RSAC Update on NI ROPS-Related Activities

NI ROPS 2013 Closeout Meeting

November 6, 2013
Presentation Outline

- Current & Future Sensors
  - AMS Transfer and Test Missions
  - WAI Fire Mission Evaluation

- NIROPS Website and Online Ordering

- 2013 Firehawk Support Summary
Autonomous Modular Sensor (AMS)

- Transition from NASA to USFS in March 2013
- Installed in N144Z in March 2013
- Initial test flights late March 2013
  - Northern Utah and Southern Idaho
  - Vineyards flight for Agricultural Research Service (ARS)
- Un-installed from N144Z in May 2013
  - 44Z/Phoenix needed for 2013 operational fire support missions
- NASA support agreement extended through 2015
  - Complete full implementation of the AMS sensor into Forest Service operations
AMS Utah/Idaho Mission

- Initial test flights of AMS in N144Z
- Integration of AMS with Applanix, AirCell
- Technology training and transfer
AMS Southern Idaho

Bands 12, 9, 10
AMS Utah Lake

2011 NAIP

Bands 12, 9, 11
AMS Vineyards Mission

• Acquire vineyard imagery for Agricultural Research Service (ARS) and cooperating vineyards
  – Water use investigation
AMS Vineyards

2012 NAIP Bands 12, 7, 5
AMS Vineyards
Supporting the Onboard Multicore Intelligent Payload Module on a NASA / USFS Suborbital Partnership Flight Series

Objective
• Employ Tilera components on airborne sensor missions to ensure operability and enhance the TRL levels for future satellite (HyspIRI) operations via the use of multicore processor technology.
• Demonstrate the end-to-end operations concept for use of the Intelligent Payload Module (IPM) for low latency users of NASA Decadal Survey missions using airborne vehicles as initial feasibility testbed platforms:
• Provide delivery of data products in near real-time for quick-looks assessment of processed information from a proven autonomous sensor system.

Approach
• Integrate IPM testbed into box that can be flown in collaboration with the recently transferred NASA Autonomous Modular Scanner (AMS) sensor onboard a US Forest Service Citation jet, during missions of opportunity over fires in the western US
• Configure the IPM as though it is on a satellite
  - Send real-time processing commands through IPM, dictating development of AMS sensor Level II products to derive/deliver.

Airborne Mission Test Collaboration
US Forest Service, National Interagency Fire Center - National Infrared Operations (NIFC-NIROPS); NASA- Ames Research Center; CSUMB, UPC

Graphic shows vision to develop & validate the HyspIRI operations concept for the high-speed multicore onboard processor Intelligent Payload Module (IPM) using a USFS Citation jet and the NASA AMS sensor system.

Key Milestones
• Engineering Design Review and A/C Fit-check
  11/12
• Initial IPM flight box complete
  12/12
• Initial Flight experiment on USFS Citation
  13
  - WCPS upload, L2 process only, (single processing layer)
AMS Next Steps

• Continue training/technology transfer to the FS for AMS ground station operation and data processing systems

• AMS Technical support
  – Augment/customize the AMS ground station interface and data processing software
  – Refine existing software user interface
    • Band/channel selection; process and status updates
    • Maintain AMS software functionality after FS computer updates
  – Increase data storage and data backup storage
  – Ingest and delivery of near-real time AMS imagery and derived products to CDE and decision support systems
AMS Next Steps

• Technical support con’t
  – Integration of AMS with AirCell systems
    • Data delivery; Operation of AMS from the ground
  – Access to Ames Airborne Sensor Facility for semi-annual sensor calibration
  – Consultation and engineering support for long-term AMS maintenance
    • Hardware upgrades; sensor cooling system maintenance
  – Consultation and recommendations for enhancement of AMS sensor technical capabilities
Wide Area Imager (WAI) Evaluation

- 5 band sensor (CIR/TIR)
  - Multi-mission potential for USFS
  - 2-channel thermal sensor using QWIPS
  - CIR digital camera

- Developed by Xiomas under NASA SBIR
WAI Evaluation Mission

• WAI deployed to Boise on Photo Science, Inc. aircraft
• First deployment of WAI for wildfire mapping
• Missions were flown on July 24-July 26
  – Fires northeast and east of Boise
  – Coincident with NIROPS flights of the same fires
• No daytime flights due an issue with the CIR camera
**WAI Evaluation Mission**

- All missions flown at 17,000 ft. ASL
  - 8,000 to 10,000 ft. AGL over the fires
- Field of View (FOV) set to 45°
WAI Evaluation Missions

Pine Creek
Summit
Ridge
Leggit
WAI Mission

WAI LWIR
White=Hot

WAI KAB
Heat Layer

Phoenix Imagery
Raw Heat & Interp
WAI Mission

Frame-to-frame registration
Pine Creek Fire

Duplicate detects
Ridge Fire
WAI Next Steps

- Acquire day time CIR imagery and day time thermal imagery
- Harden the sensor system
  - Upgrade to TMAS data system
  - Improve connectors and cables
  - Improve shielding
- Improve frame to frame registration
- Improve documentation
- Automation of the sensor’s operation
N182Z Update

• WO F&AM and Region 8 are working on an agreement to form a working group that would govern the use of N182Z within the agency
• Project proposals for use of N182Z would be submitted to the working group
• When not tasked for project work, N182Z would be used for typical missions, ex. admin flights
• Additional work is still required to formulate a proposal to F&AM utilize N182Z for NIROPS technology evaluation, and operational support when needed.
NIROPS Website 2013

