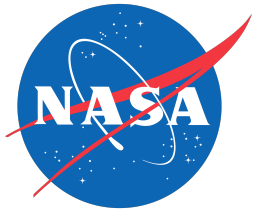


AIRS Applications & User Services: Overview of Activities, Status & Plans

Sharon Ray
AIRS Applications Development / User Services Lead
Jet Propulsion Laboratory, California Institute of Technology
April 2019

Joao Teixeira, Tom Pagano, Eric Fetzer, Bjorn Lambrigtsen
Paulo Penteado, Jeff Hall, Steve Licata
Vince Realmuto, Stephanie Granger, Alireza Farahmand, Heidar Thrastarson (JPL)
Emily Serman (USC/JPL)

Agenda

User Services

User Guide Upgrade
Web Site Upgrade

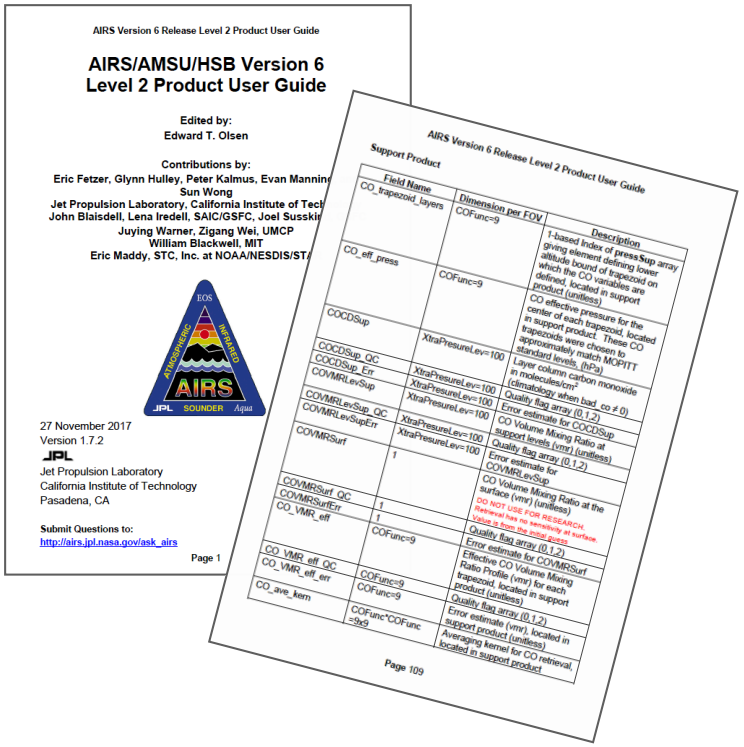
AIRS on LANCE/GIBS/Worldview

Applications

Implementation status drought, fire, flu, volcano
V7 and Applications & Users Services

LIVE DEMO - Volcanic Plume Detection web page

Re-envisioning the AIRS User Guides



V7 requires update of UGs

Can we take this opportunity to improve accessibility and usability?

Current paradigm

- MS Word authoring, served as PDFs on GES DAAC
- ~30 PDFs (including ATBDs) + readers and zip files

The Good News – *A great foundation!*

- Complicated content already written
- Well organized
- Well maintained

The Problem Space

Life Cycle

- No document of the UG life cycle – Creation, Review, Management, Distribution

Quality Control

- How do we ensure changes are consistent across guides?

Effectiveness

- New users don't know how to get started – no overview or context of how things fit together
- Current content can be difficult to consume
- No use cases
- Don't know where/how to find specific information

Accessibility

- Not machine searchable
- Hard to view across various media platforms

Maintenance

- How do we continue to improve clarity of content between new version deliveries?
- When an update is required, the process to update the change may take a long time

Authoring

- Guides written in MS Word. Constrained to this one application and it's method of tracking changes.
- Better to have the authoring environment come out of the features we need. Having a durable authoring environment improves all facets of the life cycle

Configuration Management for Version Releases

- Wiki may provide better control and historical context (everything stays in the wiki, you get to see who did what)

Stats & Feedback

- No understanding of which content used the most
- No mechanism for user feedback
- Don’t know the pain points

The Opportunity

From Swipeguide.com,
"The Future Generation of User Guides"

- Negative of bombarding busy user with too much information becomes positive of fulfilling a need
- Can enhance customer journey and build loyalty
- If UG not given priority attention – missing an opportunity to capture an audience

Great user guides that are easy & enjoyable to use, with content that describes complex content quickly and efficiently, offers the opportunity to grow a user community, increasing the utility of the data.

