

No Pixel Left Behind: Interactively Visualizing "Everything" from NASA's Earth Observations

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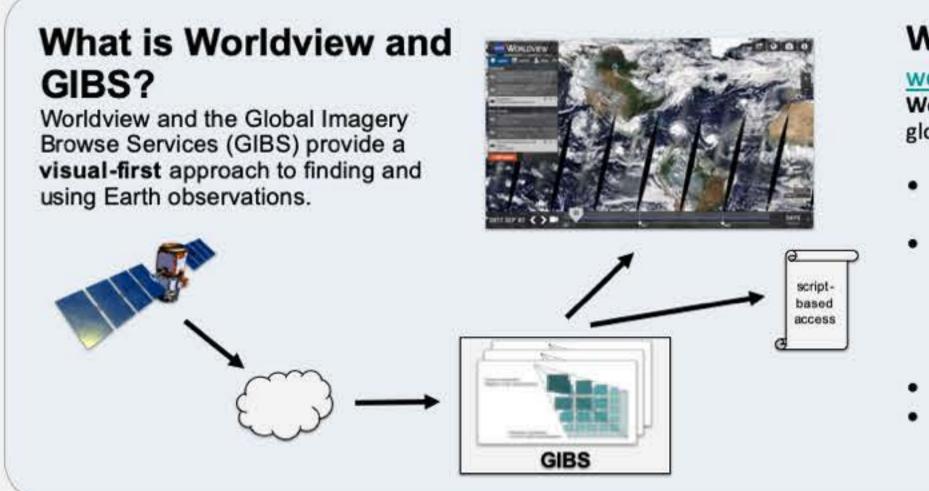
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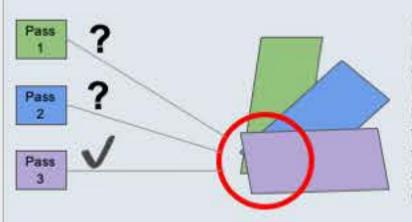
Overview: The problem: satellite swath overlaps. Polar orbiting satellites like Terra, Aqua, and the joint NASA/NOAA Suomi-NPP satellite circle the globe from pole to pole, collecting data daily, swath by swath. Having this density of data is great for building a comprehensive mosaic of the planet, but sometimes

there is something interesting occurring in one swath but is covered by a subsequent swath when the satellite passes over 90 minutes later. With our new prototype based on Worldview and the Global Imagery Browse Services (GIBS), we combine the best of both worlds to interactively visualize the entire globe

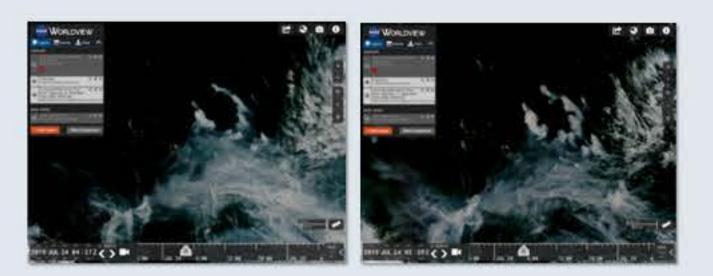


The Problem: Satellite Swath Overlaps

Mosaicking overlapping swaths limit users' ability to access "everything" that a given satellite has acquired, especially in regions where there are likely to be swath overlap from previous overpasses (e.g., near the poles).



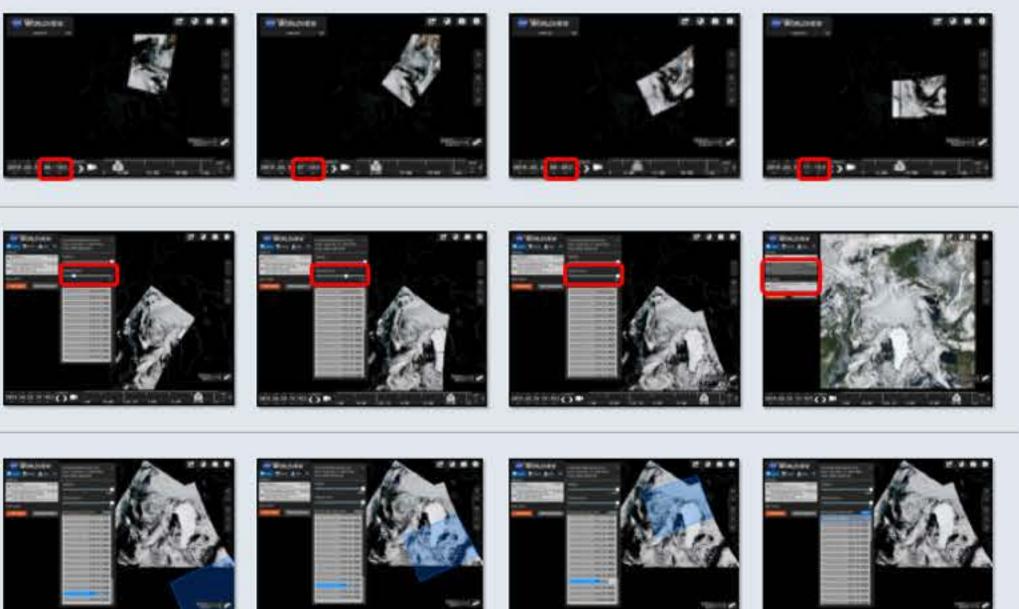
Left: when satellite swaths overlap at the poles, a traditional visualization approach combine all swaths into a single mosaic. In the example at left above, the most recent swath ("Pass 3") is the only swath that is completely visible in the visualization while the previous two swaths ("Pass 1" and "Pass 2") are obscured.