National Infrared Operations

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 2013 season
  – Auto-generation of user accounts for specific email domains
  – MODIS 0-6 and 0-12 hour detects display in Google Map
  – Re-formatted the PDF output

• Issues during 2013 season
  – The usual assortment of hiccups and broken links
    • “Check box” for scan orders doesn’t always display
    • Average elevation truncates if a comma is entered in the box

• Modifications for 2014 season?
  – Submit your requests ASAP so we can compile and prioritize a list for the programmer
NIROPS Website Usage Summary for 2013

March 1 – October 31

• Items of interest:
  - 21,314 visits to the website; 7,205 unique visitors
  - 274,625 page views
  - 19% of visits were from mobile devices
    • Tablets – 10%
    • Smart Phones – 9%

<table>
<thead>
<tr>
<th>Year</th>
<th>Visits</th>
<th>Unique Visitors</th>
<th>Page Views</th>
<th>Smart Phone(%)</th>
<th>Tablet(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>21,314</td>
<td>7,205</td>
<td>274,625</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2012</td>
<td>22,089</td>
<td>8,053</td>
<td>300,319</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>18,073</td>
<td>6,829</td>
<td>90,367</td>
<td>3 (mobile)</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>10,436</td>
<td>3,052</td>
<td>69,290</td>
<td>1 (mobile)</td>
<td></td>
</tr>
</tbody>
</table>
NIROPS Brochure

• Minor changes to text and format

• Distributed 167 brochures
  – GACC IR Liaisons
  – CalFire
NIROPS KMZ Tool

- Redesigned as a stand alone executable
- More latitude for shapefile names
- Compatible with Arc 10.0 and 10.1
Firehawk 2013 Summary

- Incident support started on Jun 21
  - Carstens Fire, CA SouthOps
- The majority of support requests were from the Alaska GACC
- Incident support ended on August 21
  - Alaska fires
## Firehawk 2013 GACC Support

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>No. of Fires</th>
<th>No. of Support Requests</th>
<th>UTF-Weather</th>
<th>UTF-Tech. Issue</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>9</td>
<td>57</td>
<td>9</td>
<td>10</td>
<td>276,572</td>
</tr>
<tr>
<td>EGB</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>31,026</td>
</tr>
<tr>
<td>NOPS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NR</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>17,138</td>
</tr>
<tr>
<td>NW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SOPS</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>16,030</td>
</tr>
<tr>
<td>SW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>21</strong></td>
<td><strong>66</strong></td>
<td><strong>9</strong></td>
<td><strong>14</strong></td>
<td><strong>340,766</strong></td>
</tr>
</tbody>
</table>

*(Through October 31, 2013)*
### Firehawk 2013 Incident Support

<table>
<thead>
<tr>
<th>Incident</th>
<th>No. of Fires</th>
<th>Geographic Area</th>
<th>No. of Support Requests</th>
<th>UTF-Weather</th>
<th>UTF-Tech. Issue</th>
<th>Acres¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspen</td>
<td>1</td>
<td>SOPS</td>
<td>1</td>
<td>1</td>
<td></td>
<td>14,322</td>
</tr>
<tr>
<td>Birch Creek</td>
<td>1</td>
<td>AK</td>
<td>2</td>
<td>1</td>
<td></td>
<td>24,923</td>
</tr>
<tr>
<td>California Point</td>
<td>2</td>
<td>NR</td>
<td>1</td>
<td></td>
<td></td>
<td>5,138</td>
</tr>
<tr>
<td>Carstens</td>
<td>1</td>
<td>SOPS</td>
<td>2</td>
<td></td>
<td></td>
<td>1,708</td>
</tr>
<tr>
<td>Gold Pan Complex</td>
<td>3</td>
<td>NR</td>
<td>1</td>
<td>1</td>
<td></td>
<td>9,000</td>
</tr>
<tr>
<td>Lodgepole</td>
<td>1</td>
<td>EGB</td>
<td>1</td>
<td>1</td>
<td></td>
<td>20,132</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1</td>
<td>AK</td>
<td>11</td>
<td>2</td>
<td>6</td>
<td>67,288</td>
</tr>
<tr>
<td>Moon Lake Complex</td>
<td>5</td>
<td>AK</td>
<td>30</td>
<td>3</td>
<td>5</td>
<td>76,548</td>
</tr>
<tr>
<td>Moose Meadow</td>
<td>1</td>
<td>NR</td>
<td>1</td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>Papoose</td>
<td>1</td>
<td>EGB</td>
<td>1</td>
<td></td>
<td></td>
<td>9,439</td>
</tr>
<tr>
<td>Stuart Creek #2</td>
<td>1</td>
<td>AK</td>
<td>13</td>
<td>3</td>
<td>3</td>
<td>87,064</td>
</tr>
<tr>
<td>Tetlin Ridge Junction</td>
<td>1</td>
<td>AK</td>
<td>1</td>
<td>1</td>
<td></td>
<td>20,749</td>
</tr>
<tr>
<td>Thunder City</td>
<td>2</td>
<td>EGB</td>
<td>1</td>
<td></td>
<td></td>
<td>1,455</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>21</strong></td>
<td><strong>66</strong></td>
<td><strong>9</strong></td>
<td><strong>14</strong></td>
<td></td>
<td><strong>340,766</strong></td>
</tr>
</tbody>
</table>

Reported acres are from the last night of Firehawk support, which may not match the final reported acreage for the incident.
Through October 31, 2013

5% of the support requests in 2013 were assigned to Firehawk
Thanks

Comments/Questions?

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