Status

User guide upgrade will include transition to a digital multi-user authoring environment, digital access to UG contents, and close coordination with the GES DISC DAAC

Team Assembled

- AIRS, Graphic Communications, Human Centered Design, Documentation

Workshop

- Two 2-hour sessions
- Part 1 - Understanding Goals: SME Roundtable (Student Input), GES DAAC input
- Part 2 - Solution-Making: Blue sky vision, highlighting minimum requirements
- Capture Requirements, Personas, Use Cases, Candidate Technologies, Issues

Trade Study

Select the authoring system

Post-Workshop Report

Target Completion

April 2020

AIRS DUG Team

DUG Upgrade Lead
Sharon Ray
AIRS Applications / User Services Lead

AIRS DUG Upgrade Support
Heidar Thrastarson
AIRS User Services Support

Strategy and Project Consultant
Chris Hawley
Graphics Communications

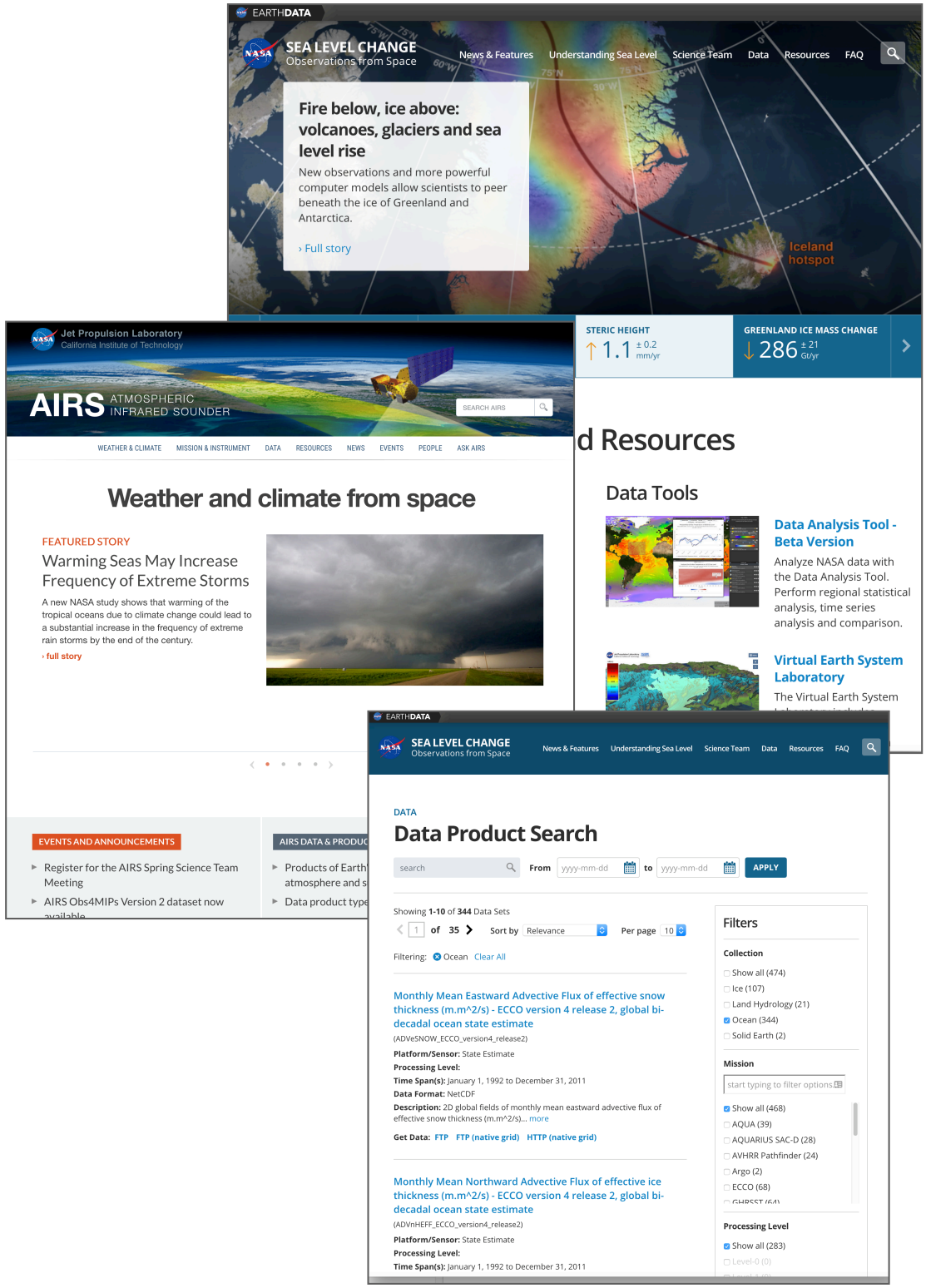
Use Case Identification, Required Content Determination, Existing UG assessment
Krys Blackwood
Human Centered Design Group Lead

