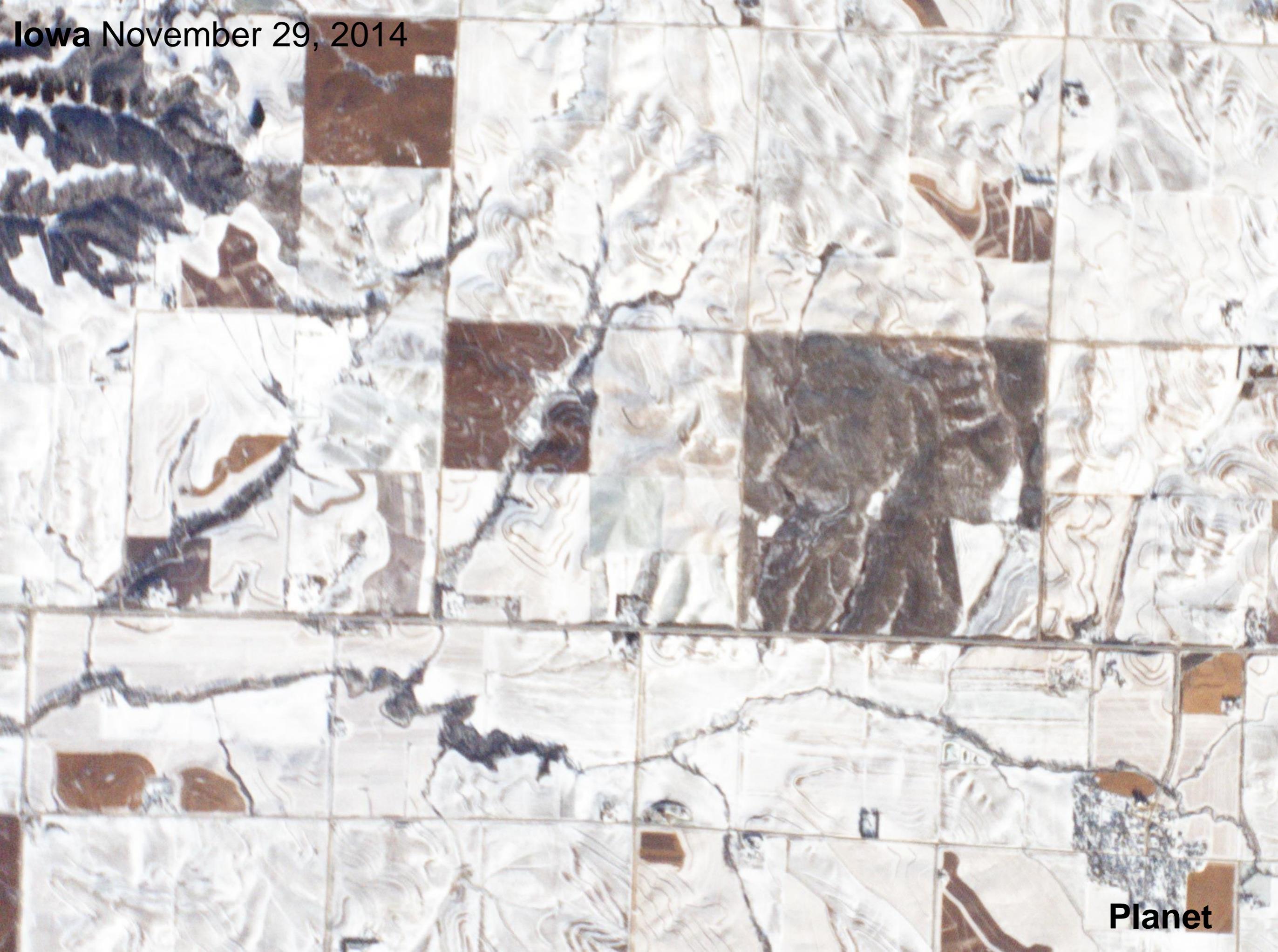


Iowa September 6, 2014



Planet

Iowa November 29, 2014



Planet

Cambodia December 22, 2014



Landsat

Cambodia January 14, 2015



Landsat

Brazil August 8, 2014



Landsat

Brazil August 24, 2014



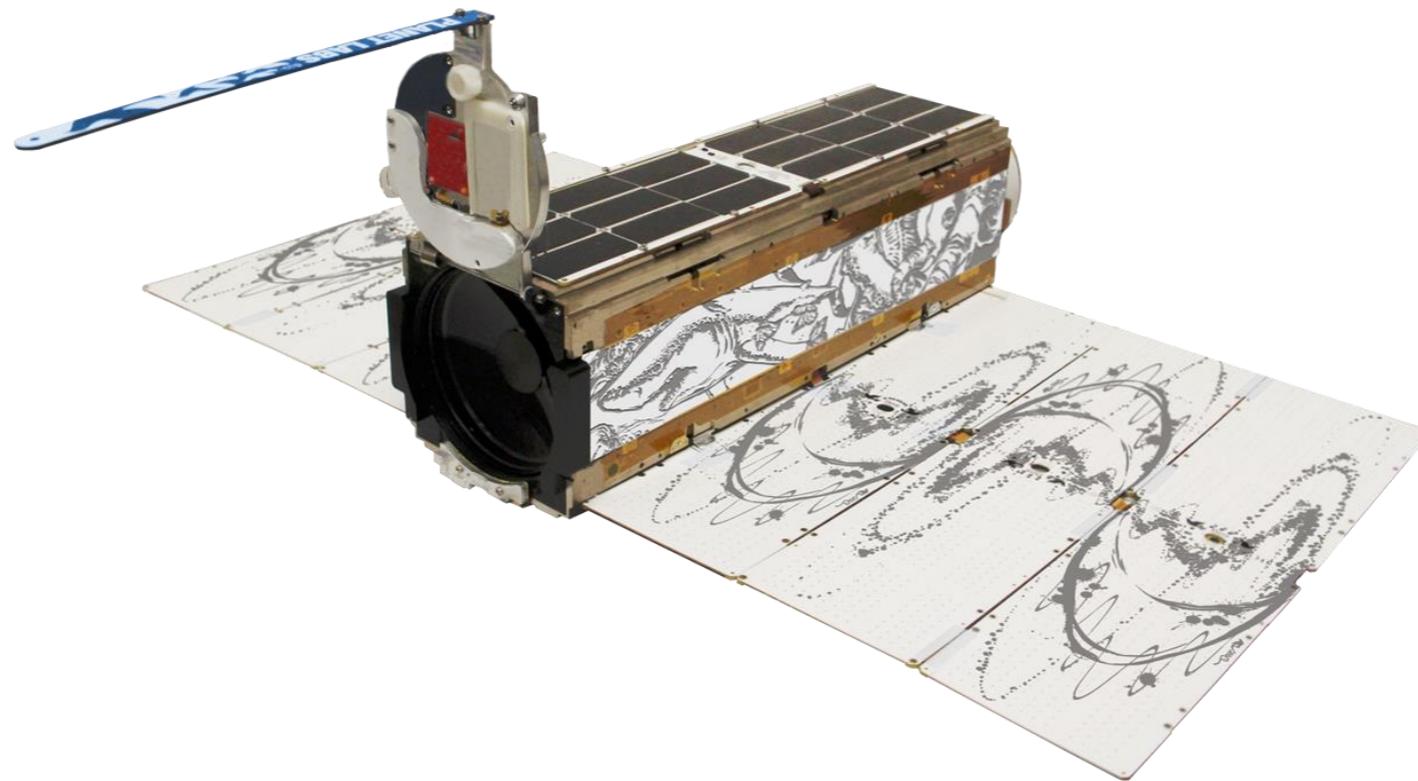
Landsat

Brazil August 9, 2014

