Distribution and Tracking of NASA EOSDIS Data

Towards mapping NASA’s Earth Observation Value Chains

Diane Davies, Jeanne Behnke
NASA Goddard Space Flight Center/ESDIS Project
diane.k.davies@nasa.gov, jeanne.behnke@nasa.gov
NASA Earth Observation (EO) Data Products

- NASA Satellite missions are based on key science questions
- Once on orbit, the value of the mission is multiplied by the many possibilities afforded by the data – many of which were not part of the original justification for the mission
- The value is increased by every link in the chain.

EOS Data Operations
- Data capture and Level 0 processing

Science Investigator-led Processing Systems
- Higher level product generation

LANCE NRT capability
- Reformat
- Subset
- Re-project
- Visualize
- How-to’s

Distributed Archive Centers
- Models
- Assimilate
- Forecast
- Infer

How-to’s
- Guides
EOSDIS Evolution: Worldview and Global Browse Imagery Services

GIBS / Worldview Goal:
To transform how users interact with and discover NASA Earth data; make it visual

Approach:

- The **Global Imagery Browse Services (GIBS)** provide open access to full resolution imagery derived from NASA products to any mapping client and script
  
  [https://earthdata.nasa.gov/gibs](https://earthdata.nasa.gov/gibs)

- **Worldview** is an open source, browser-based client to interactively explore GIBS (and SEDAC) imagery and download the underlying data
  
  [https://worldview.earthdata.nasa.gov](https://worldview.earthdata.nasa.gov)
EOS Imagery Available
Global Imagery Browse Services (GIBS)

- Most imagery is available within 3-5 hours of observation
- Supported application areas include air quality, flood monitoring, wildfire management, shipping

Yosemite Rim Fire, 2013 August 20-24
Sea ice near Nome, AK, 2014 April 23-28
NASA’s Fire Information for Resource Management System (FIRMS)

Data processing at SIPS in NRT (LANCE)

Value Added Services
- Fire Email Alerts
- Visualize imagery
- GIS compatible data

End users adding value: Customized Email and SMS alerts, press releases
GEOGLAM Crop Monitor for AMIS
(Agricultural Market Information System)

- Endorsed by the G20 Heads of state, response to G-20 AMIS request
- The objective of the Crop Monitor is to provide an international and transparent multi-source, consensus assessment of crop growing conditions, status, and agro-climatic conditions, likely to impact global production
  - inputs from GEOGLAM Community of Practice, international and national agencies, based on evidence from near real time satellite, weather, agromet, and national expert assessments

Website: http://www.geoglam-crop-monitor.org

Coordinated by Becker-Reshef, GEOGLAM Secretariat/UMD with NASA support
Crop Monitor Interface for Crop Condition Assessments

Slide from C. Justice and I. Becker-Reshef, GeoGLAM / UMD
Condition Synthesis Maps Covering All AMIS Crops

Crop Conditions as of April 28th, 2015

Crop condition map synthesizing information for all four AMIS crops. Crops that are in other than favorable conditions are displayed on the map with their crop symbol. (Cropland area shown is an aggregation of all cropland areas)
Crop Condition Pie Charts by Crop

Crop Conditions as of April 28th, 2015
The Monthly Crop Monitor Monthly Bulletin

Crop Conditions in AMIS countries (as of September 28th)

Highlights

Wheat conditions remain mostly favorable. In the northern hemisphere, the early wheat season is setting in across the region. Winter wheat planting has progressed well owing to favorable weather. However, widespread cool and wet conditions continue to cause some delays in the southern hemisphere. In Canada, winter wheat conditions remain favorable, except in some areas where wetness and cool temperatures have delayed planting.

In the southern hemisphere, winter wheat conditions are mostly favorable, with the exception of Argentina, where cool and wet conditions have delayed planting.

Operational since Sept 2013
Mapping value chains in NASA EO

How does NASA map actors engaged in satellite Earth observation and value adding activities, as well as exploring ways to track data streams to final users when possible?