Development and implementation support
Joe Spahr
Document Services

Additional support
Stephanie C. Smith – Senior Web Designer/ Developer, Graphics Communications
Peter Basch – Document Services

AIRS Web Site Upgrade

- Leverage user guide upgrade effort
- Upgrade platform to allow access to new web site capability
- Integrated display tool
- Developer demo
- Next up –
- create roadmap



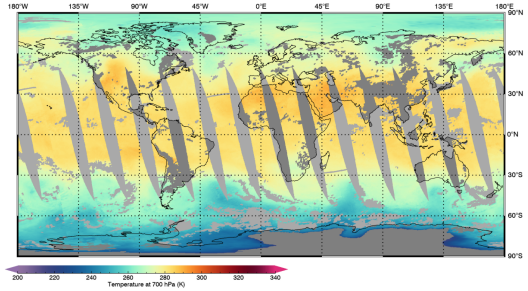
AIRS *by* LANCE *in* GIBS & *on* Worldview

- Existing imagery has updated color tables
- New imagery
- Removed imagery (T & RH @400, 600 hPa levels; CO tc)
- Improved visualization algorithm
- Now will include polar projections
- Historical archive from beginning of mission in development at JPL

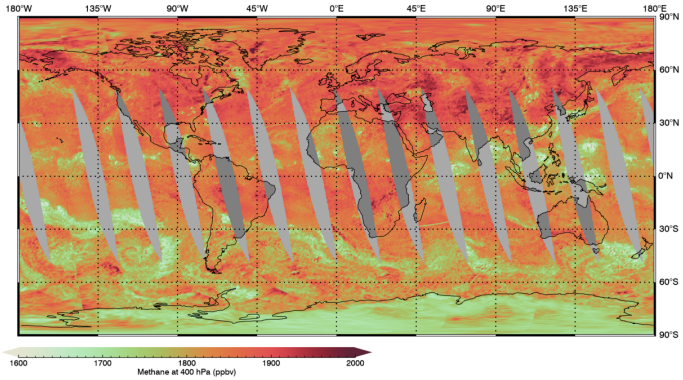
Daily, Day & Night

- Surface Air Temp
- Surface Skin Temp
- Temperature 500, 700, 850 hPa
- Surface Relative Humidity
- Relative Humidity 500, 700, 850
- Carbon Monoxide 500 hPa
- Methane 400 hPa
- Sulfur Dioxide Brightness Temperature Difference
- Dust Score
- Total Cloud Fraction
- Cloud Top Height

