Introduction to Planet's New 8-Band Data and Access via NASA's Commercial SmallSat Data Acquisition (CSDA) Program

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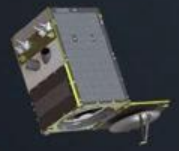
PLANET'S MISSION

To image the whole world every day, making change **visible, accessible, and actionable**.

Planet Dove Satellite

- Always-on, broad-area monitoring
- 3 meter resolution
- RGB and NIR bands

Planet SkySat Satellite



- Custom, targeted monitoring
- 50 centimeter resolution
- RGB, NIR, and Pan bands

Planet Dove Constellation

~98º Sun-Synchronous Orbit

Planet SkySat Constellation

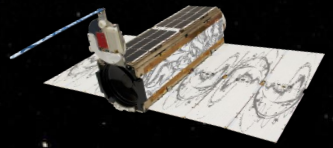
SkySats 1-15

~98º Sun-Synchronous Orbit

SkySats 16-21

~53º Inclined Orbit

Planet's Industry-Leading Constellations

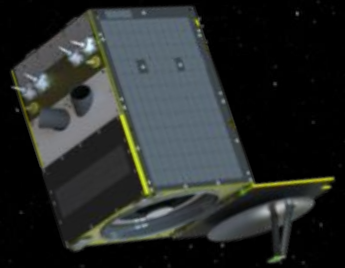


180+
PlanetScope Dove Satellites

Doves

SATELLITES	GSD	CAPACITY
180+	**3.7 m**	**200 million km²**/day

ORBIT ALTITUDE	8 SPECTRAL BANDS
475 km	**Coastal Blue, Blue, Green I, Green II Yellow, Red, Red Edge, Near Infrared**



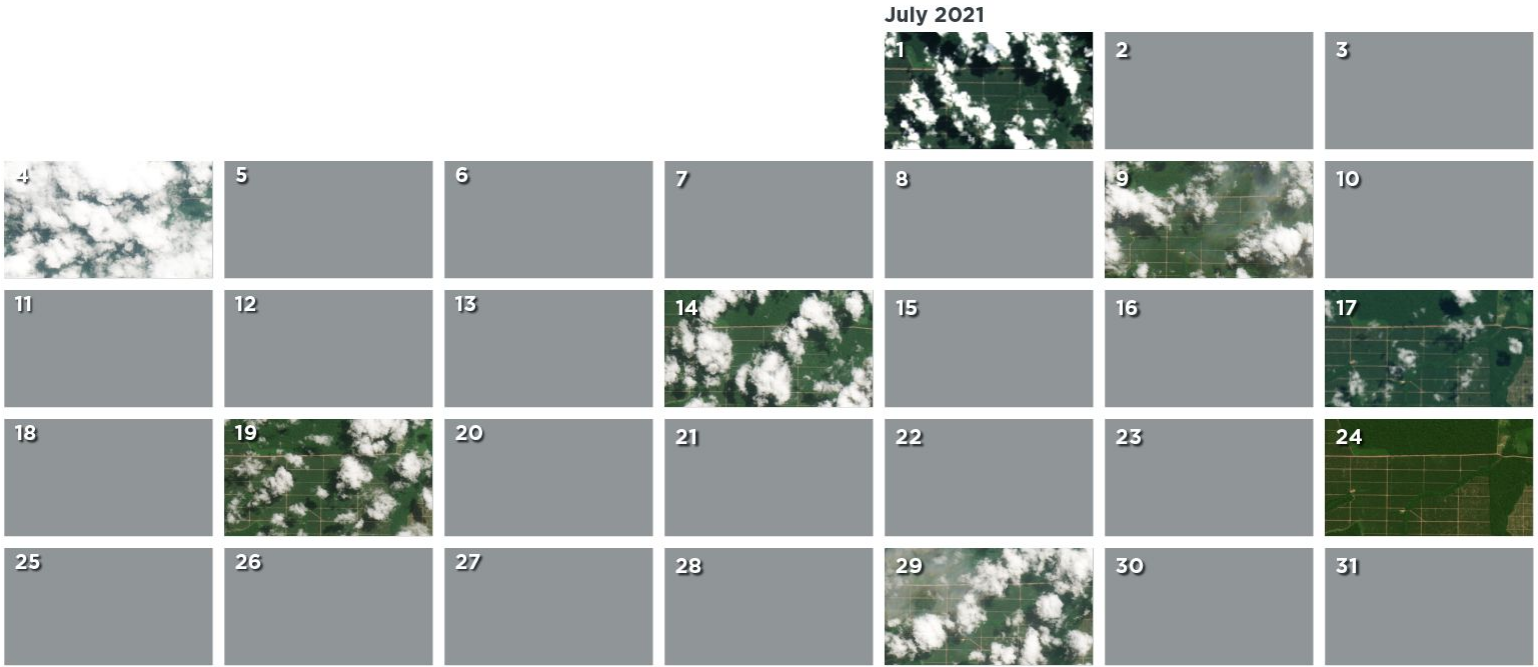
21
SkySat Satellites

SkySat

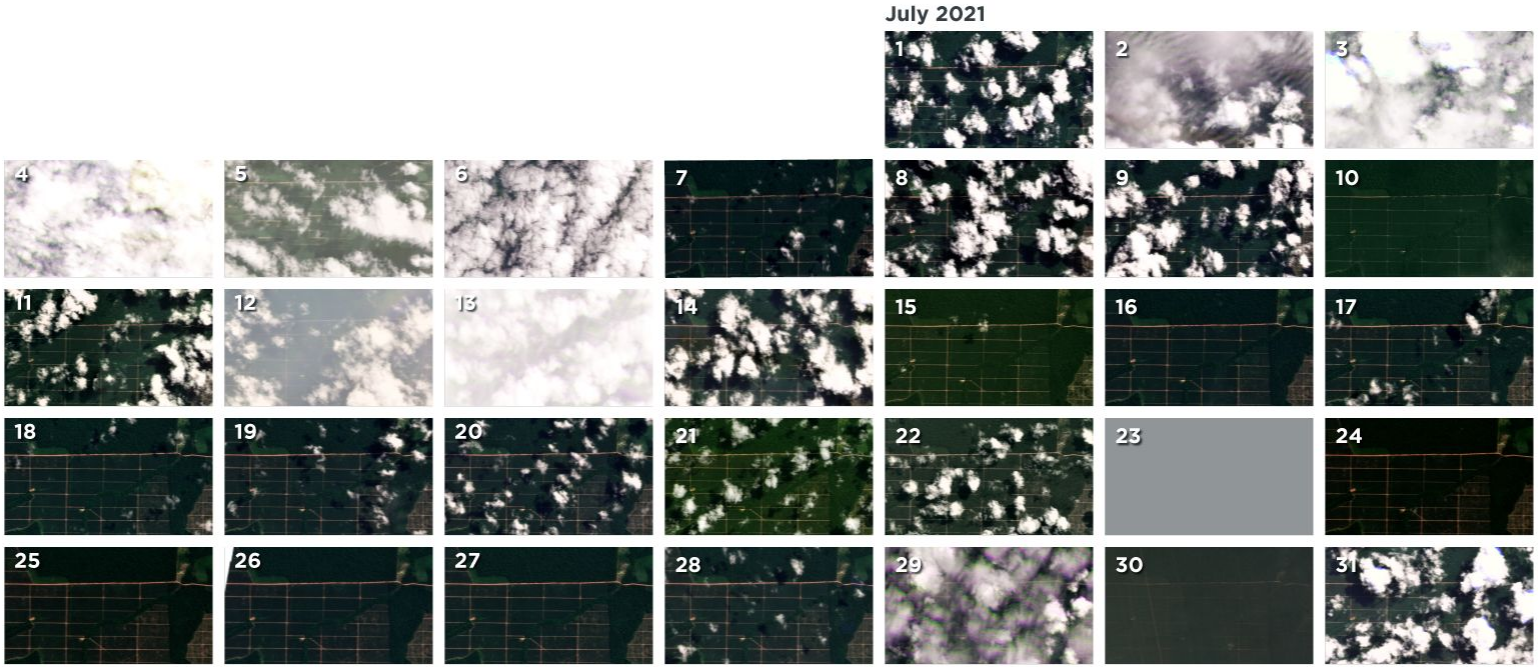
SATELLITES	GSD	CAPACITY
21	**0.65 m**	**400 K km²**/day

ORBIT ALTITUDE	SPECTRAL BANDS
450 km	**RGB, PAN** and **NIR**

PLANTATION, TAILÂNDIA, BRAZIL Landsat & Sentinel-2

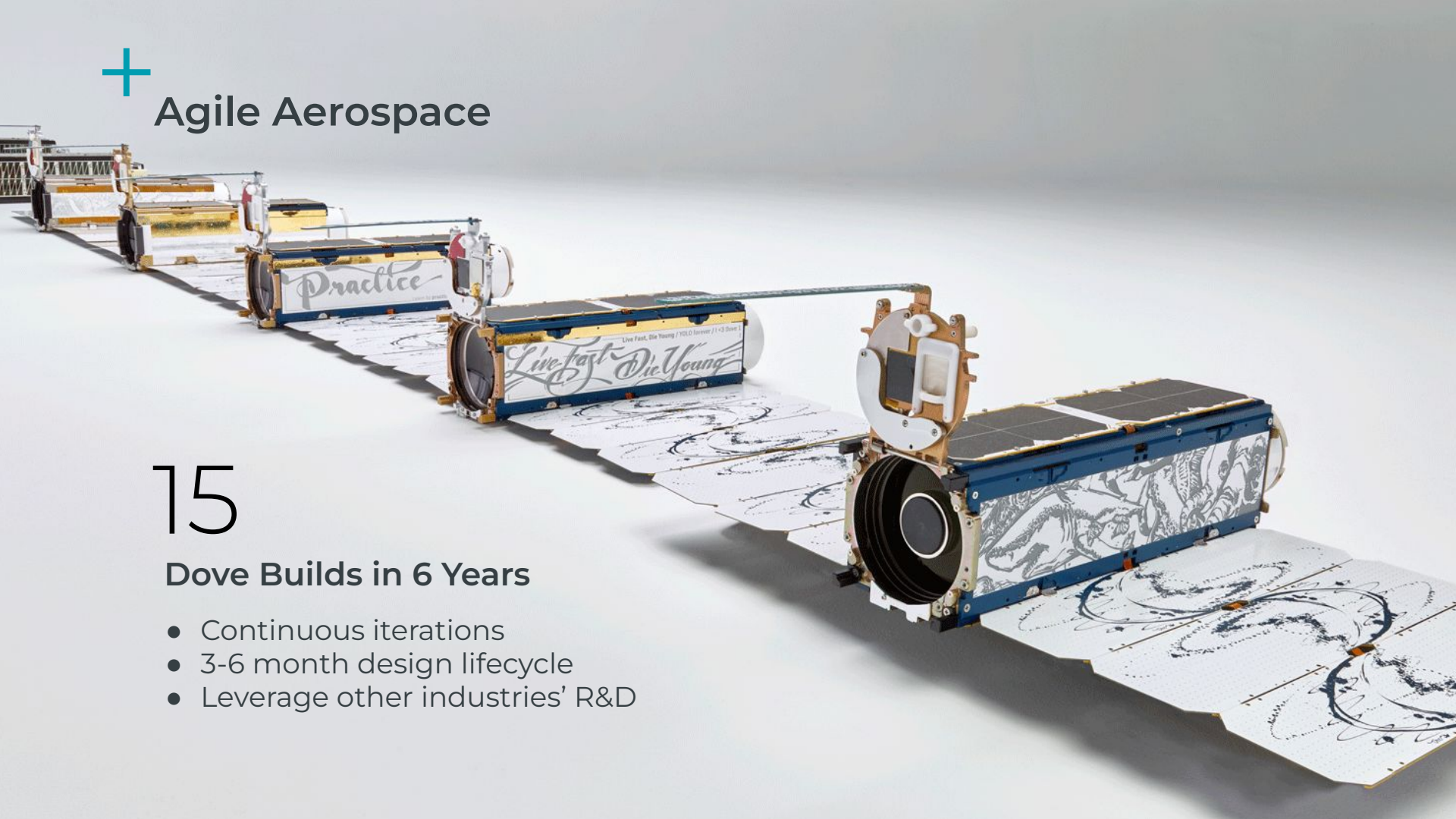


PLANTATION, TAILÂNDIA, BRAZIL PlanetScope & SkySat



PLANETSCOPE CONSTELLATION

Agile Aerospace



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Dove Builds in 6 Years

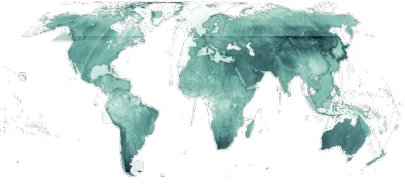
- Continuous iterations
- 3-6 month design lifecycle
- Leverage other industries' R&D

4 29&47 MEGA-PIXELS MILLION IMAGES EVERY DAY

AN AVERAGE OF

1700 IMAGES

for every point on the Earth's landmass



AREA COVERED

350

million km² per day

10X

ALL OTHER COMMERCIAL SOURCES AND PUBLIC SOURCES E.G. LANDSAT/ SENTINEL COMBINED!

More than 2 times the total landmass of Earth!