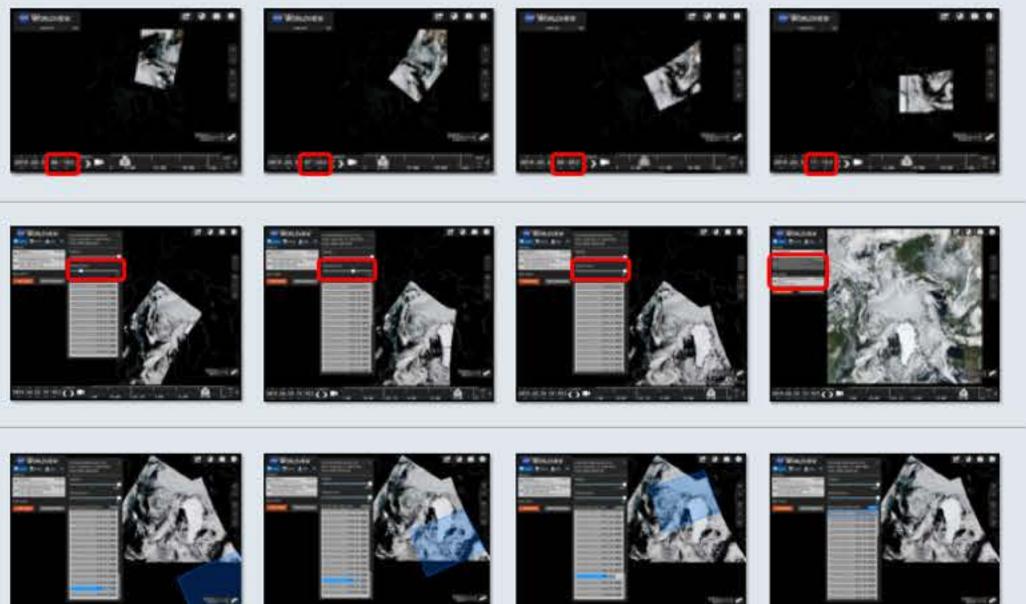
Above: in this arctic fire example, the image on the right was acquired approximately 90 minutes after the image on the right; during that time, the smoke and fire locations have visibly changed; those changes would be impossible to see if the swaths were mosaicked into a single image.

The vision: to have "no pixel left behind" to better support near real time and science users who monitor rapidly evolving events like fire, cloud, or volcanic activity.

Idea #1: a user can view individual swaths granules by adjusting the selected time



Idea #2: a user can select how many swaths granules they would view to like simultaneously; the final image shows a full mosaic



Idea #3: a user can display individual granule footprints and adjust their ordering to compare over time



as a mosaic and allow the user to "peel away the overlaps" to see every pixel that was observed by the satellite. This ability to look at every pixel - and to know when they were captured - is especially important near the poles where swath overlaps are most common.

Worldview

worldview.earthdata.nasa.gov

Worldview is a web app to interactively browse NASA's global satellite imagery within hours of it being acquired

- Interactively explore the Earth as it is "right now" and throughout the past
- Browse over 900 imagery products provided by the Global Imagery Browse Services (GIBS), many of which are available in near real-time via the Land, Atmosphere Near real-time Capability for EOS (LANCE)
- Download imagery and/or the underlying data Use the Comparison feature, Animation feature, Events listing, and many more features and tools

Global Imagery Browse Services (GIBS)

gibs.earthdata.nasa.gov

GIBS is a system providing fast and open access to 800+ NASA imagery products for Worldview and any other application via standards-based APIs.

- Access imagery through standards-based web services for access through web clients, GIS clients, and scripts
- Imagery is provided in several map projections:
 - Geographic / Equirectangular
 - Web Mercator
 - Arctic Polar Stereographic
 - Antarctic Polar Stereographic

A Solution: Swath Browser Prototype

The prototype: a web app based on Worldview/GIBS which uses imagery from NOAA-20 / VIIRS granules generated by the MODIS Adaptive Processing System (MODAPS).

Questions and Future Work

Questions

- Should the interactions be driven by swaths or by granules?
- there a need to...
- stacking order?
- shown at a given time?
- hovering over the map?
- this capability?

Future work:

- end users

Please contact us if you have suggestions as this is a work in progress!





 Within the Worldview user interface, is Individually reorder the granule Choose how many granules are Show granule footprints when hovering over a granule list?

Show granule footprints when

· Which products would be best served by

Iterate on design and functionality with

 Integrate prototype capabilities into production version of Worldview/GIBS