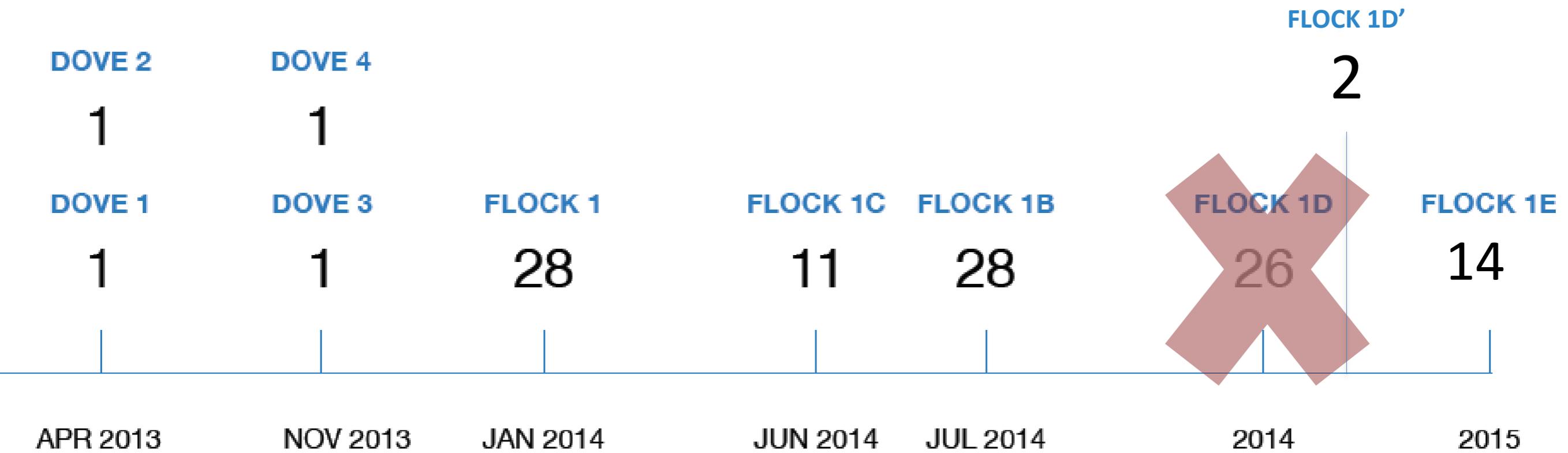


Planet

# Agile Aerospace



# Planet Labs – Launch History

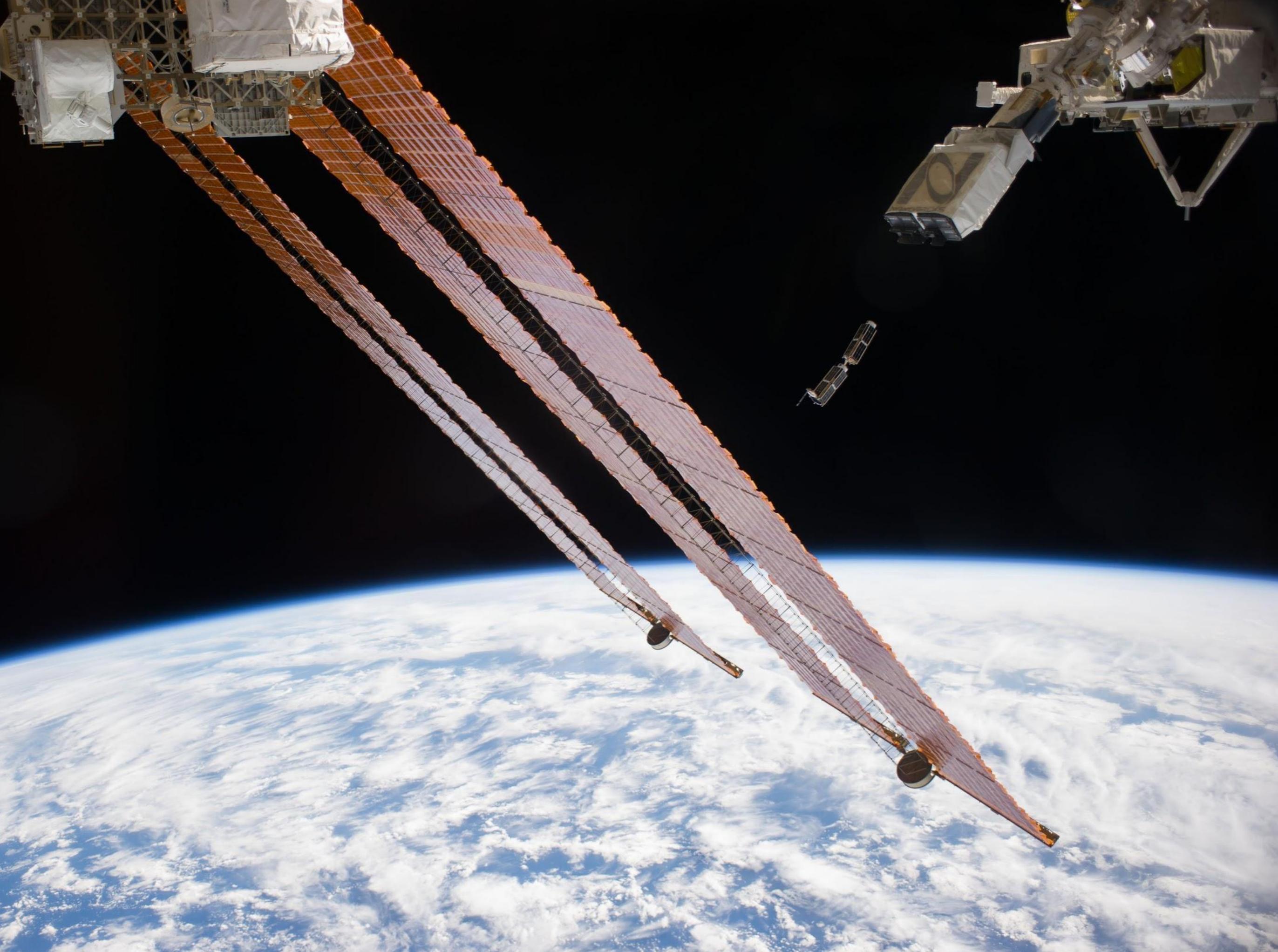




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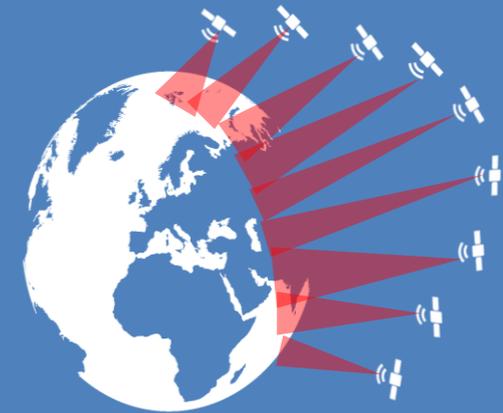


At Planet, “Mission 1” is to image the whole earth, every