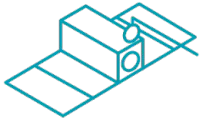
496 SATELLITE DEPLOYMENTS

FROM 10 ROCKET TYPES

10 SITES IN 7 COUNTRIES

25TB

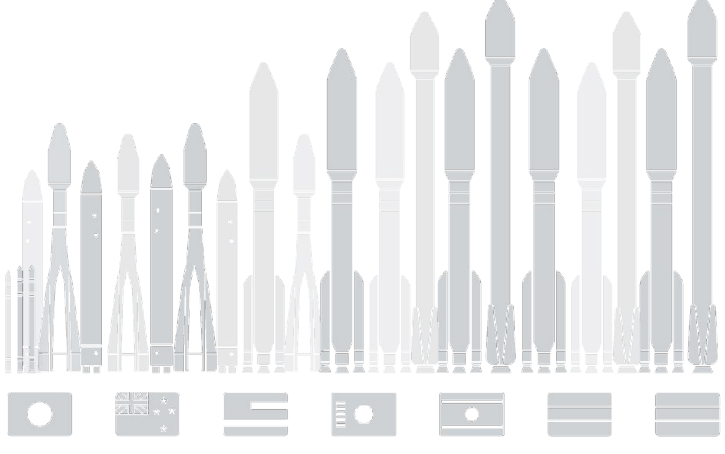
DATA PER DAY DOWNLINKED



48 GROUNDSTATION ANTENNAS

100%

SUCCESSFUL FIRST CONTACT



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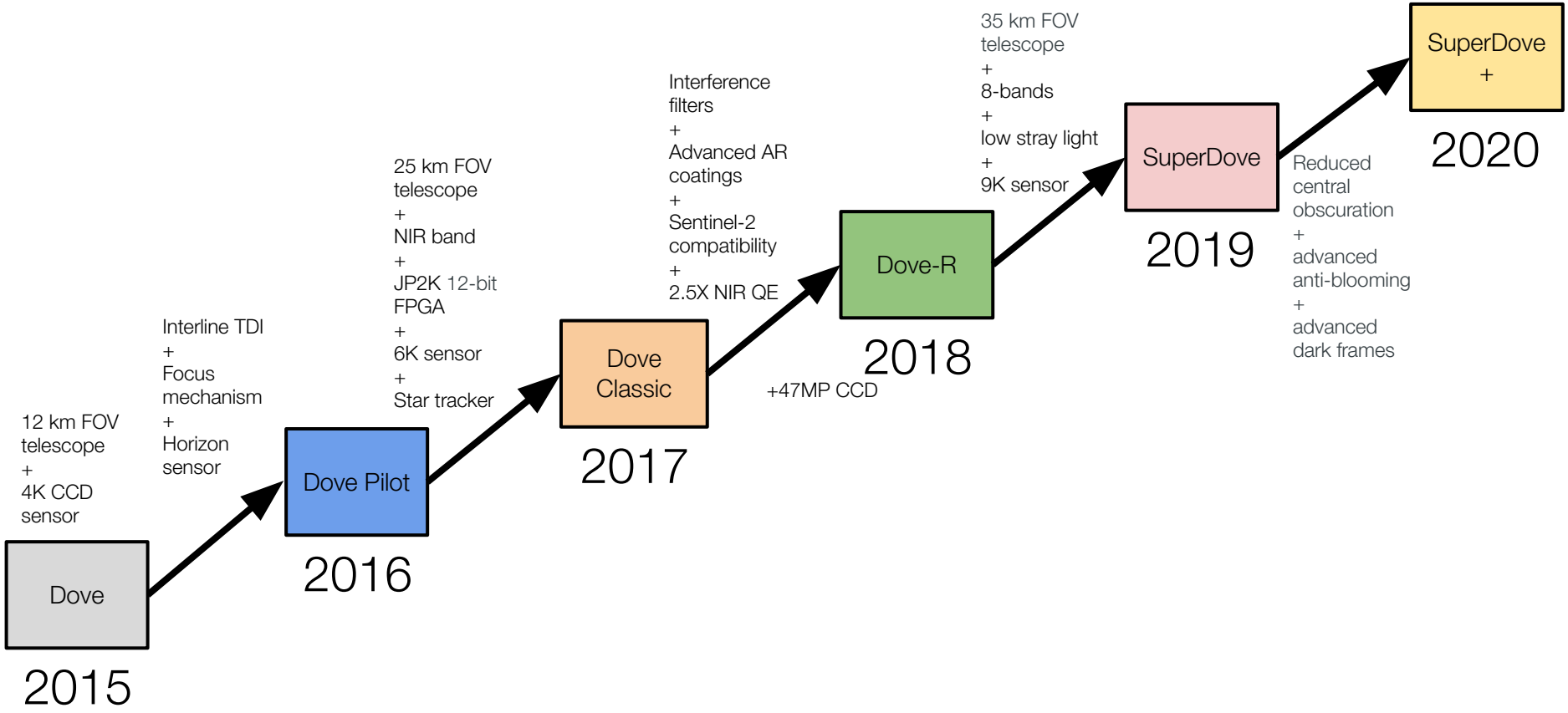
SUCCESSFUL LAUNCHES

planet.

Constellation Overview: Planetscope

CONSTELLATION OVERVIEW: PLANETSCOPE			
Mission Characteristics	Sun-synchronous Orbit		
Instrument	**PS2**	**PS2.SD**	**PSB.SD**
Orbit Altitude (reference)	450 - 580 km (~98° inclination)		
Max/Min Latitude Coverage	±81.5° (dependent on season)		
Equator Crossing Time	9:30 - 11:30 am (local solar time)		
Sensor Type	Four-band frame Imager with a split-frame VIS+NIR filter	Four-band frame imager with butcher-block filter providing blue, green, red, and NIR stripes	Eight-band frame imager with butcher-block filter providing coastal blue, blue, green I, green II, yellow, red, red-edge, and NIR stripes
Spectral Bands	Blue: 455 - 515 nm Green: 500 - 590 nm Red: 590 - 670 nm NIR: 780 - 860 nm	Blue: 464 - 517 nm Green: 547 - 585 nm Red: 650 - 682 nm NIR: 846 - 888 nm	Coastal Blue 431-452 nm* Blue: 465-515 nm Green I: 513. - 549 nm Green II: 547. - 583 nm* Yellow: 600-620 nm* Red: 650 - 680 nm Red-Edge: 697 - 713 nm NIR: 845 - 885 nm *(* avail. after 8-band release)*
Ground Sample Distance (nadir)	3.7 m (approximate)		
Frame Size	24 km x 8 km (approximate)	24 km x 16 km (approximate)	32.5 km x 19.6 km (approximate)
Maximum Image Strip per orbit	20,000 km²		
Revisit Time	Daily at nadir		
Image Capture Capacity	200 million km²/day		
Imagery Bit Depth	12-bit		

History of Dove payloads (2016-2020)



SuperDove upgrades PlanetScope to eight spectral bands

BLUE

COASTAL BLUE
Useful for bathymetry applications, ie, monitoring water quality and algal blooms.

Monitoring aerosol particles, such as smoke and haze in the atmosphere.

Improves accuracy of land cover classification for a breadth of cover types.

GREEN II

GREEN I
Monitoring vegetation health, productivity, and volume.

More accurate vegetation & crop classification (often used with the yellow band).

RED

YELLOW
Improves accuracy of land cover classification for a breadth of cover types.

Analyzing sediment load in water & coastal applications.

Detecting vegetation stress & tracking senescence.

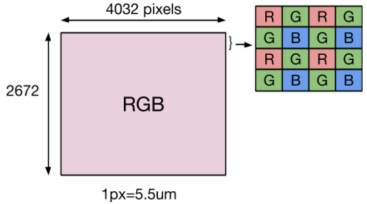
NEAR INFRARED

RED EDGE
Detecting vegetation stress earlier, more finely, and more consistently through the year than via NDVI, esp. in areas of thick foliage.

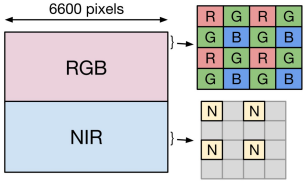
Estimating nitrogen & chlorophyll concentration in crops.

Measuring water turbidity & quality.

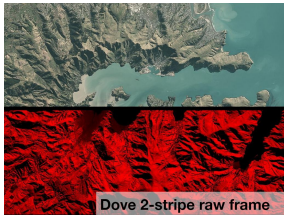
Spectral Bands of the Dove and SuperDove Satellites

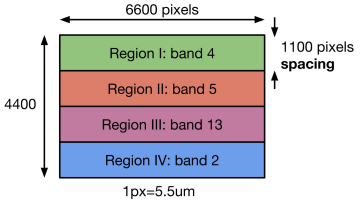


Dove Pilot

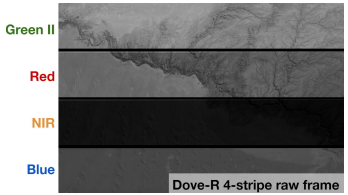


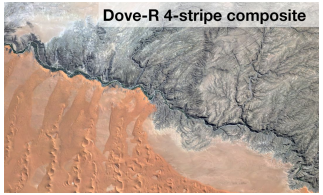
Dove

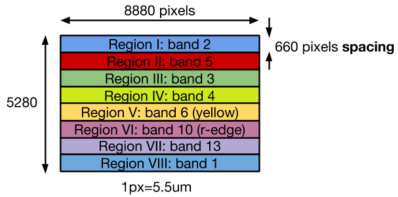




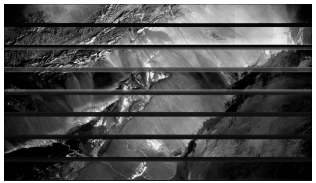
Dove-R

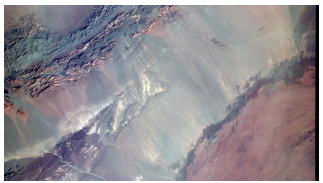




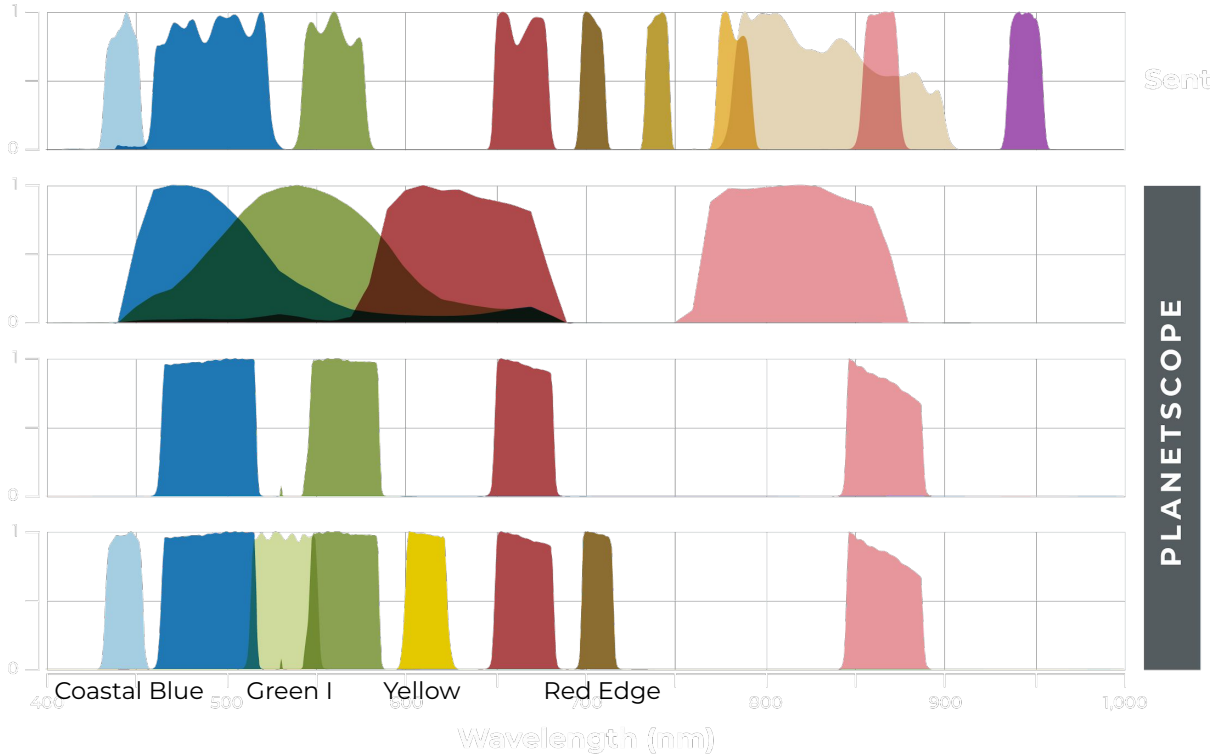


SuperDove





From Doves towards Sentinel **through the years**



PLANETSCOPE

Sentinel-2

Dove Classic

Blue: 455 - 515 nm
Green: 500 - 590 nm
Red: 590 - 670 nm
NIR: 780 - 860 nm

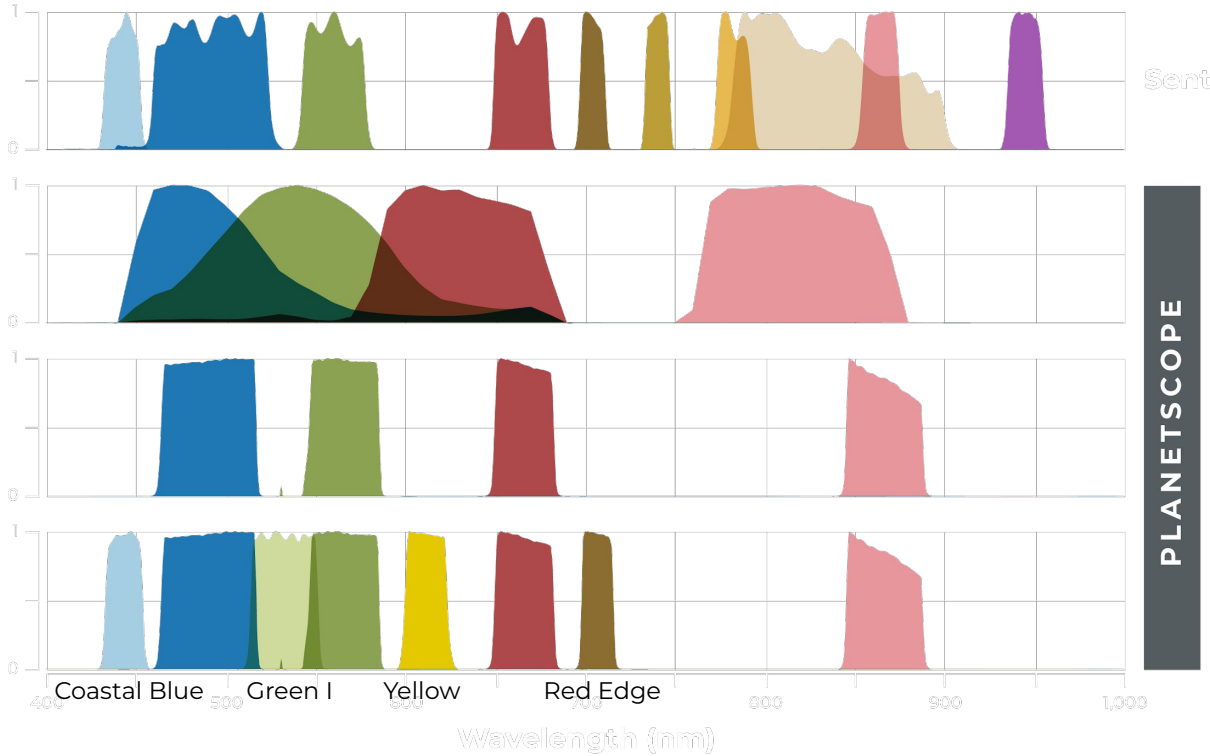
Dove-R

Blue: 464 - 517 nm
Green: 547 - 585 nm
Red: 650 - 682 nm
NIR: 846 - 888 nm

SuperDove

Coastal Blue 431-452 nm*
Blue: 465-515 nm
Green I: 513. - 549 nm
Green II: 547. - 583 nm*
Yellow: 600-620 nm*
Red: 650 - 680 nm
Red-Edge: 697 - 713 nm
NIR: 845 - 885 nm
(avail. after 8-band release)*