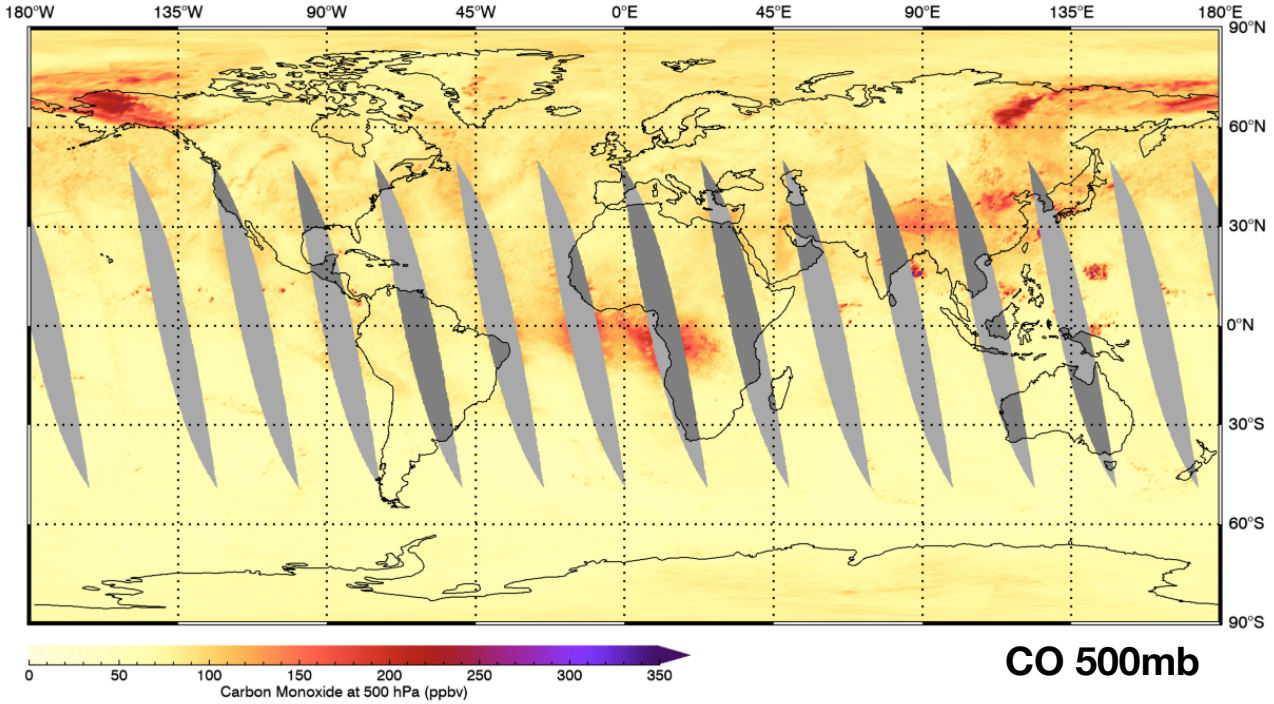
April 2019
AIRS at LANCE UWG



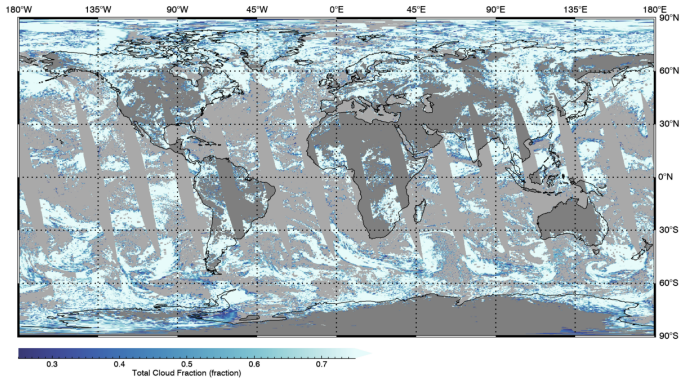
T 700mb



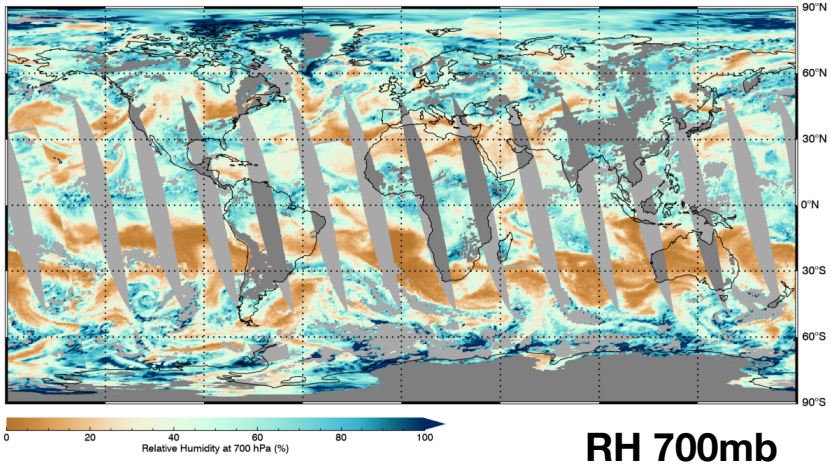
CH4 400mb



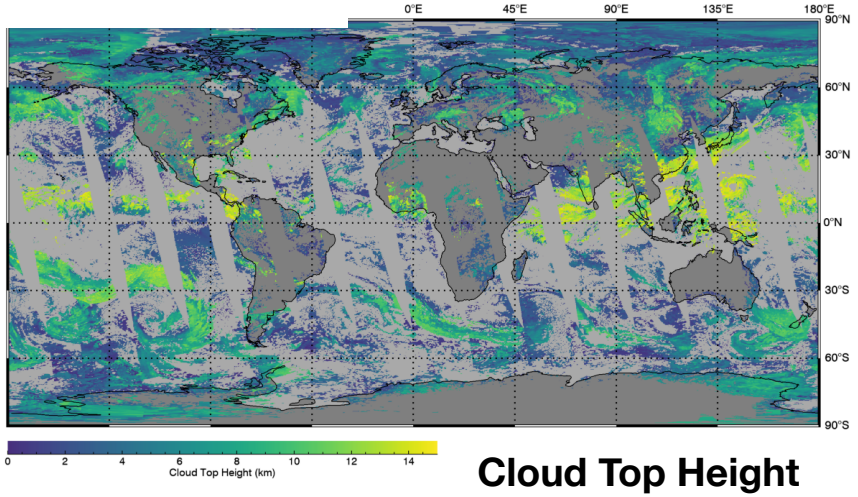
CO 500mb



Cloud Fraction



RH 700mb



Cloud Top Height

Applications

- **Converting science into products for use by decision-makers**
- **Cultivating, maintaining partnerships > ROSES**
- **AIRS project works with scientists to integrate data into existing algorithms**

AIRS Applications In Play

Weather

Weather prediction centers world-wide

Aviation

Washington DC VAAC

- *SO2 alert*

Support to Aviation Control Service (supports Toulouse VAAC)

- *Daily global SO2 BT Diff*
- *SO2 load (BIRA/NILU Prata retrieval)*
- *Ash index*

NOAA Rapid Update Cycle Rapid Refresh Model

- *Volcanic ash detection*

● **Volcanic Plume Detection Rapid Response – AIRS SO2 & Dust Detection**

2017 Earth Science Senior Review Subcommittee
AIRS data are of significant importance to FAA and the aviation community (sulfur dioxide, volcanic plumes).

Drought

● **US Drought Monitor**

Wildfire

● **Fire Danger Assessment System**

Health

● **Influenza Forecasting**
Dengue
Zika

● In development

AIRS Applications Mapped to ARL Level *

1	2	3	4	5	6	7	8	9
Basic Research Baseline Ideas	**Application Concept** Invention	**Proof of App Concept** Viability Established	**Initial Integrn & Verification** Prototype/Plan Includes Dec Sup activities	**Validation in Relevant Environ** Potential Determined	**Demonstation in Relevant Environ** Potential Demonstrated	**Prototype in Decn Making** Functionality Demonstrated	**Completed and Qualified** Functionality Proven	**Operational** Sustained Use
		Wildfire FDAS Reager, Stavros, Farahmand, Randerson *NOT FUNDED BY AIRS*	**Dengue** Drewry **Zika** Drewry **Temperature Inversion** **Cold Air Aloft**	**Volcanic Plume Detection Rapid Response** Realmuto **Flu Forecast Model** Thrastarson, Teixeira Basic components are integrated with reasonably realistic supporting elements so application can be tested in a simulated decision making environment	Prototype application system is demonstrated in a relevant environment or in a simulated operational decision making environment. Any application component(s) already deployed in the end-user's environment are tested in operational decision making context.			**AIRS in Weather Prediction Systems** **SO2 @ VAAC/SACS for Volcanic Plume Detection** **Drought @ USDM** Granger, Farahmand, Behrangi

Where AIRS typically enters

- ARL Level — Highest level for which all milestones preceding it completed in full
- Ideal to have applications in a range of levels
- Not expected projects start at ARL 1 and end at ARL 9
- Can help determine if staff needed for future ARL level

* Not a true mapping. ARL levels also have other requirements, such as the project team must articulate the potential for performance improvement in decision making to achieve the ARL. But functionally the application is at this level.