- Track data usage
- Solicit feedback from users
  - surveys
  - feedback tool
  - user interviews
  - social media
- Encourage citation
- Outreach
Tracking Distribution: NASA’s EOSDIS distributed over a 1 Billion products to Users in 2014

EOSDIS Yearly Total Data Volume (PB) and Number of Products (Billions) Distributed to End Users

Products whose discipline was not available or not applicable including some of the ancillary data.
NASA’s Earth Science data is distributed globally, the effect of an open data policy now in effect for over 15 years
Yearly Distribution of NRT Products

Yearly NRT Products Data Volume and Files Distributed by LANCE
2010 - 2014

<table>
<thead>
<tr>
<th>Yearly Summary</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archive</td>
<td>7.8 TB/week</td>
<td>8.5 TB/week</td>
</tr>
<tr>
<td>Distribution</td>
<td>16.5 TB/week</td>
<td>16.8 TB/week</td>
</tr>
</tbody>
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Started to see a shift from Rapid Response downloads to use of GIBS and Worldview
NRT Downloads from Worldview and GIBS
• Measure customer satisfaction with NASA Earth Observing System Data and Information System at a national level for each Distributed Active Archive Center (DAAC)
• Identify the key areas that NASA can leverage across the Archive Centers to continuously improve its service to its customers
• Assess the trends in satisfaction with NASA EOSDIS specifically in the following areas:
  • Product Search, Selection and Order, Delivery
  • Product Ease of Use, Documentation
  • Customer Support
• Survey is performed via the web

• In 2014 EOSDIS received an ACSI score of 78 (highest ever)
• Ratings in the mid to upper 70s are considered “very good” by the rating organization, the CFI Group
• 2014 Survey results are based on 4,147 responses
• Responses came from 150 different countries

Type of User

<table>
<thead>
<tr>
<th>Type of User</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>General Public</td>
<td>10%</td>
</tr>
<tr>
<td>Grade School Teachers</td>
<td>1%</td>
</tr>
<tr>
<td>University Professor or Student</td>
<td>53%</td>
</tr>
<tr>
<td>Other Education and Outreach</td>
<td>5%</td>
</tr>
<tr>
<td>Data Scientist</td>
<td>17%</td>
</tr>
<tr>
<td>Earth Science Researcher</td>
<td>39%</td>
</tr>
<tr>
<td>Earth Science Modelers</td>
<td>12%</td>
</tr>
<tr>
<td>Data Tool Developer</td>
<td>7%</td>
</tr>
<tr>
<td>Decision Support Systems Analyst</td>
<td>6%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
</tbody>
</table>

Number of Respondents: 4,147
Comments from the Survey and the Earthdata Feedback tool help define system improvements

| Product Selection and Order | Users want to download data preprocessed and ready to import into tools  
Bulk delivery of selected data is important as users move to time-series processing |
|----------------------------|--------------------------------------------------------------------------|
| Product Selection and Order | Users want mobile / tablet friendly clients  
Users want to save searches |
| Product Documentation      | Many requests for tutorials and other educational material on our website |
| Product Search             | Users are requesting the ability to subscribe to data |
Increasing Interaction with End Users using Social Media and Webinars

EOSDIS launched its social media campaign in 2014

- Increase awareness and help users discover Earth science data, services, information and tools from EOSDIS
- Provide information and videos to help users discover, access and work with NASA Earth science data
- Webinars are held once a month
Repeat is defined as attending 3 or more webinars since May 29, 2013
New is defined as 2 or less webinars since May 29, 2013
2015 International Space Apps Challenge

- Teams from around the world took up NASA’s EOSDIS challenge to find volcanoes, icebergs, and other interesting Earth events in images provided by the Global Imagery Browse Services (GIBS)
  - a two day “hack-a-thon” to develop open-source solutions to address global needs applicable to both life on Earth and life in space.
  - 13k participants in over 133 locations created 949 projects
  - 40 teams put together GIBS-related projects, including one nominated for “Best Use of Data” and “People’s Choice”.

Images:
- Person working on a computer
- Earth in space
- Event browser interface