From Doves towards Sentinel **through the years**



PLANETSCOPE

Sentinel-2

Dove Classic

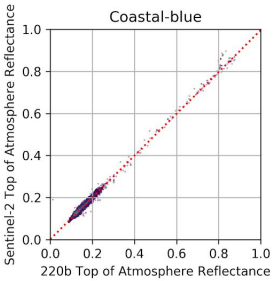
Dove-R

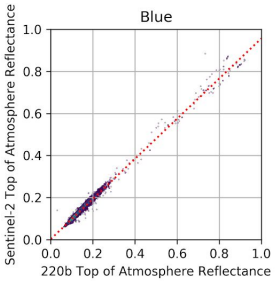
SuperDove

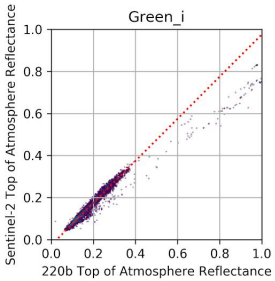
Turning off this month

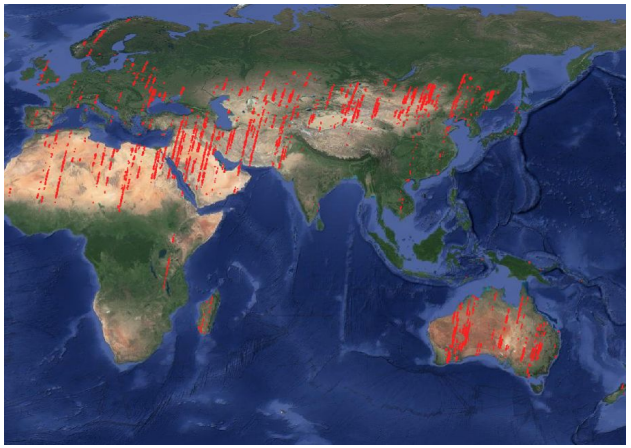
Coastal Blue 431-452 nm*
Blue: 465-515 nm
Green I: 513. - 549 nm
Green II: 547. - 583 nm*
Yellow: 600-620 nm*
Red: 650 - 680 nm
Red-Edge: 697 - 713 nm
NIR: 845 - 885 nm
(avail. after 8-band release)*

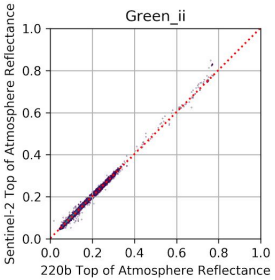
SuperDove is **natively interoperable with Sentinel-2**

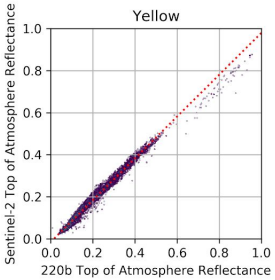


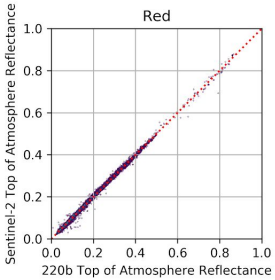


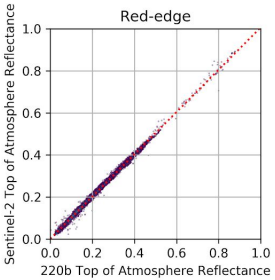


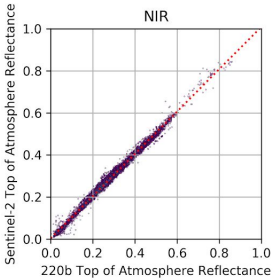






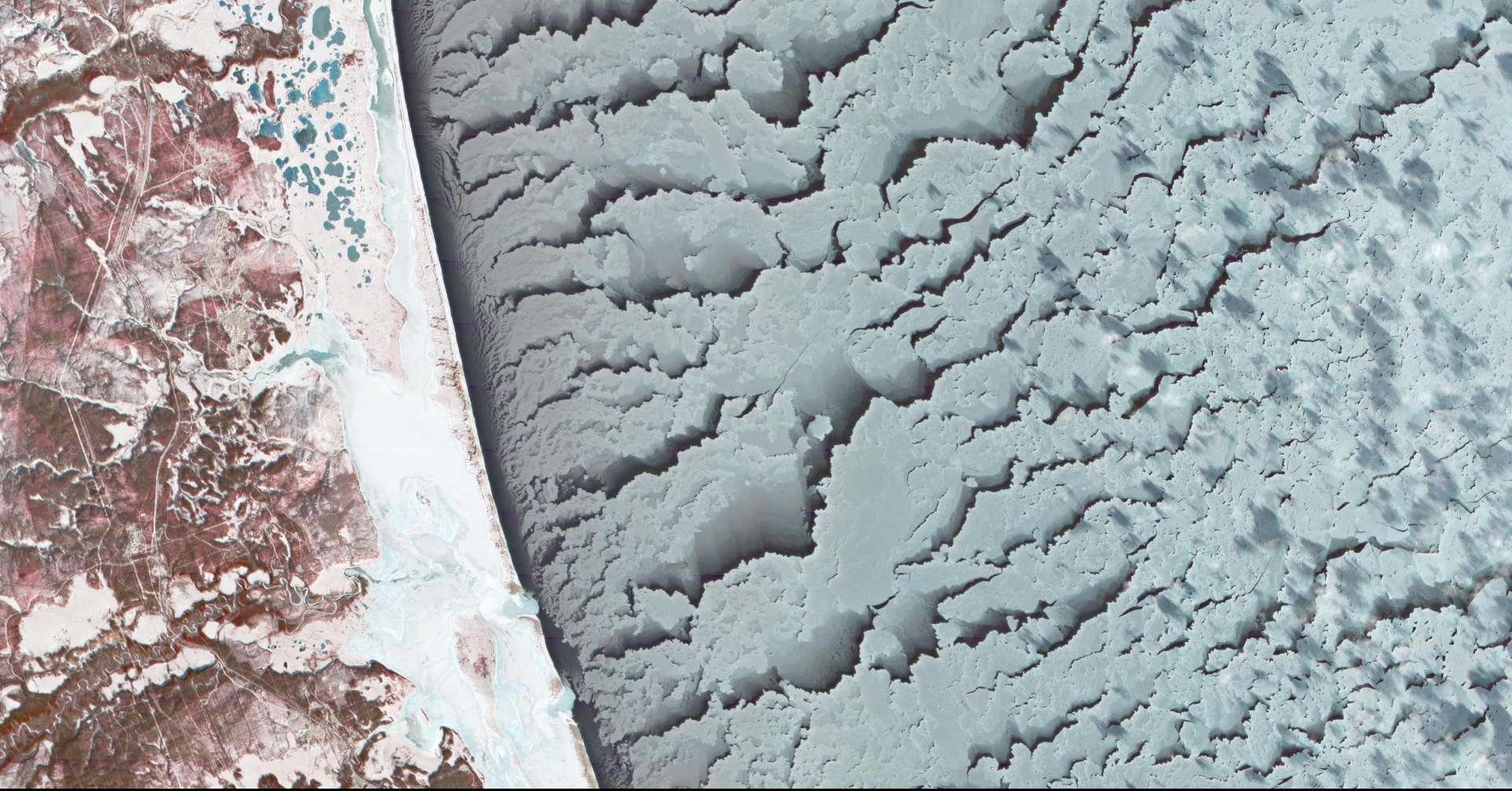






All 9304 orthotile events between a Superdove and Sentinel-2 for September. This dataset covers 19 separate dates in September and shows the results of the initial calibration.

Dove-R (Nunavut, Canada)

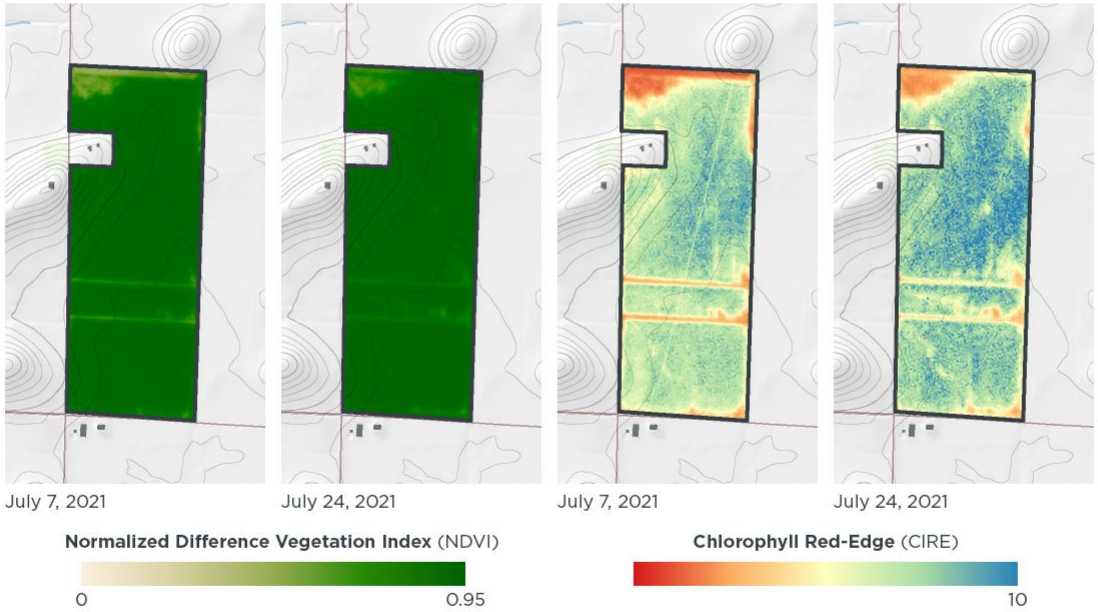


SuperDove (Sea of Okhotsk with NIR)