day and make global change visible, accessible, and actionable.

# The Whole Earth, Every Day

## What - Monitoring:

- 100+ Smallsat Constellation in SSO
- Fresh and persistent data
- Catches serendipitous events
- Observing Change at Human Scales (3-5m)

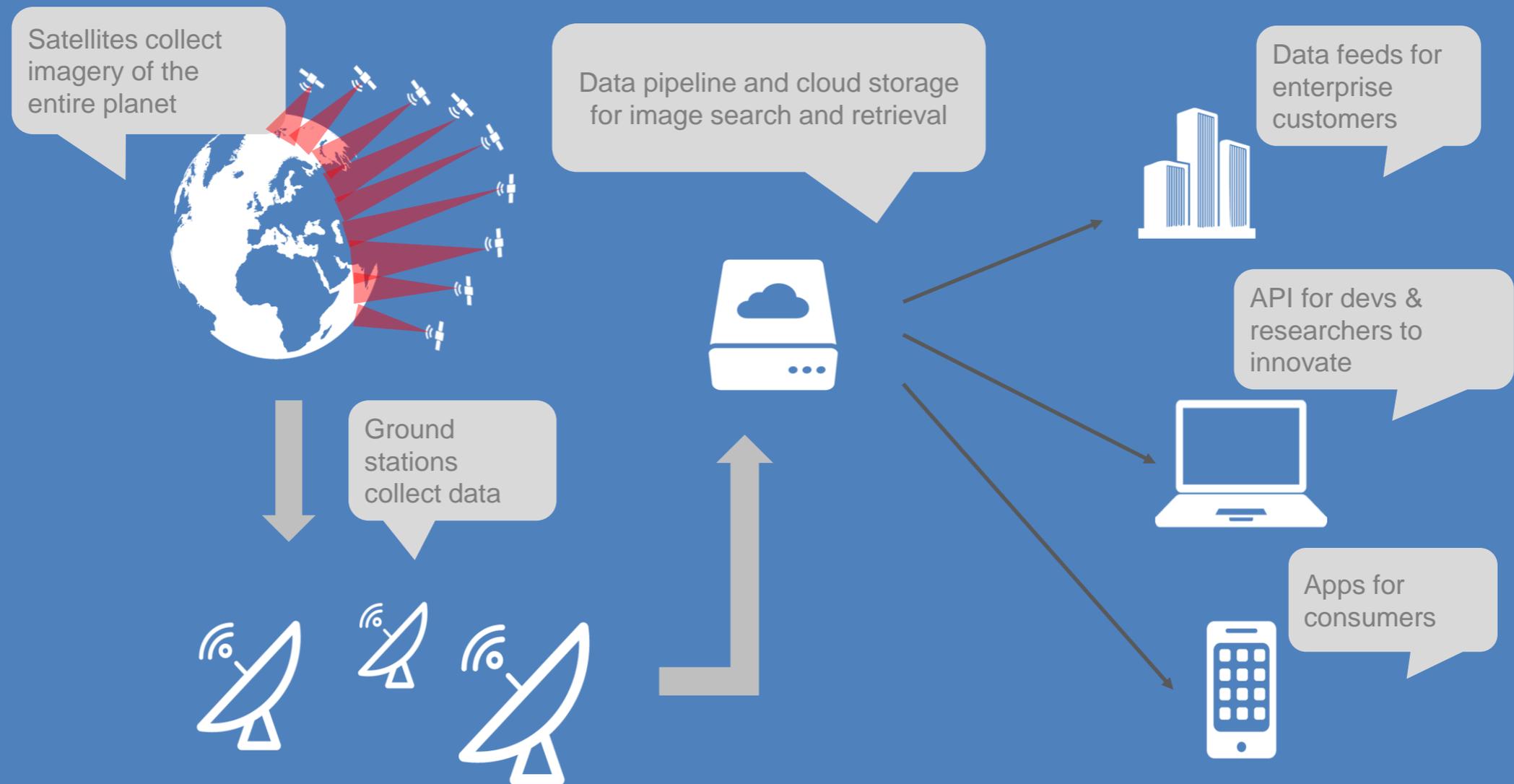


## Why?

- Environmental Monitoring & Regulatory Support
- Site/Facility Monitoring: Infrastructure Development & Progress
- Agriculture: Daily-to-Seasonal Modeling for Improved Predictions
- Discovering the Planet: New Data in Previously Under-Observed Places
- Forensic Analysis: What Happened to Precipitate Change?