Applications Snapshot

Drought Onset Prediction

- Drought products provided weekly to USDM for inclusion in drought assessment and forecast (AIRS Surface RH & T, VPD)
- 1/2 degree gridded L2; 1, 4, & 8-week rolling average L2 CONUS
- Determine roadmap for drought, keep as-is or improve and broaden user base

Fire Danger Assessment System

- Not funded by AIRS
- Building formal relationship between JPL and operational fire science community
- Create global fire-potential data product, uses AIRS VPD
- At ARL 3 (Proof of Application Concept)
- Did not get funded by 2018 ROSES Disasters – will apply again and explore other funding (CALFIRE, NISAR)

Influenza Forecasting

- JPL model based on SIRS model
- Weekly reports sent to Los Angeles County Acute Communicable Disease Center weekly for evaluation (mock trial) during flu season
- Periodic meetings with LAC to review results and gather feedback to improve model and ensure output matches what LAC needs
- CDC - following flu forecasting contest to prepare for participation next flu season.

Volcanic Plume Detection

- Algorithm uses AIRS SO2
- Automated system operational behind firewall
- Feedback solicited & received from volcano community
- Select improvements based on feedback in progress, more to improvements to follow after public launch
- Imagery (SO2, Dust, Cloud Fraction, Cloud Top Height) to be produced by NASA LANCE, archived in GIBS for viewing in NASA Worldview. Will allow AIRS volcano page to utilize Worldview capability for volcano events.




All photos: Wikimedia Commons. Drought credit: Ranjith66, commons.wikimedia.org/wiki/File:Earth_in_Farmer.jpg; Fire credit: USDA; Vaccine credit: NIAID, commons.wikimedia.org/wiki/File:A_woman_receives_the_seasonal_influenza_vaccine_(flu_shot)._Credit-_NIAID_(31028518766).png; Volcano credit: MONUSCO / Neil Wetmore, commons.wikimedia.org/wiki/File:An_aerial_view_of_the_towering_volcanic_peak_of_Mt._Nyiragongo.jpg

Version 7 Impacts

Applications

1. **Determine if there are impacts - discuss/plan**
2. **Determine if/how to respond to impacts**
   - Drought, Fire, Flu, Volcanic Plume Detection

User Guides

- **Plan A:** Current user guides ingested into authoring system; authors update to V7 within the new system
- **Plan B:** Authors update to V7 in existing Word docs, then ingest content into new system.
- V7: Will all guides be V7 guides, or just a subset?
- **Be ready by April 2020**

Web Site

- **Determine content required for V7**
- **Completion schedule for web improvements & content updates**
- **Utilize effort from User Guide upgrade** - link to relevant section, repurpose content, organization/navigation

V6.6 Impacts

Applications

Assuming applications will not use V6.6

User Guides

- **V6.6: All all guides be V6.6 guides, or just a subset?**
- **Will need simple, clear guidance for users on which version to use for their needs**
- **Do we need to account for multiple versions in new digital user guide system?**