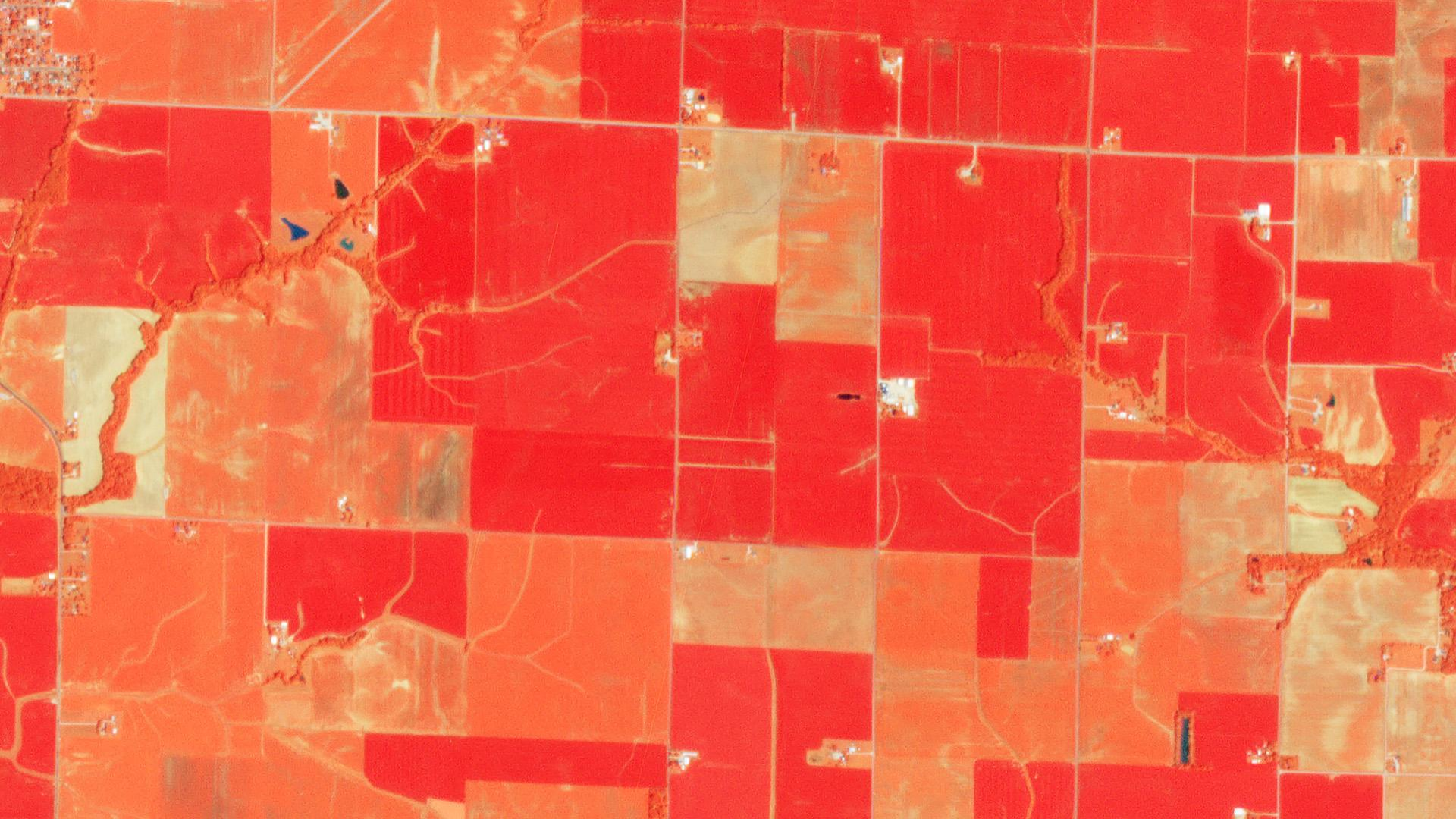

red edge, yellow, coastal blue

Equipment Failure Use Case

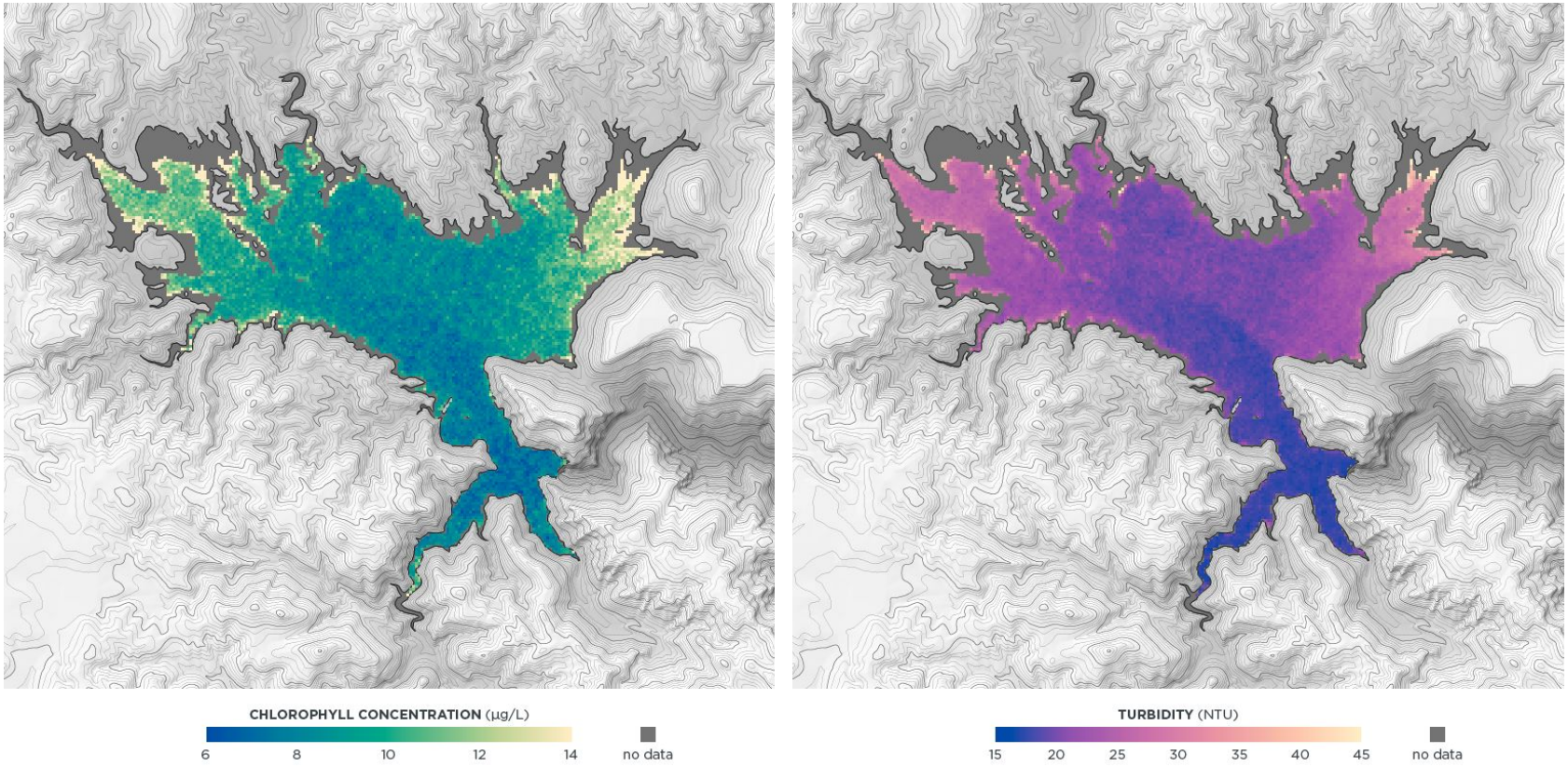
Marion County, Illinois

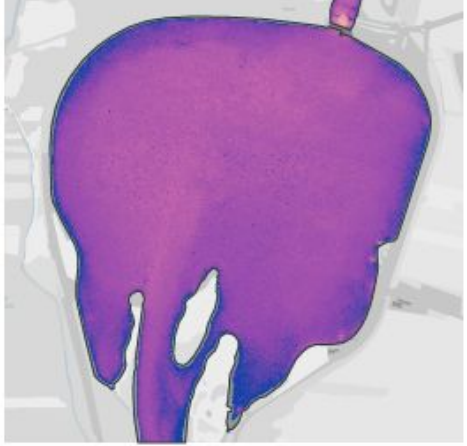


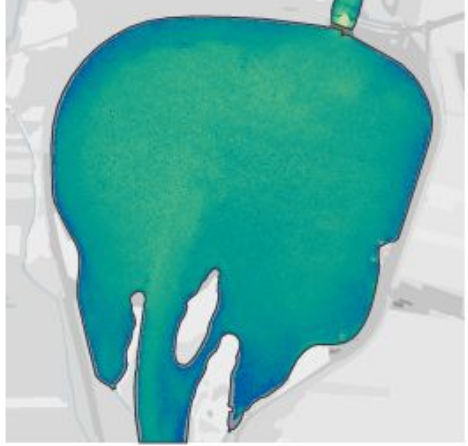
Aerial Image

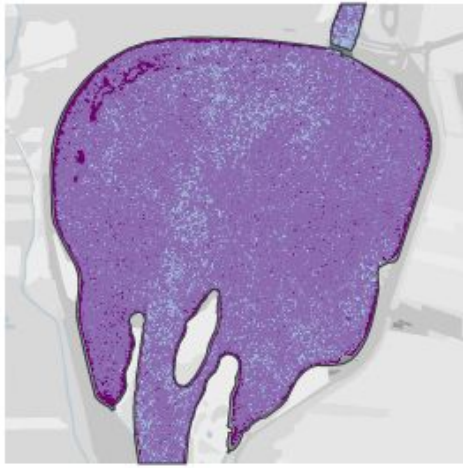


Monitoring water quality use case

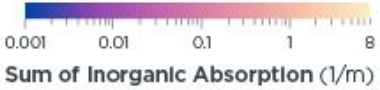




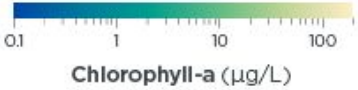




True Color (red, green, blue)



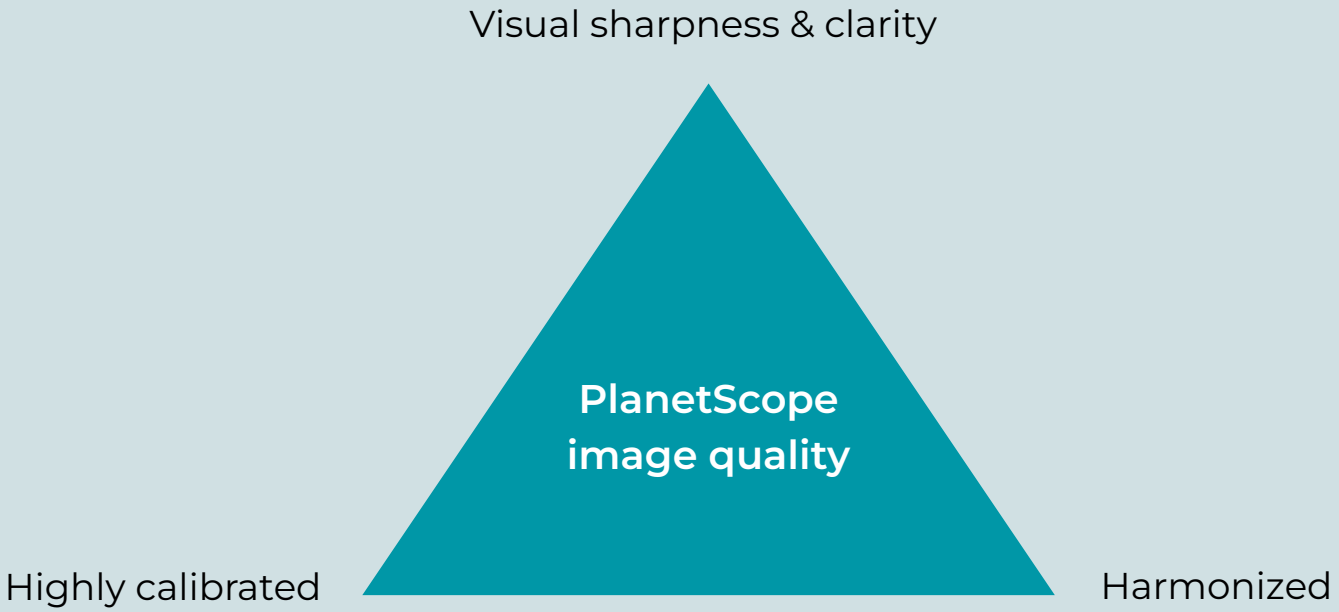
Sum of Inorganic Absorption (1/m)



Chlorophyll-a (µg/L)