## How?

- Automated Feature Identification, Change Detection
- Alerting Tools, Tip & Cue, Business/Information Feeds

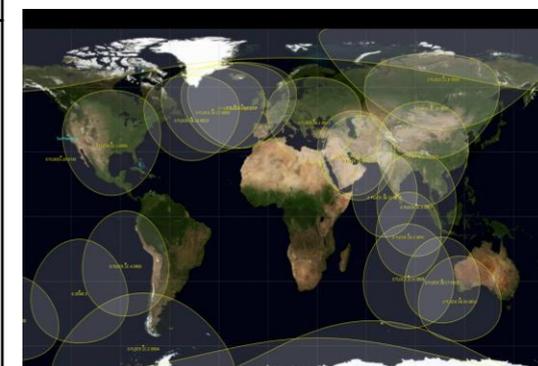
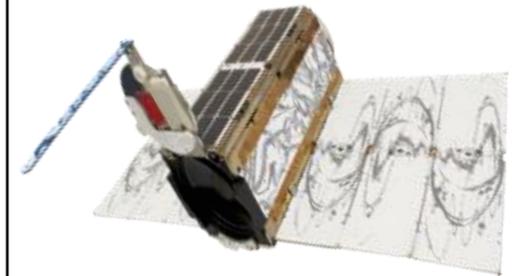


## Requirements, Every Day:

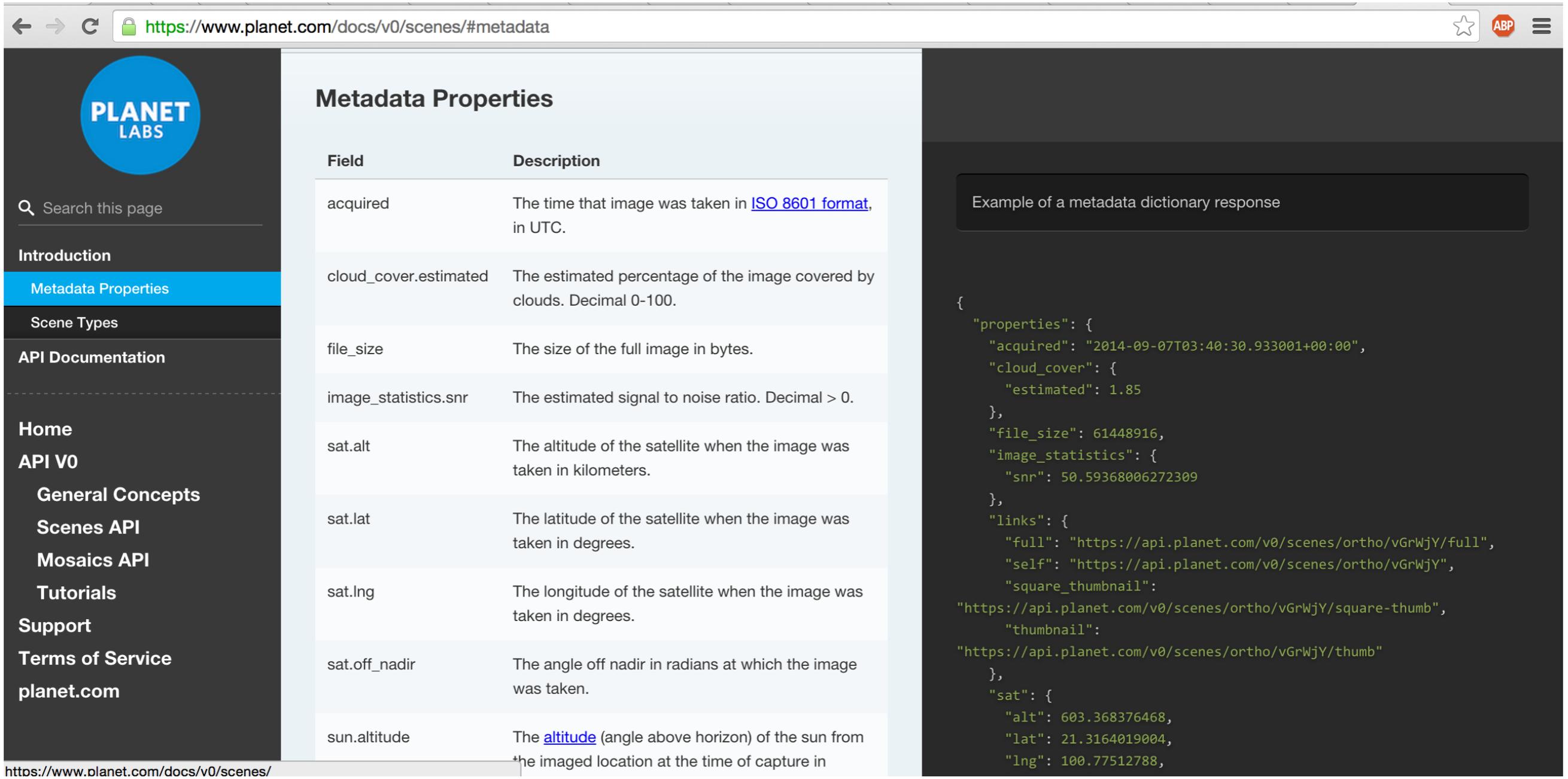
- Maintain 100+ Satellites Autonomously
- Collect and Downlink ~150 million km<sup>2</sup> of imagery
- Process almost 6 TB of Data Daily
- Get it done within Hours

