (red)</td>
<td>0.672</td>
</tr>
<tr>
<td>M6</td>
<td>0.746</td>
</tr>
<tr>
<td>M7</td>
<td>0.865</td>
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<tr>
<td>M8</td>
<td>1.240</td>
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<tr>
<td>M9</td>
<td>1.378</td>
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<tr>
<td>M10</td>
<td>1.61</td>
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<tr>
<td>M11</td>
<td>2.25</td>
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<td>M12</td>
<td>3.7</td>
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<td>M13</td>
<td>4.05</td>
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<tr>
<td>M14</td>
<td>8.55</td>
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<tr>
<td>M15</td>
<td>10.763</td>
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<tr>
<td>M16</td>
<td>12.013</td>
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<tr>
<td>DNB</td>
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<tr>
<td>I1</td>
<td>0.64</td>
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<tr>
<td>I2</td>
<td>0.865</td>
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<tr>
<td>I3</td>
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<tr>
<td>I4</td>
<td>3.74</td>
</tr>
<tr>
<td>I5</td>
<td>11.45</td>
</tr>
</tbody>
</table>

I bands - 375m
M bands - 750m
AFM and VIIRS

• VIIRS data/product availability
  - May 5, 2012 to present for CONUS
  - Direct readout data only
  - Coverage may be incomplete

• Provisional VIIRS fire products available
  - JPG/PDF fire detection maps
  - Fire detection KMLs
  - Fire detection GIS data

• Reflectance imagery subsets available soon
  - True color
  - False color
  - Day/night band (DNB)
Ongoing R&D Efforts Related to AFM

- GOES Early Fire Detection (GOES-EFD)
Ongoing R&D Efforts Related to AFM

- Use of moderate resolution sensor assets for fire detection

- **Objective:**
  - Develop and exploit a suite of active fire detection data from moderate resolution sensors
  - Spatial resolutions ranging from 20-375m
  - Frequency of 2-4 overpasses a day for any location in the CONUS region and Alaska
  - Infuse data into existing operational activities

- **NASA ROSES 2011 Wildland Fires RFP (Schroeder & Riggan Co-PIs)**
  - Beginning 1 year feasibility study

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**Sensor** | **Agency** | **Swath (km)** | **Spatial Resolution (m)** | **Revisit Time** | **Launch** | **Equator Crossing (day/night)** | **Data Acquisition Plan**
---|---|---|---|---|---|---|---
NIRST* | CONAE & CSA | 182 | 351 | 1 day | June 2011 | 6:00 pm | On-demand
NPP/VIIRS | NASA & NOAA | 3,000 | 375 | 12 h | Oct 2011 | 1:30 pm | Continuous
LDCM | NASA & USGS | 185 | 30 | 16 days | Dec 2012 | 10:00 am | Continuous
TET-I | DLR | 178 | 356 | 1 day | Fall 2012* | 11:30 am | On-demand*
Sentinel-2A | ESA | 290 | 20 | 2-3 days | 2013 | 10:00 am | Continuous
BIROS | DLR | 178 | 356 | 1 day | 2013 | 1:30 pm (tentative) | On-demand*
Sentinel-2B | ESA | 290 | 20 | 2-3 days | 2014 | 10:00 am | Continuous

*Complementary Data Set Available for Historical/Retrospective Analyses & Applications*

- Landsat 5 TM | NASA & USGS | 185 | 30 | 16 days | 1984 | 9:45 am | Continuous
- Landsat 7 ETM+ | NASA & USGS | 185 | 30 | 16 days | 1999 | 10:00 am | Continuous
- ASTER | NASA & METI, Japan | 60 | 30 | 16 days | 1999 | 10:30 am | On-demand
Thanks

Comments/Questions?