Harmful Algal Bloom

Richer, more consistent data for analysis

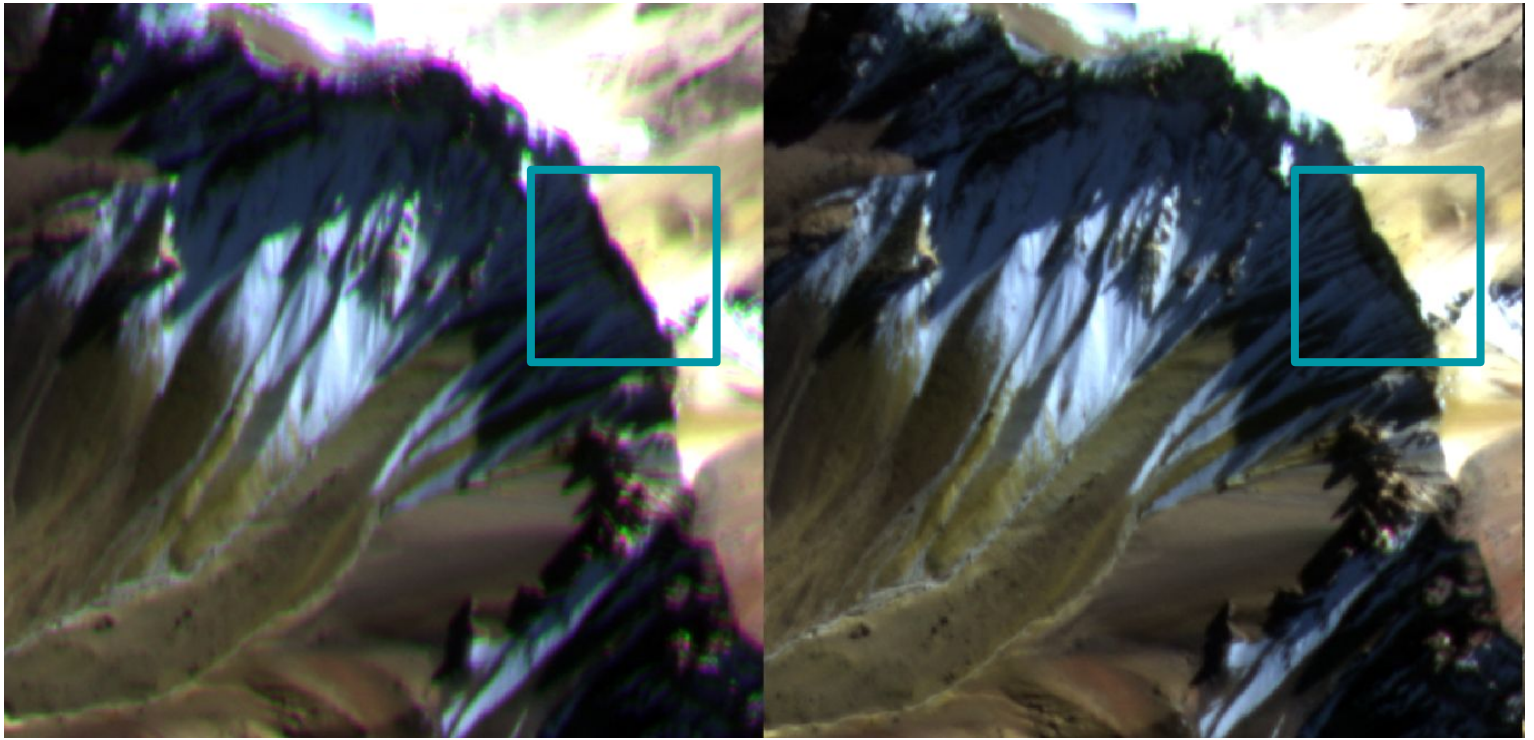


Improved visual sharpness & clarity

Before

After

Improved Spectral Band Alignment



Before

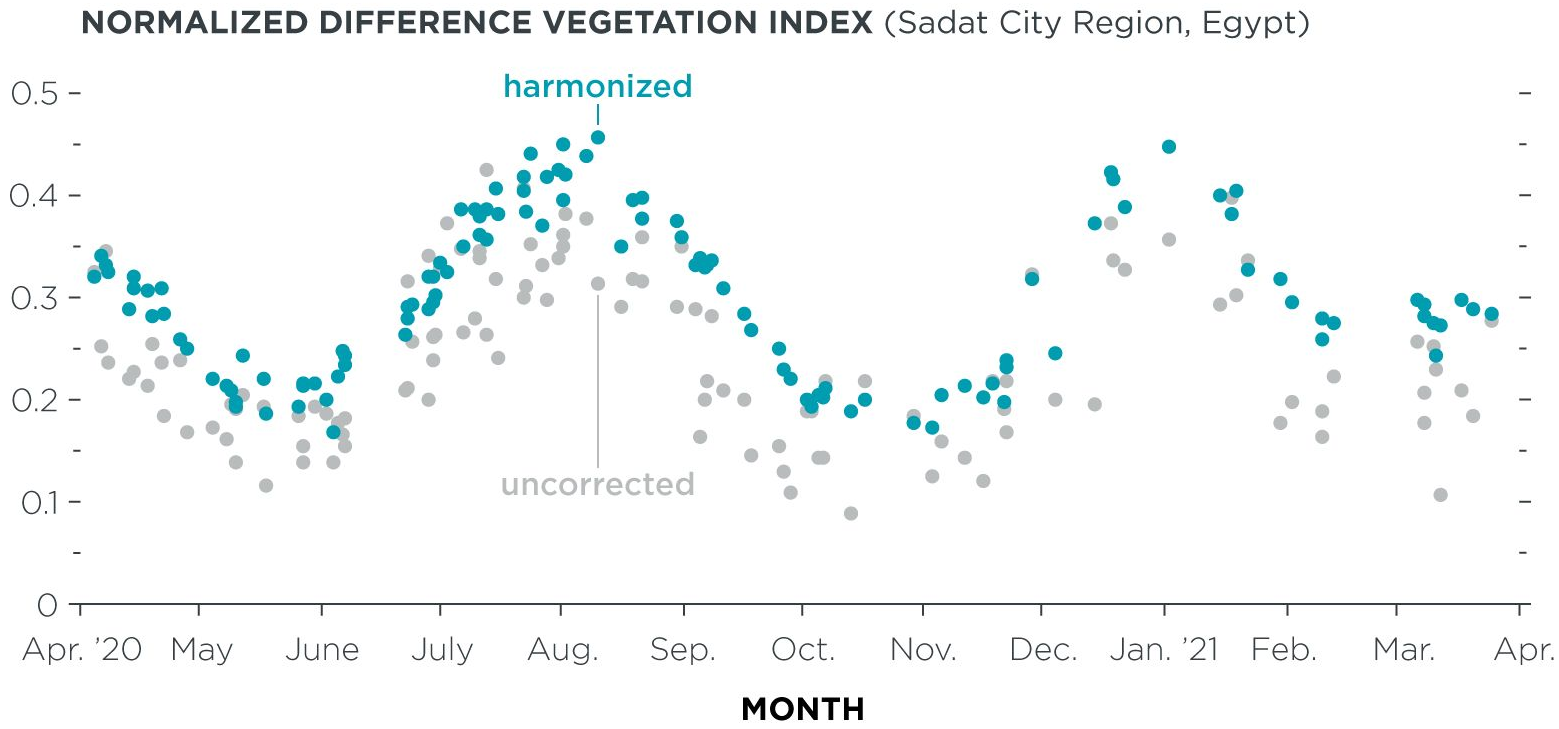
After

Improved Spectral Band Alignment

Before

After

Harmonized Data for More Consistent Time Series



Planet Publications across the Earth System

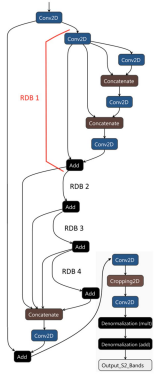
~1,800 peer-reviewed publications & conference papers:
www.planet.com/pulse/publications

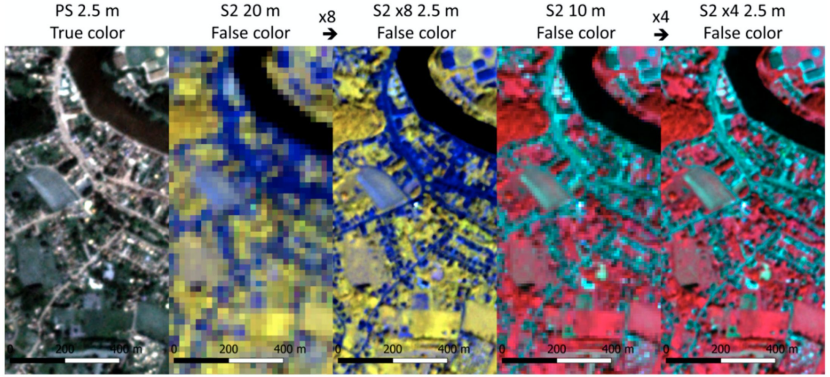
Remote sensing science;
Imaging and calibration;
Atmospheric correction;
Sensor fusion.

See also, e.g.,
Houborg et al. 2018 Remote Sensing of Environment
Houborg et al. 2018 Remote Sensing

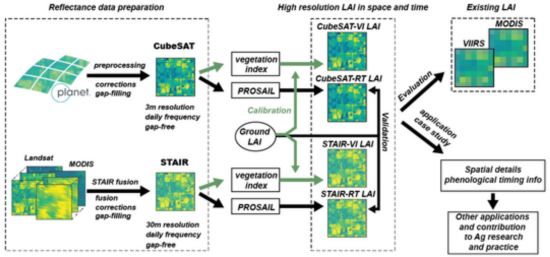
Remote sensing research demonstrates consistently high-accuracy sensor fusion between Planet data and other Earth Observation datasets

Latte and Lejeune 2020 Remote Sensing, fused Dove and Sentinel-2 imagery to achieve 2.5m superresolution data using Residual Convolutional Neural Networks, stabilizing radiometry across time-series and multiple S2 target sites.

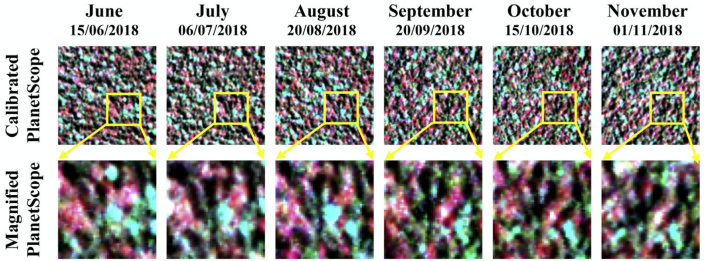




Kimm et al. 2020 Remote Sensing of Environment, fused Dove and MODIS imagery to achieve 3m resolution LAI with STAIRS algorithm



Wang et al. 2020 Remote Sensing of Environment, fused Dove and MODIS imagery using histogram matching to explore dense tropical forest phenology



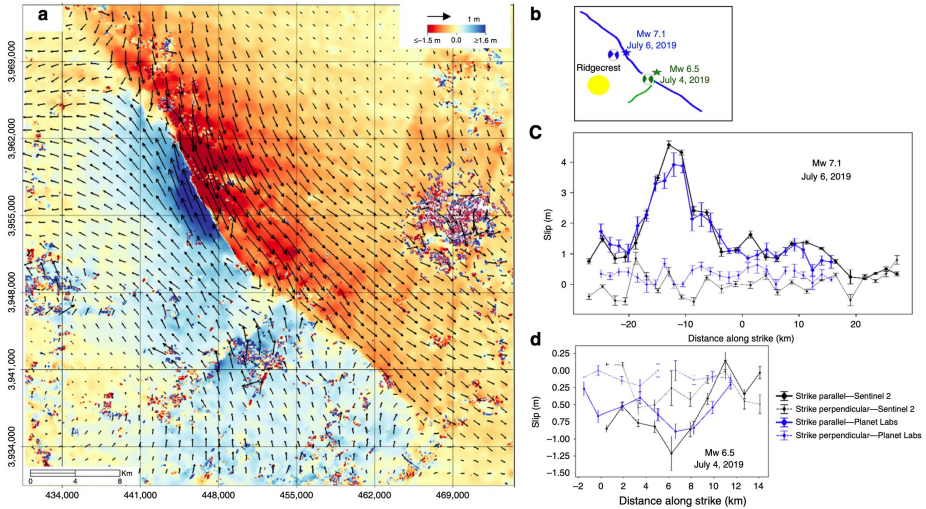
Understanding how Planet's data is used today

~1,800 peer-reviewed publications & conference papers:
www.planet.com/pulse/publications

Surface deformation;
Earthquakes;
Geohazards;

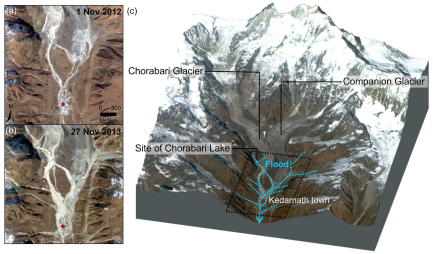
See also, e.g.,
Mazzanti et al 2020, Remote Sensing
Milliner and Donnellan 2020, Seismological Research Letters
Aldeghi et al. 2019, Remote Sensing

Planet data used to understand surface deformation and other displacement events in near-real time, in combination with other sensors



Chen et al. 2020 Nature Communications, used Planet and Sentinel-2 imagery to measure surface deformation caused by the July 4, 2019 Ridgecrest earthquake. The authors reported that Planet imagery was collected July 4 (pre-) and July 5 (post-quake), versus June 28 and July 8 with Sentinel 2. Panel c shows a strong correspondence between the Planet and Sentinel displacement estimates.

Kirschbaum et al. 2019 Frontiers in Earth Science, used Dove, RapidEye, and Sentinel-2 data to to see how these data could benefit natural hazard assessment within High Mountain Asia, looking at the complex interplay between humans, infrastructure, and ecosystems.



Bradley et al. 2019 Nature Geoscience, analyzed landslides triggered by 2018 M7.5 Palu earthquake via PlanetScope images captured directly before and after the earthquake.

Deadly Flash Flood in India Triggered by Landslide

- On Feb 7, 2021, a **massive flash flood** in the state of Uttarakhand killed dozens and washed away two hydroelectric power stations
- Initial reports suggested a glacial collapse triggered the flood
- PlanetScope images taken **27 minutes apart** caught a landslide as it was happening—**including catching the destruction of one of the power stations in that time interval**—and demonstrated it was the true culprit behind the flood
- Scientists analyzed these images **within hours of the landslide** with a coordinated response at Planet to task high-resolution SkySat coverage
- Science News coverage

Landslide Caught in Progress; Power Station Destroyed

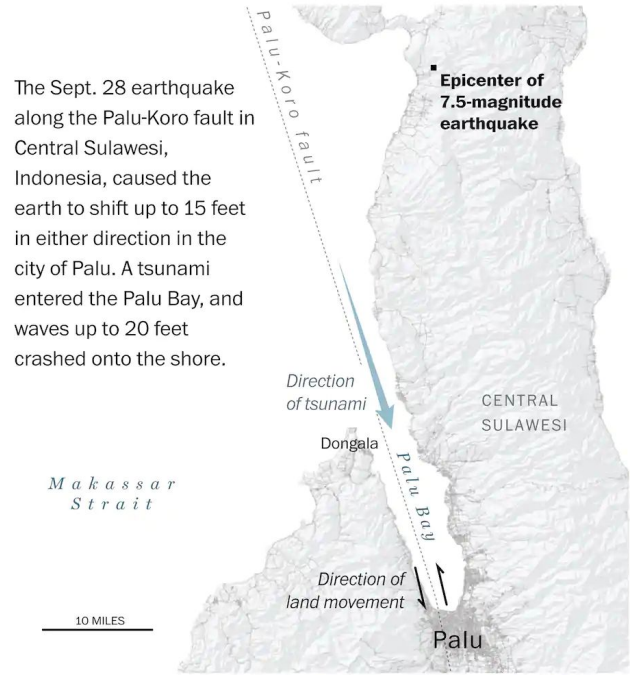
First image:
0501 UTC

Second image:
0528 UTC


rockfall site
dust deposition
flood path
Uttarakhand
India
0
0.5 Km
0
0.5 Mi
N

2018 Sulawesi Earthquake

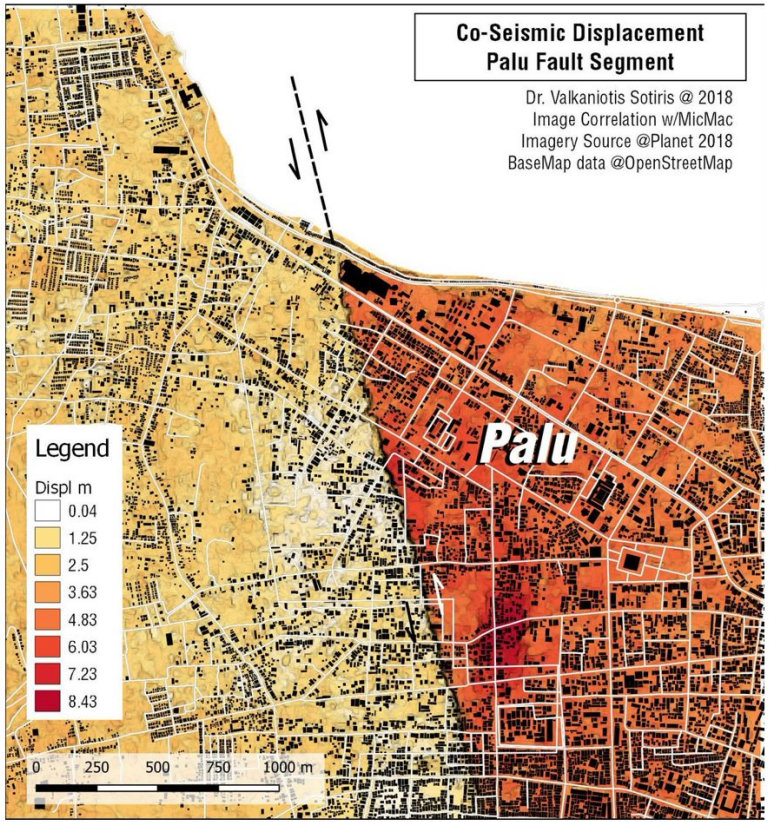
- On September 28, 2018, a **magnitude 7.5 earthquake** struck Indonesia near a provincial capital city, Palu
- The quake triggered a tsunami and some of the **largest soil liquefaction mudflows ever observed**, killing an estimated ~5000 people, and causing widespread destruction of infrastructure
- Dr. Kyle Bradley of the Earth Observatory of Singapore: “We were able to use PlanetScope images captured **directly before and after the earthquake**, which allowed us to focus on and isolate the landsliding caused by ground shaking.”
- Bradley’s team found that based on the locations of the mudflows, **rice farming practices** in the area played a significant role in creating the conditions for the massive landslides to occur with such a strong earthquake