# Innovating in Space

Satellites	
Satellite R&D	<ul style="list-style-type: none"> <li>• New satellite build every quarter</li> <li>• Design for manufacturability, deterministic assembly 12 Satellite Builds in 3.5 years</li> <li>• Lowest cost EO satellites ever</li> </ul>
Satellite Manufacturing	<ul style="list-style-type: none"> <li>• Established new inventory, QA, and documentation processes</li> <li>• Ability to build dozens of satellites in a week</li> <li>• Most satellites launched in 12 months (71)</li> <li>• Fastest turn around of satellites in history following launch failure? (9 days)</li> </ul>
Satellite Operations	<ul style="list-style-type: none"> <li>• Built entire mission control architecture from scratch</li> <li>• Largest constellation of commercial EO satellites</li> <li>• Fastest refresh of EO satellite constellation</li> </ul>



# Innovating a Geospatial Platform



The screenshot shows a web browser window with the URL <https://www.planet.com/docs/v0/scenes/#metadata>. The page title is "Metadata Properties". On the left, there is a navigation sidebar with the Planet Labs logo and links for "Introduction", "Metadata Properties" (highlighted), "Scene Types", "API Documentation", "Home", "API V0", "General Concepts", "Scenes API", "Mosaics API", "Tutorials", "Support", "Terms of Service", and "planet.com".

The main content area features a table with the following data:

Field	Description
acquired	The time that image was taken in <a href="#">ISO 8601 format</a> , in UTC.
cloud_cover.estimated	The estimated percentage of the image covered by clouds. Decimal 0-100.
file_size	The size of the full image in bytes.
image_statistics.snr	The estimated signal to noise ratio. Decimal > 0.
sat.alt	The altitude of the satellite when the image was taken in kilometers.
sat.lat	The latitude of the satellite when the image was taken in degrees.
sat.lng	The longitude of the satellite when the image was taken in degrees.
sat.off_nadir	The angle off nadir in radians at which the image was taken.
sun.altitude	The <a href="#">altitude</a> (angle above horizon) of the sun from the imaged location at the time of capture in

On the right side of the page, there is a dark box titled "Example of a metadata dictionary response" containing the following JSON:

```
{
  "properties": {
    "acquired": "2014-09-07T03:40:30.933001+00:00",
    "cloud_cover": {
      "estimated": 1.85
    },
    "file_size": 61448916,
    "image_statistics": {
      "snr": 50.59368006272309
    },
    "links": {
      "full": "https://api.planet.com/v0/scenes/ortho/vGrWjY/full",
      "self": "https://api.planet.com/v0/scenes/ortho/vGrWjY",
      "square_thumbnail": "https://api.planet.com/v0/scenes/ortho/vGrWjY/square-thumb",
      "thumbnail": "https://api.planet.com/v0/scenes/ortho/vGrWjY/thumb"
    },
    "sat": {
      "alt": 603.368376468,
      "lat": 21.3164019004,
      "lng": 100.77512788,