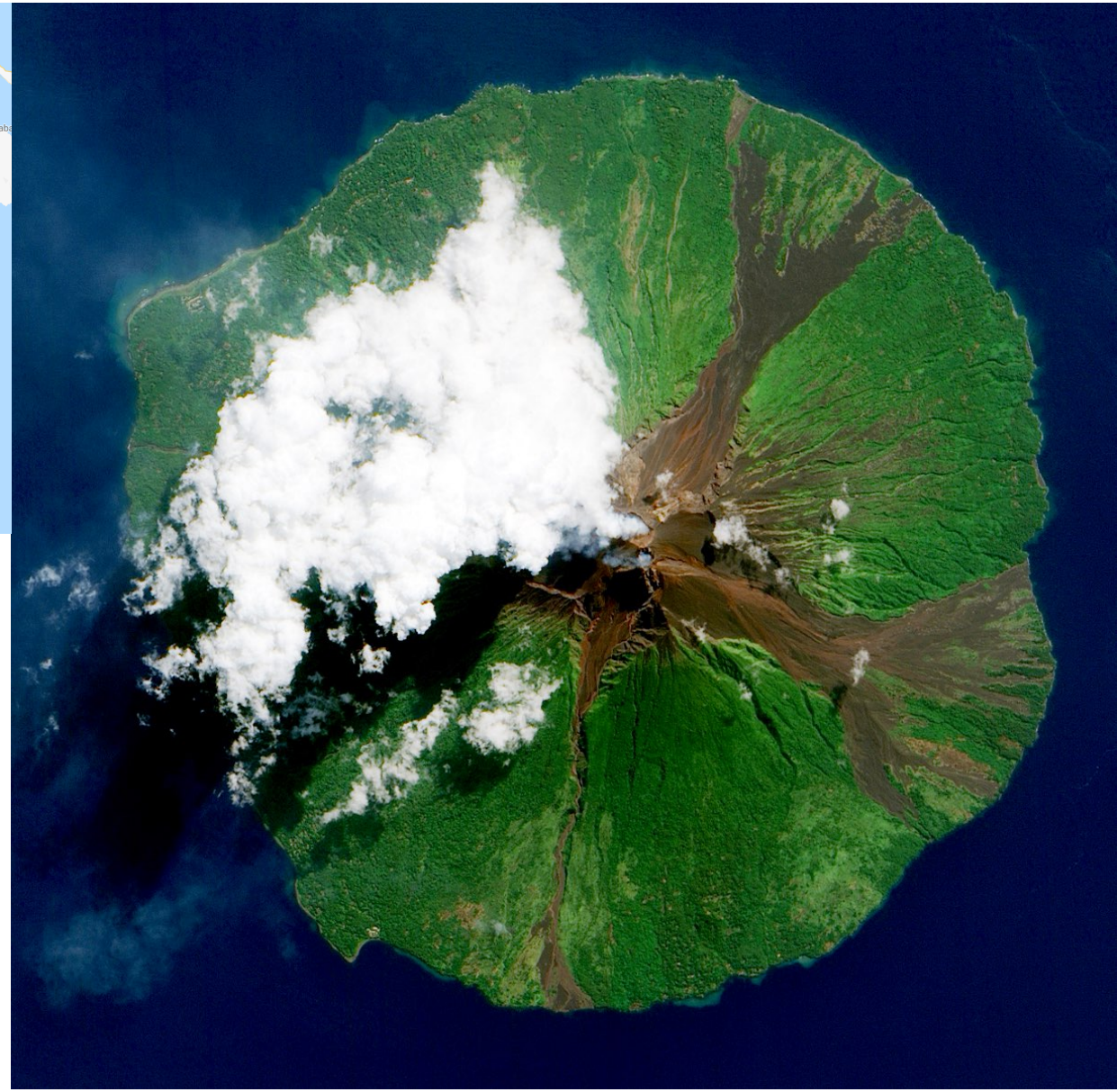
Web Site

- **Determine content required for V6.6**
- **Completion schedule for web improvements & content updates**
- **Utilize effort from User Guide upgrade** - link to/embed relevant sections, repurpose content, organization/navigation

Volcanic Plume Detection Live Demo

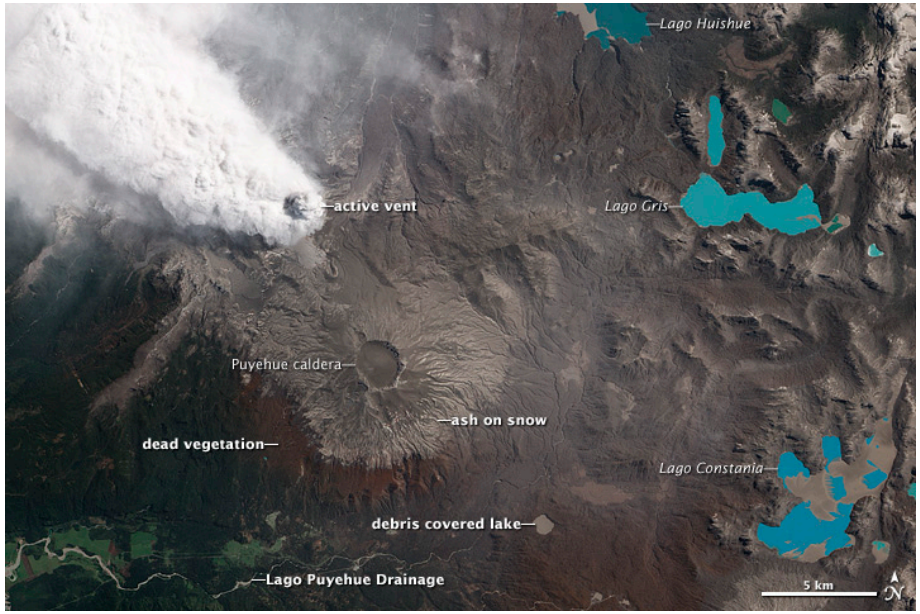
Credit: Map data © 2019 Google.