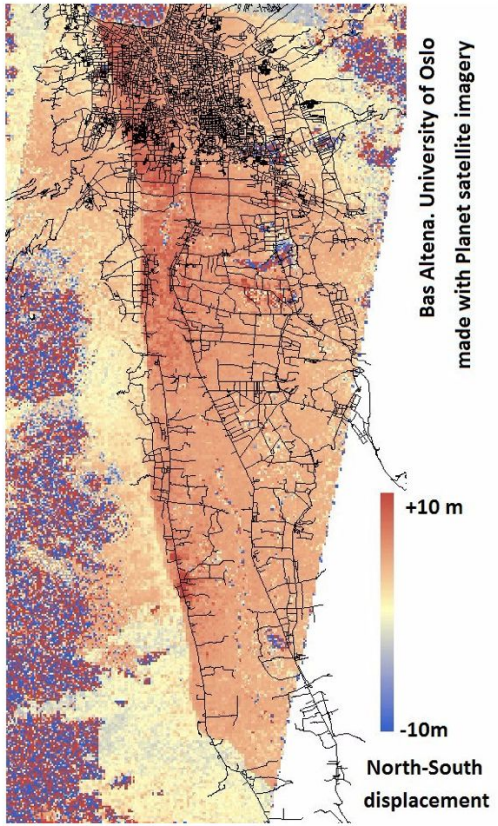


Sources: U.S. Geological Service; Sotiris Valkaniotis, Aristotle University of Thessaloniki
TIM MEKO/THE WASHINGTON POST


Displacement ~10 m!

Displacement After Palu Earthquake: Analysis Within Hours





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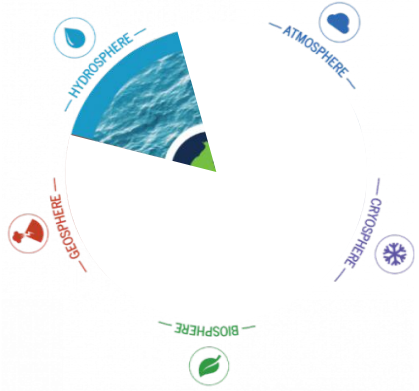
www.planet.com/pulse/publications

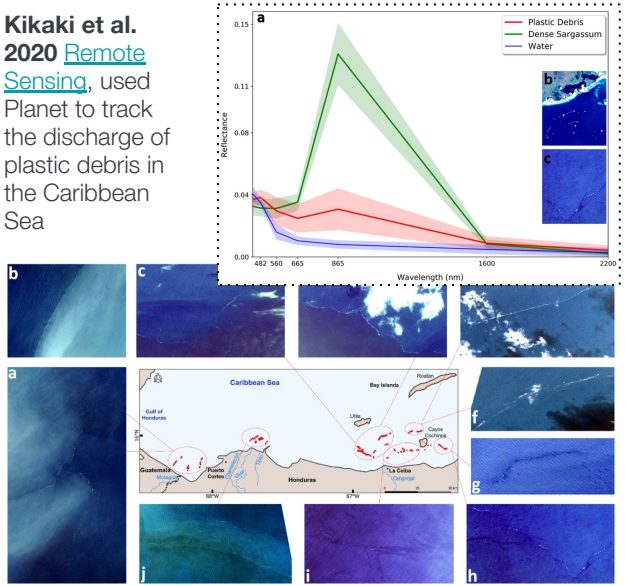


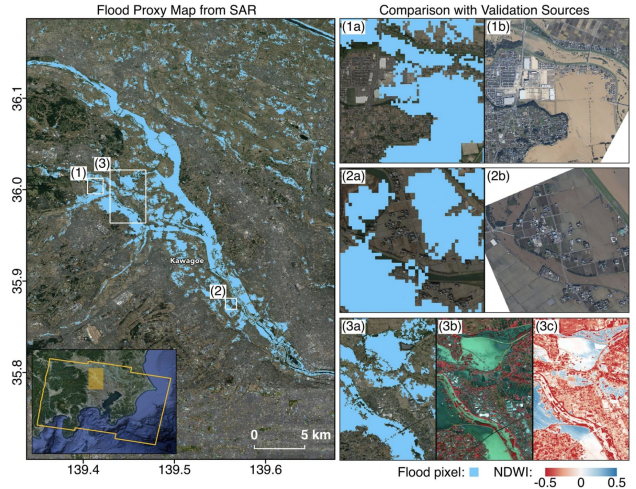
Coral reef bathymetry, habitat classification;
Flooding;
Stream discharge and sediment transport;
Marine ecosystems;

See also, e.g.,
Li et al. 2019, Remote Sensing of Environment

Planet data used to map flooding, track marine plastics, estimate stream discharge and sediment flow rates, in combination with other Earth Observation sensors

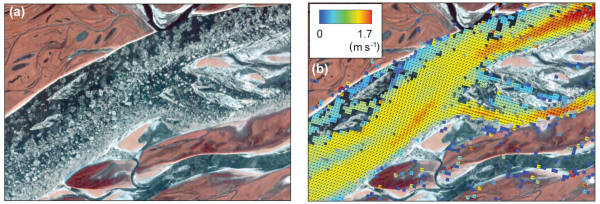
Kikaki et al. 2020 Remote Sensing, used Planet to track the discharge of plastic debris in the Caribbean Sea





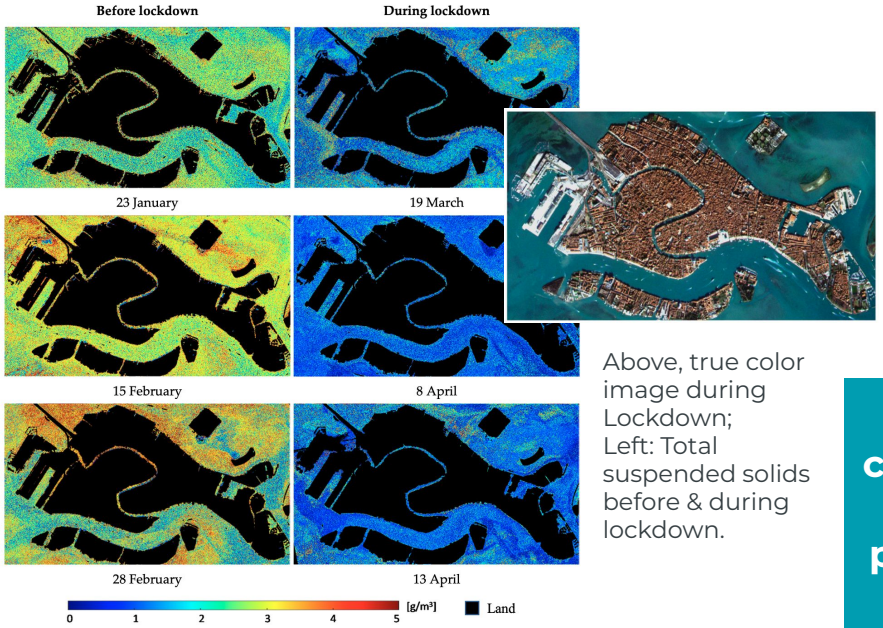
Tay et al. 2020 Scientific Data, used dense time-series Planet imagery to verify SAR analyses (Sentinel-1 and ALOS 2) of flooding caused by Typhoon Hagibis

Kääb et al. 2019 Hydrology and Earth Systems Science, used Planet imagery to track intra-day river flow rates in the arctic, leveraging multiple Dove passes separated by only a few seconds.



Water Quality Changes During COVID Lockdown

Analysis published within months of observations



Above, true color image during Lockdown; Left: Total suspended solids before & during lockdown.

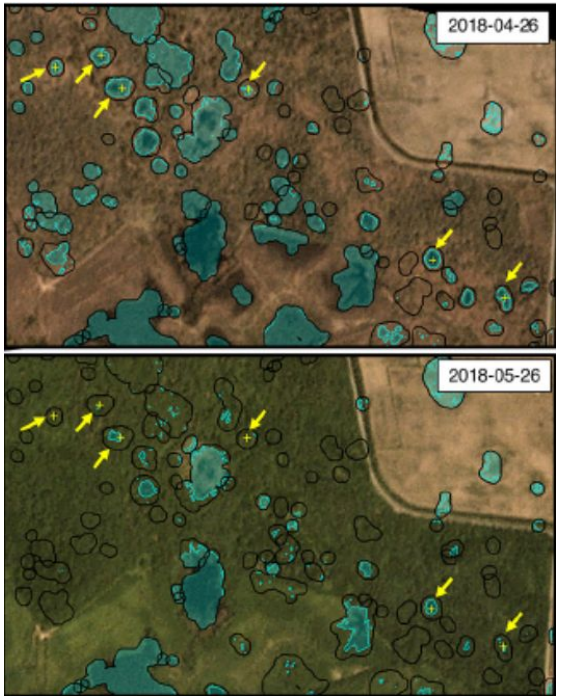
- COVID lockdowns in Europe led to dramatic reductions in vessel traffic in Venice, Italy.
- Behavior changes in watercraft were visible within Planet imagery
- Niroumand-Jadidi et al. (2020) leveraged Planet data to generate estimates of total suspended sediments, exploring water attenuation in Dove imagery

"The high spatial resolution in combination with daily revisits of the PlanetScope constellation potentially enables advances in near real-time monitoring of inland/coastal aquatic systems."

Niroumand-Jadidi et al. 2020 (Remote Sensing)

Using PlanetScope to Estimate Methane Emissions from Wetlands

- Wetlands emit methane into the atmosphere when water levels decline
- Hondula et al. (2021) used **421 PlanetScope images covering 5,118 forested wetland areas** over the course of one year to see how much the wetlands changed in size
- Found wetlands **<1 hectare are responsible for the majority of methane emissions**—requiring high-resolution imagery to be spotted

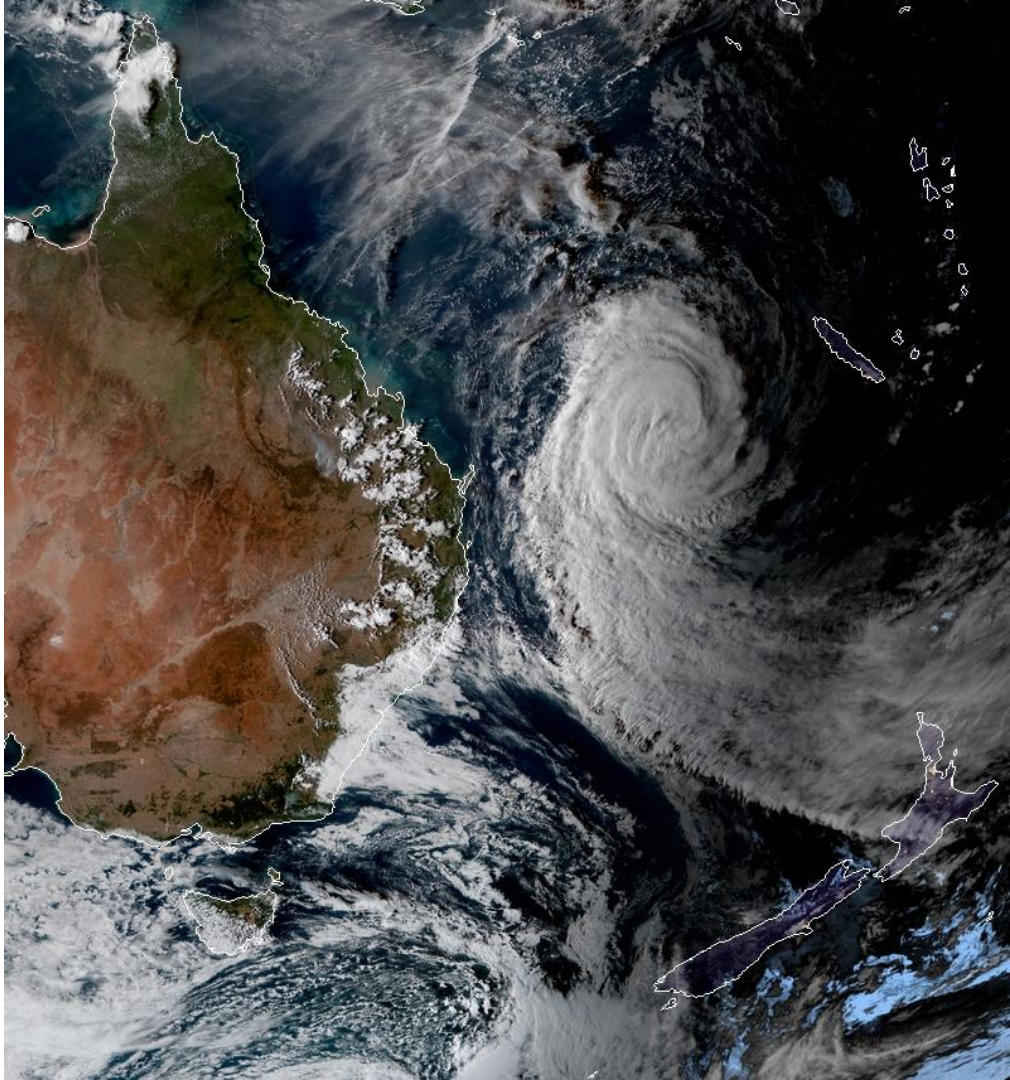


"Understanding the source of methane is important for mitigation strategies and policies aimed at reducing carbon emissions from local to global scales."