```

# Innovating a Geospatial Platform

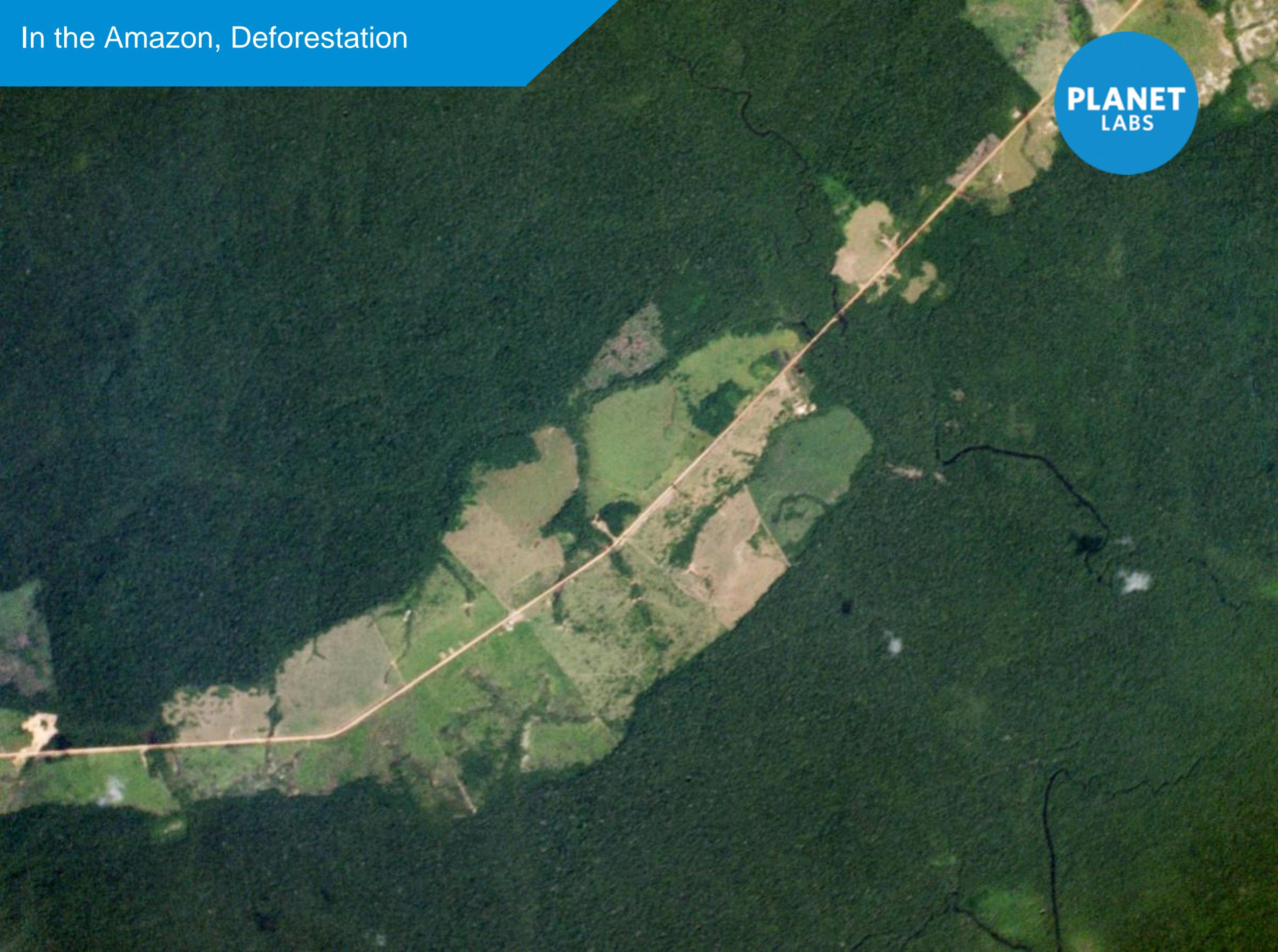
Product Engineering	
Data Pipeline	<ul style="list-style-type: none"> <li>• 10x to 10,000x images per day in 1 yr.</li> <li>• 0 to 500GB per day in 1 yr.</li> <li>• Automated geo- &amp; orthorectification, atmospheric correction</li> <li>• Automated mosaicking with pixel-level compositing to select best image &amp; remove clouds</li> </ul>
Platform, Tools & Analytics	<ul style="list-style-type: none"> <li>• Built 2 API products to support contract bookings</li> <li>• 600,000 hits per day in 2+ months</li> <li>• Browser-based product: Rethinking catalog browsing &amp; delivery for modern web</li> </ul>
Dev. Ops & Services	<ul style="list-style-type: none"> <li>• Built and composited Global Mosaic in 1 Day with 170,000 jobs on AWS spot instances</li> <li>• Pre-cached entire global mosaic on S3</li> <li>• Tracking and serving millions of images with metadata indexed for speed on ElasticSearch</li> <li>• Full scene processing in seconds per scene</li> </ul>