January 23, 2019
Manam eruption, PNG
Plume 40,000 ft (Darwin VAAC)



Manam on 2010.06.16
Credit: NASA Earth Observatory. EO-1 ALI data provided courtesy of NASA EO-1 team.

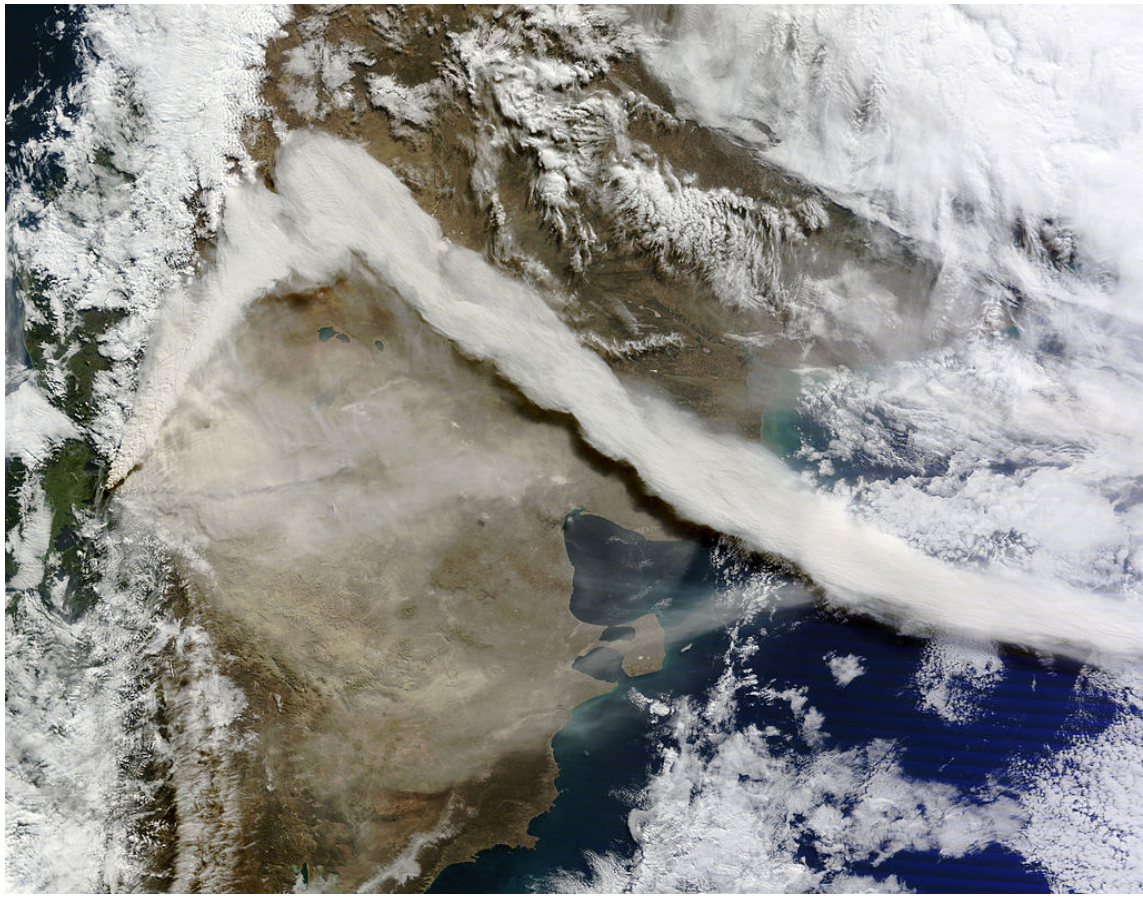
Volcanic Plume Detection Live Demo



Puyehue-Cordón Caulle Volcano, Chile on 2011.10.22
Credit: NASA Earth Observatory. EO-1 ALI data provided courtesy of NASA EO-1 team.

June 6, 2011 eruption
Puyehue-Cordón Caulle, Chile
Plume 40,000 ft (Buenos Aires VAAC)

Eruption began 6/4/11
Plume stretched around Andes
Winds shifted causing kink in plume



Puyehue-Cordón Caulle Volcano, Chile on 2011.06.06
Credit: NASA Goddard/MODIS Rapid Response Team.