Shoreline Changes from Cyclone Oma

- Cat 2; struck Feb 2019

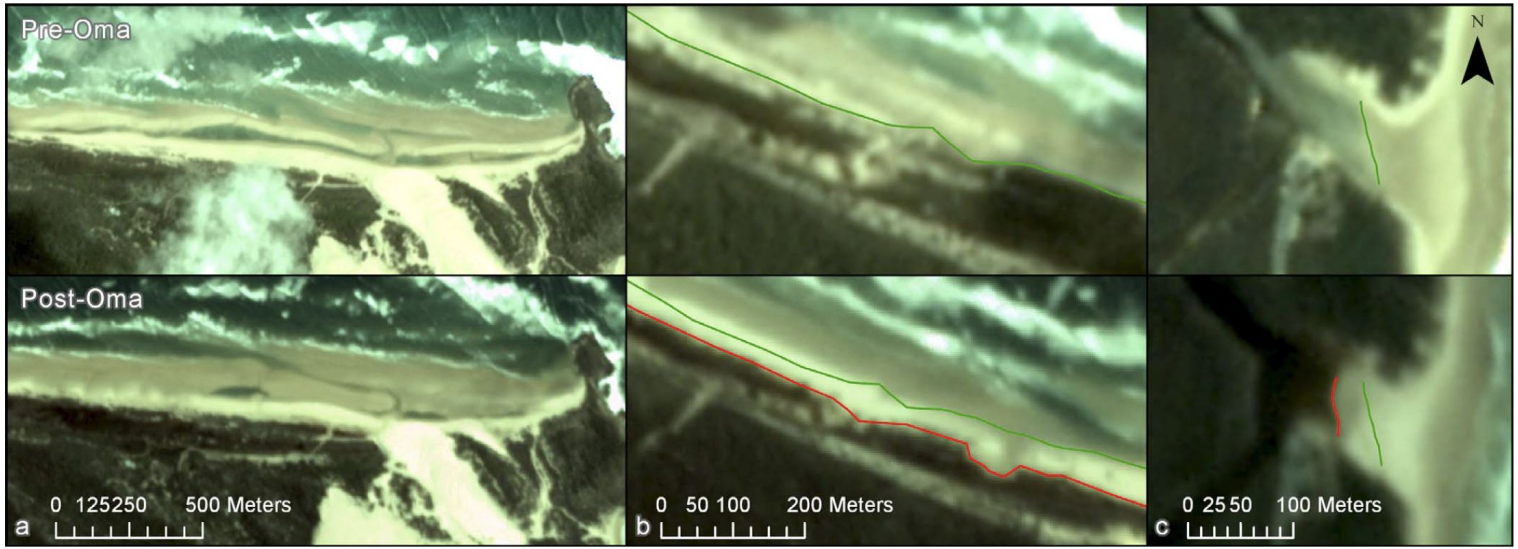
- Kelly and Gontz (2020) used 3-m PlanetScope data to map the high water line along 200 km of coastline
    - Not resolvable with Landsat or Sentinel-2
    - Planet captured images with few enough clouds to see the shoreline before and *immediately* after the cyclone



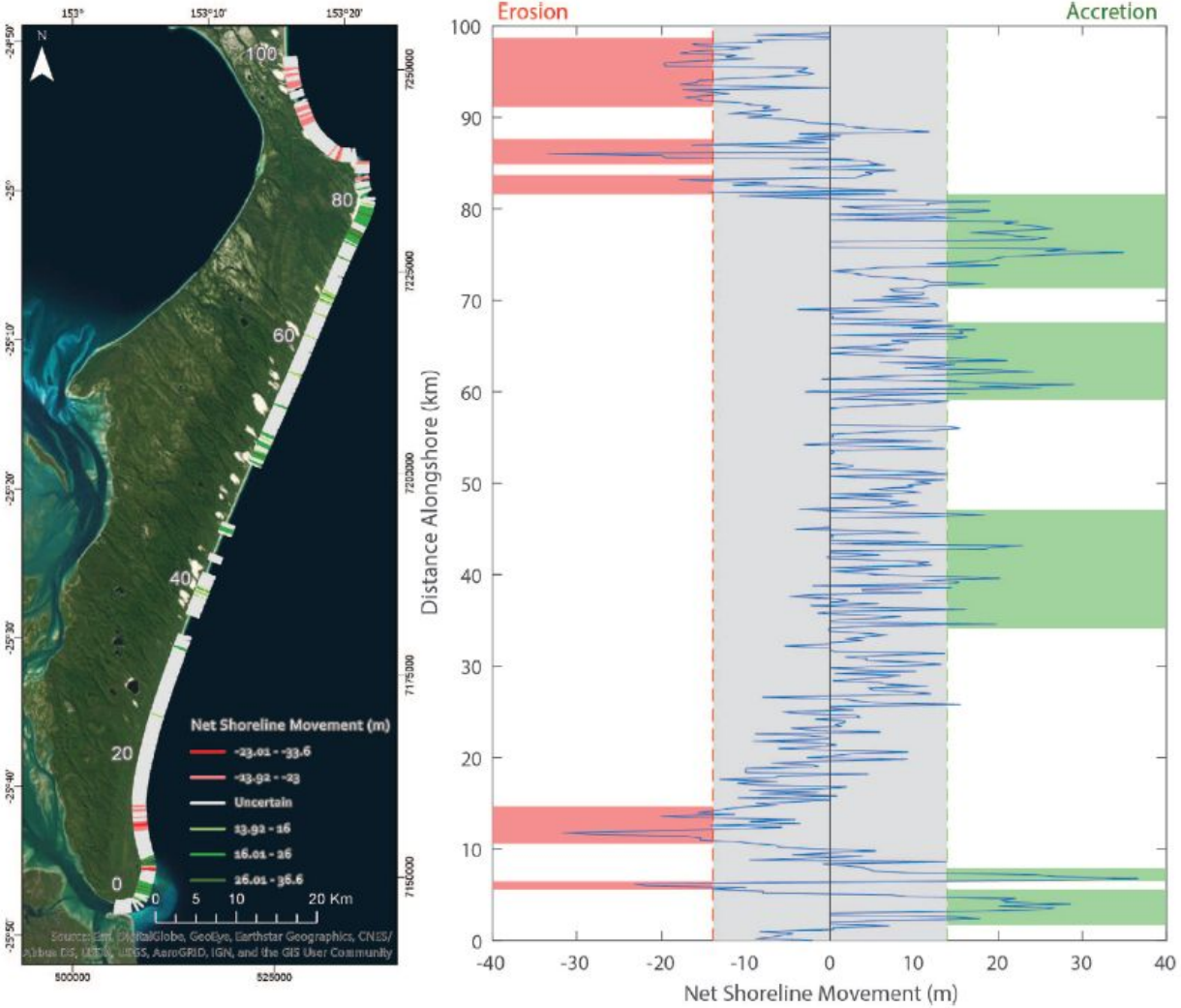
Kelly and Gontz (2020), Journal of Coastal Research
Image: NASA Worldview, EOSDIS

Shoreline Changes from Cyclone Oma

Kelly and Gontz (2020), *Journal of Coastal Research*



Changes in the shoreline visible in PlanetScope imagery pre- (top row) and post-Oma (bottom row). The red lines in the post-Oma imagery denote changes compared to the green lines from the pre-Oma imagery.

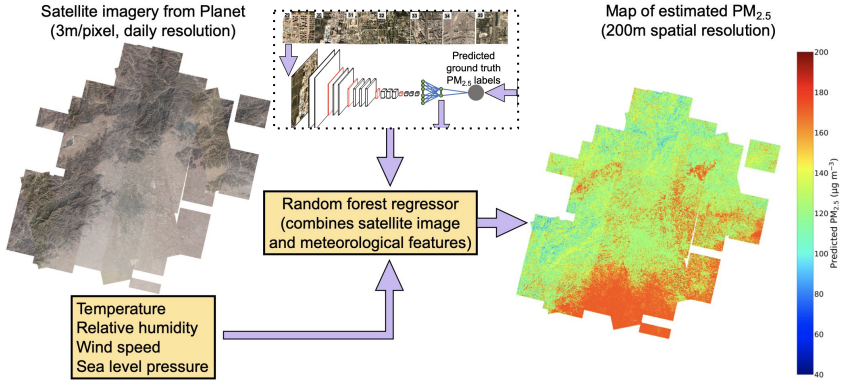

Erosion
Accretion
Distance Alongshore (km)
Net Shoreline Movement (m)
Net Shoreline Movement (m)
-23.01 - -33.6
-13.92 - -23
Uncertain
13.92 - 16
16.01 - 26
26.01 - 35.6
0
5
10
20 Km
153°
153°10'
153°20'
-24°50'
-25°
-25°10'
-25°20'
-25°30'
-25°40'
-25°50'
7250000
7225000
7200000
7175000
7150000
500000
525000
N
100
80
60
40
20
0

Understanding how Planet's data is used today

~1,800 peer-reviewed publications & conference papers:
www.planet.com/pulse/publications

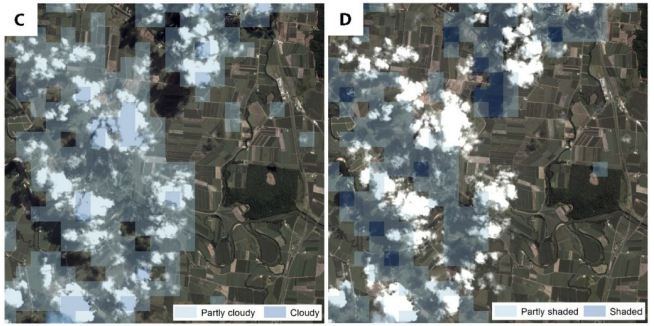
Atmospheric correction;
Air quality;
Cloud masking

Planet data used to produce large scale estimates of air quality, using CNNs to link imagery with air quality data from ground stations



Zheng et al. 2020 Atmospheric Environment, fused Planet imagery with ground-station based PM 2.5 air quality sensors using CNNs, allowing them to generate predictive maps of estimated PM 2.5 at scale in China.

Shendryk et al. 2019 ISPRS Journal of Photogrammetry and Remote Sensing, developed cloud- and cloud-shadow masking algorithms using CNNs. "The performance of our CNN models was also comparable to the state-of-the-art methods (i.e. Sen2Cor and MACCS) developed specifically for classifying cloud and shadow classes in Sentinel-2 imagery"



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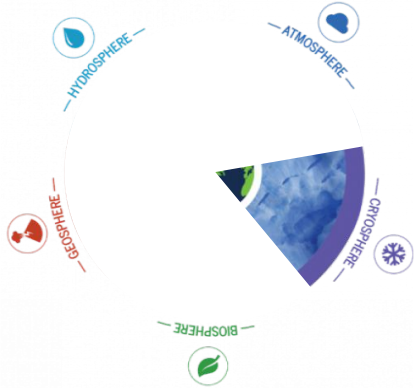
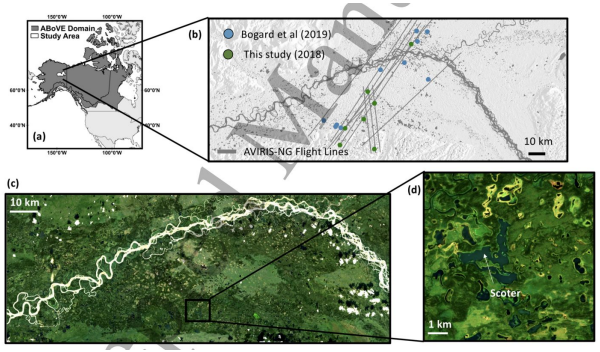


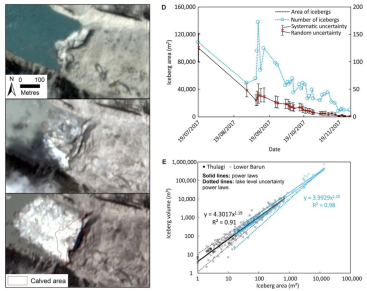
Glacier flow rates and hazards;
Optical flow;
Permafrost dynamics;
Snow depth and seasonality;

See also, e.g.,
Racoviteanu et al. 2019, Frontiers in Earth Science
Higgens et al. 2019, JGR Biogeosciences
Dell et al. 2019, Journal of Glaciology

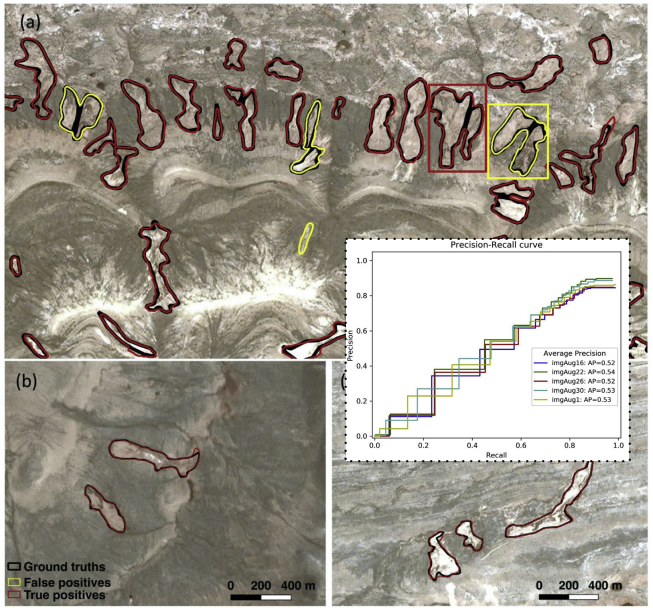
Planet data used to understand cryosphere dynamics, including permafrost, arctic lakes, and glacier flow rates

Kuhn et al. 2020 Environmental Research Letters, utilized PlanetScope, Landsat 8, and Sentinel-2 data to estimate gross primary production (GPP) in shallow boreal and Arctic lakes in Alaska.





Watson et al. 2020 Frontiers in Earth Science, used Planet imagery to estimate glacier calving rates at the Thulagi Glacier in combination with UAV imagery.