# Some Specifications

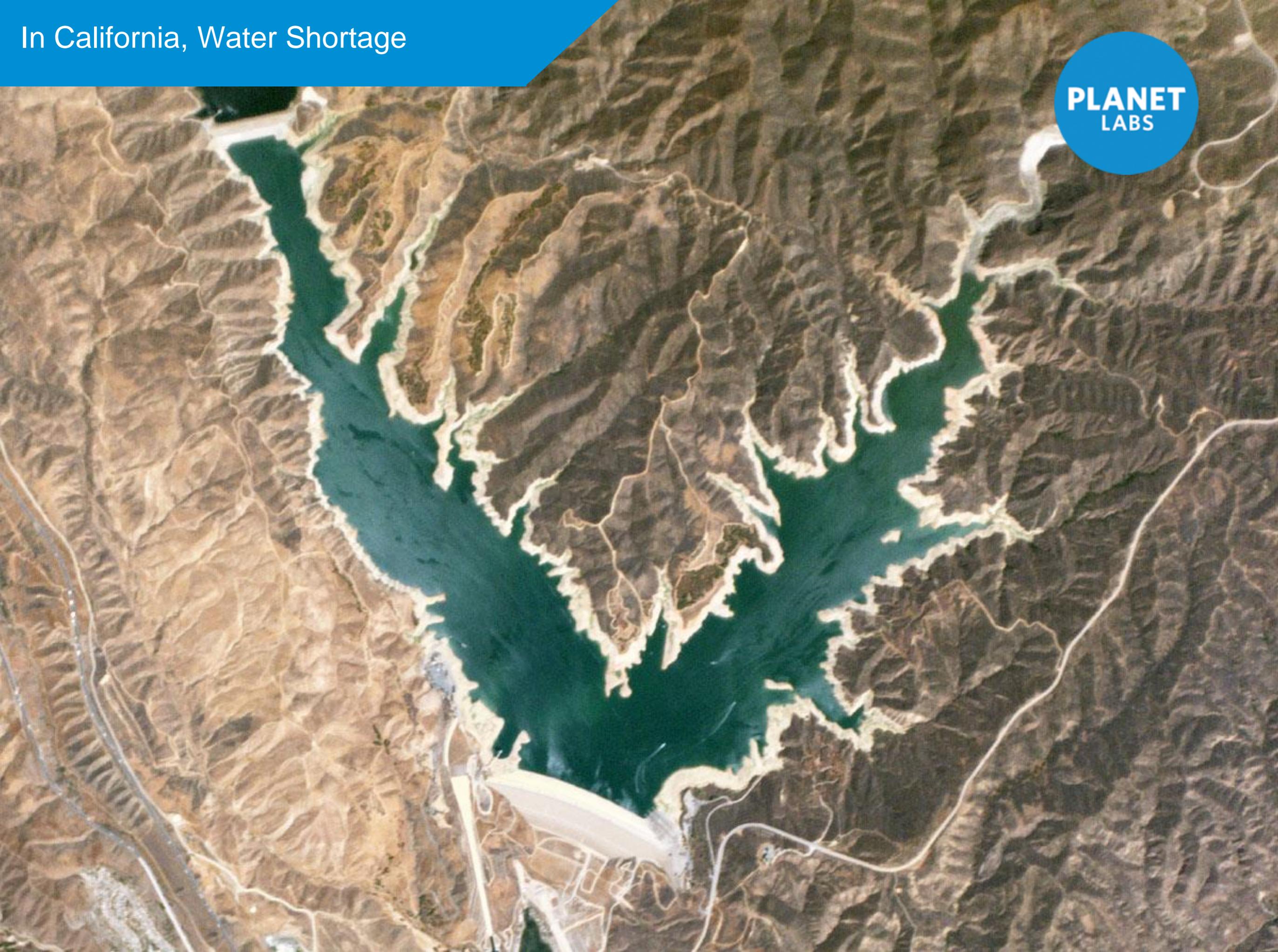
Color filter	RGB, with NIR in development/testing in 2015
Resolution	3-5 meters ground sampling distance – final TBD based on orbit altitude
Revisit rates	Seasonally - monthly (2015), weekly - daily (2016)
Image format	Commercial - Orthorectified, atmospherically corrected GeoTIFF
Mosaic size	240+ km <sup>2</sup>
Geolocation accuracy	Less than 50 meters
Delivery	Open API

- Evolving over 2015
  - Total imaging capacity (daily/monthly), based on launch and number of satellites
  - Total downlink capacity, as Planet expands in ground network
  - Latency from imagery collection from API availability
  - Improvements in image quality

# In the Amazon, Deforestation



In California, Water Shortage



In the Middle East, Food Insecurity