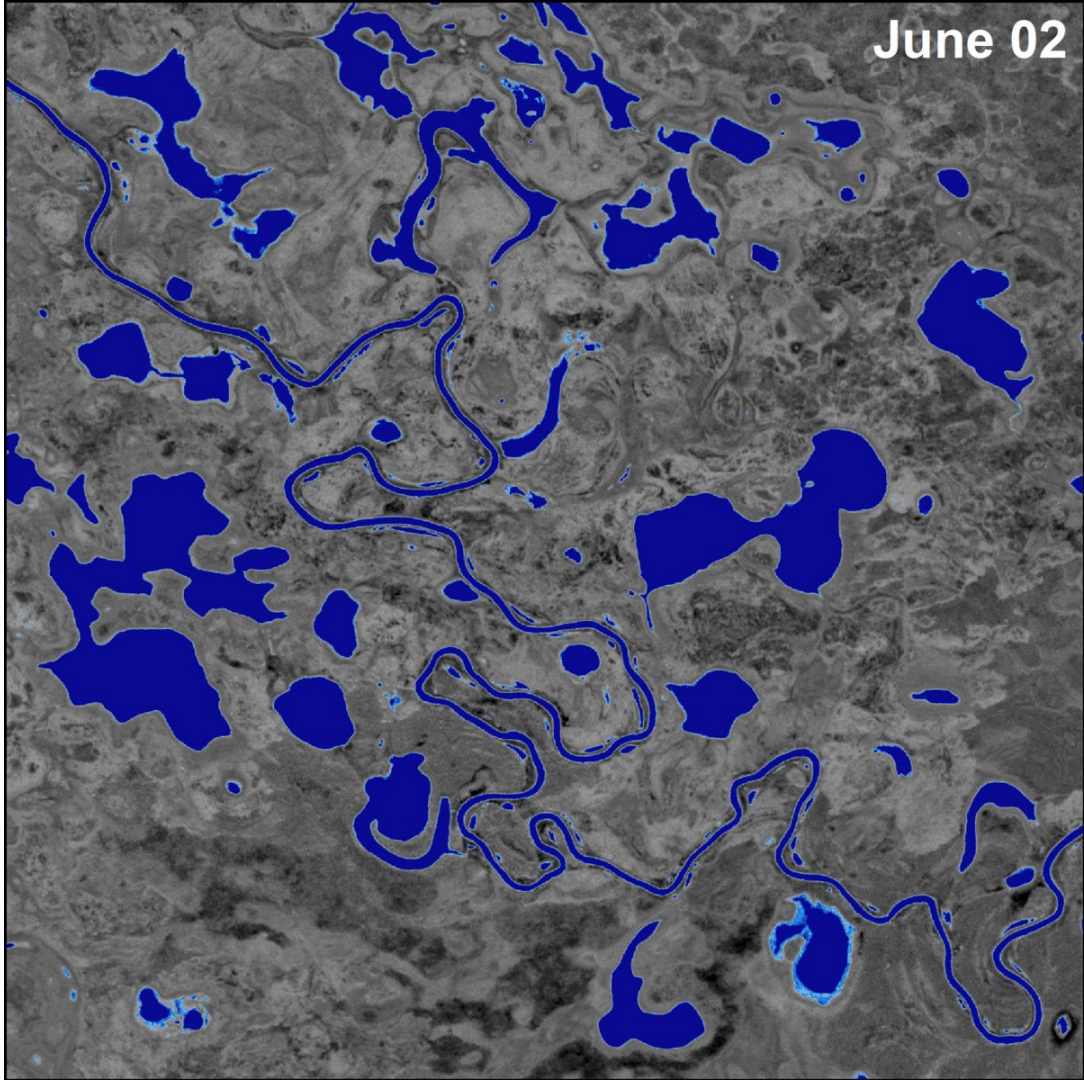
Haung et al. 2020 Remote Sensing of Environment, used deep learning to autonomously map permafrost slumps in Tibet

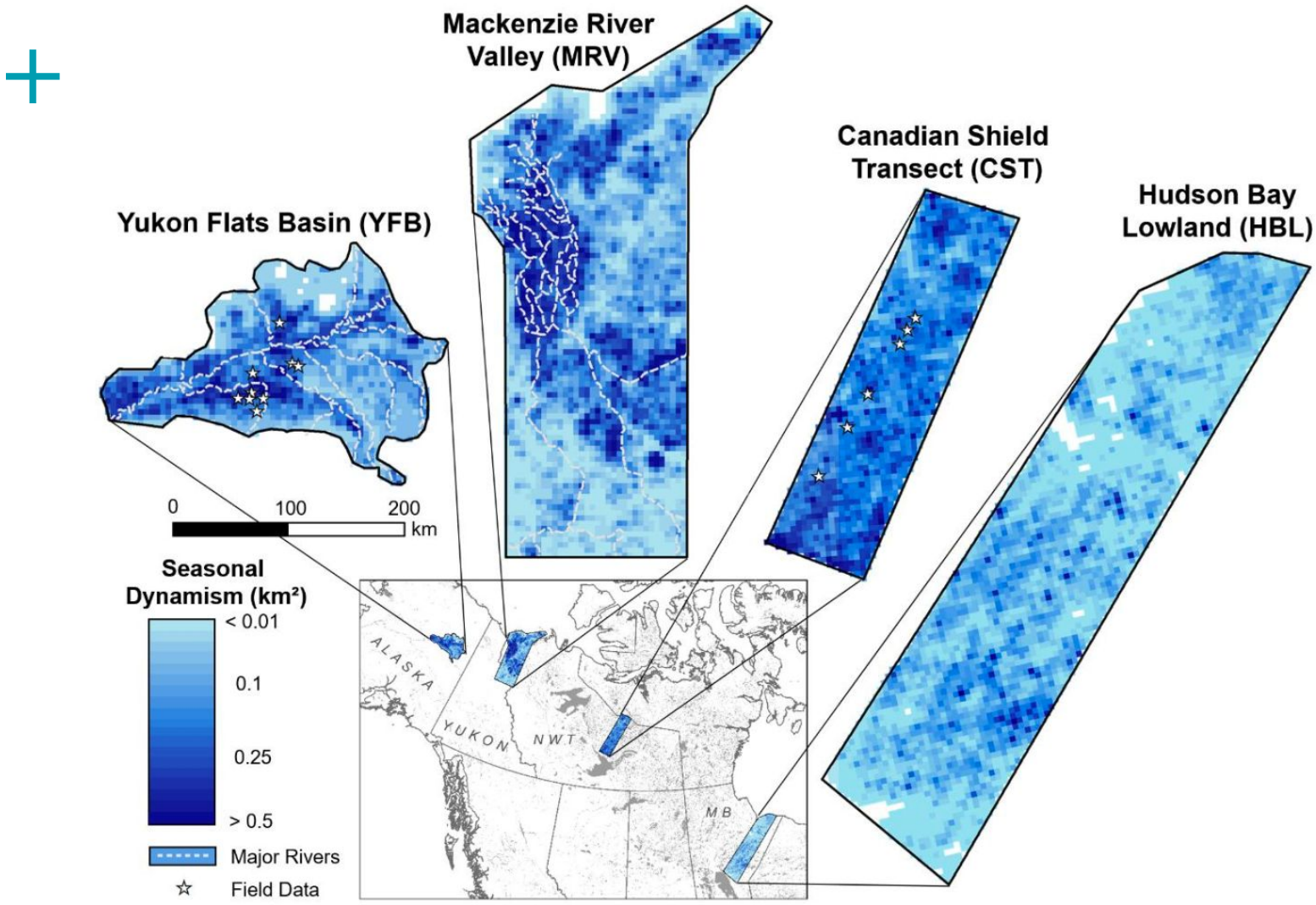
Collapse of the Last Intact Arctic Ice Sheet

- On July 30, 2020, the Milne Ice Shelf in the Canadian Arctic broke apart, **triggered by warm air temperatures** and offshore winds
- Planet captured imagery **immediately before and after the collapse**
- Growing melt ponds visible on the ice sheet leading up to the collapse—**a potential early warning sign**
- BBC News coverage

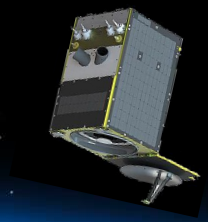
Seasonal changes of high-latitude lakes

- Used **thousands** of Dove images to track near-daily changes in water extent via machine learning across Alaska and Northern Canada
- Revealed that in some areas, lake shorelines **fluctuated much more widely than previously known**
- Suggests these lakes are potentially **emitting more greenhouse gases** than previously thought
- Brown University coverage




Mackenzie River Valley (MRV)
Canadian Shield Transect (CST)
Hudson Bay Lowland (HBL)
Yukon Flats Basin (YFB)
0
100
200
km
Seasonal Dynamism (km²)
< 0.01
0.1
0.25
> 0.5
Major Rivers
Field Data
ALASKA
YUKON
NWT
MB

Accessing Planet Data through NASA's Commercial SmallSat Data Acquisition (CSDA) Program



Data access for all researchers funded by NSF and/or any U.S. federal civilian agency

Data is available for scientific, non-operational research purposes

What is included?

- PlanetScope with 30-day latency*
- RapidEye archive
- 5,000,000 km^2 initial quota per user*

What is not included?

- SkySat tasking + archive
- PlanetScope + SkySat Basemaps

Questions?
nasa_cs@federal.planet.com

*Exceptions may be approved by NASA on a case-by-case basis

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PlanetScope and RapidEye data are provided under a Scientific Use License.

- Imagery can be used for the purpose of conducting experiments, evaluation, research, and/or development, including applied research
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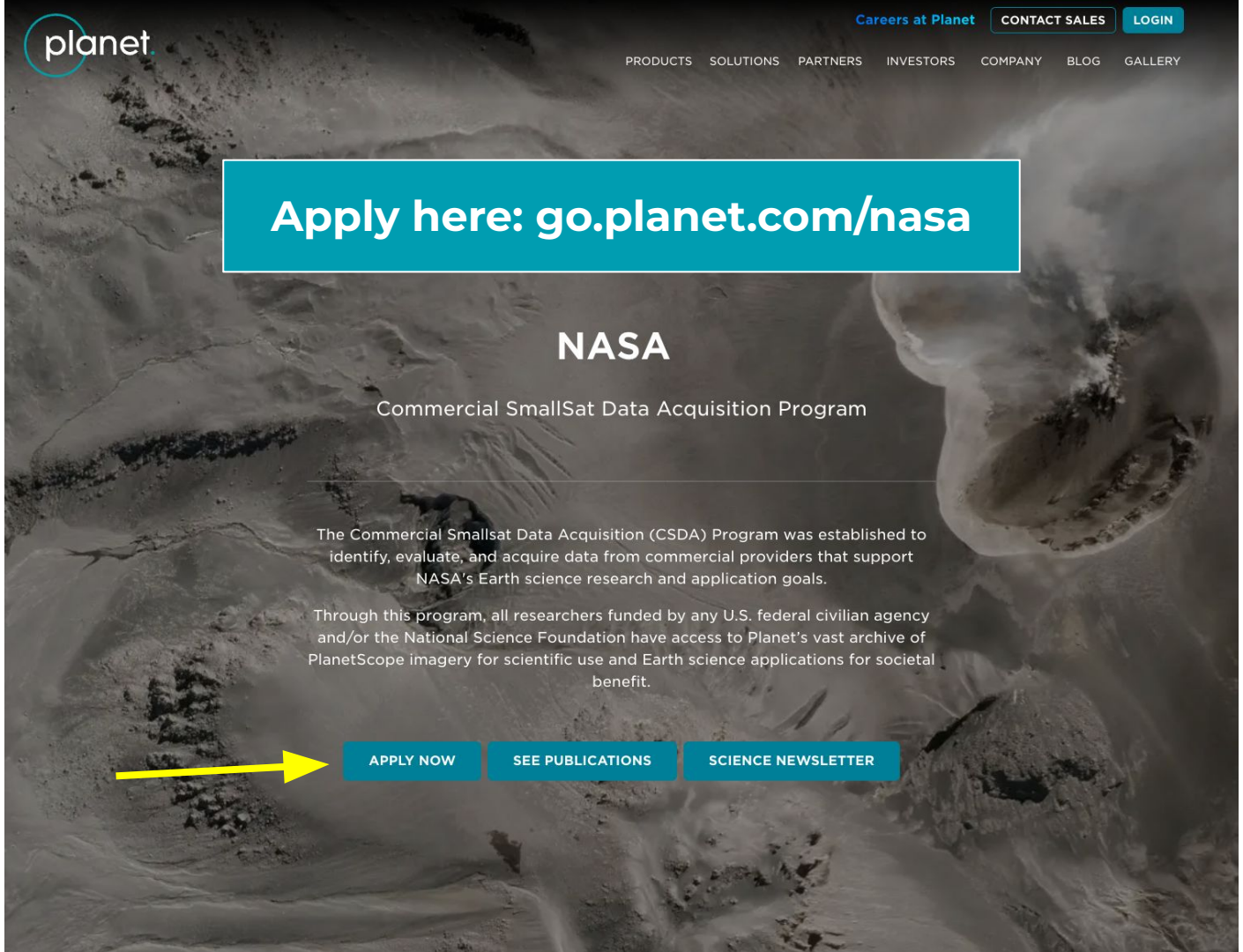
  - **Cannot** be used for operational work (i.e., resource management, facility monitoring, regulation/compliance enforcement, law enforcement)

- Derivative products (i.e., maps, figures, etc.) **can be used** in conference presentations, journal publications, and media releases about your research
  - Original imagery **cannot** be shared with researchers not registered with CSDA
  - Products using Planet imagery should be noted as such in the caption information where possible

- Use this citation in publications when Planet imagery is used:
    - Planet Team (2017). Planet Application Program Interface: In Space for Life on Earth. San Francisco, CA. https://api.planet.com.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The Commercial Smallsat Data Acquisition (CSDA) Program was established to identify, evaluate, and acquire data from commercial providers that support NASA's Earth science research and application goals.
Through this program, all researchers funded by any U.S. federal civilian agency and/or the National Science Foundation have access to Planet's vast archive of PlanetScope imagery for scientific use and Earth science applications for societal benefit.
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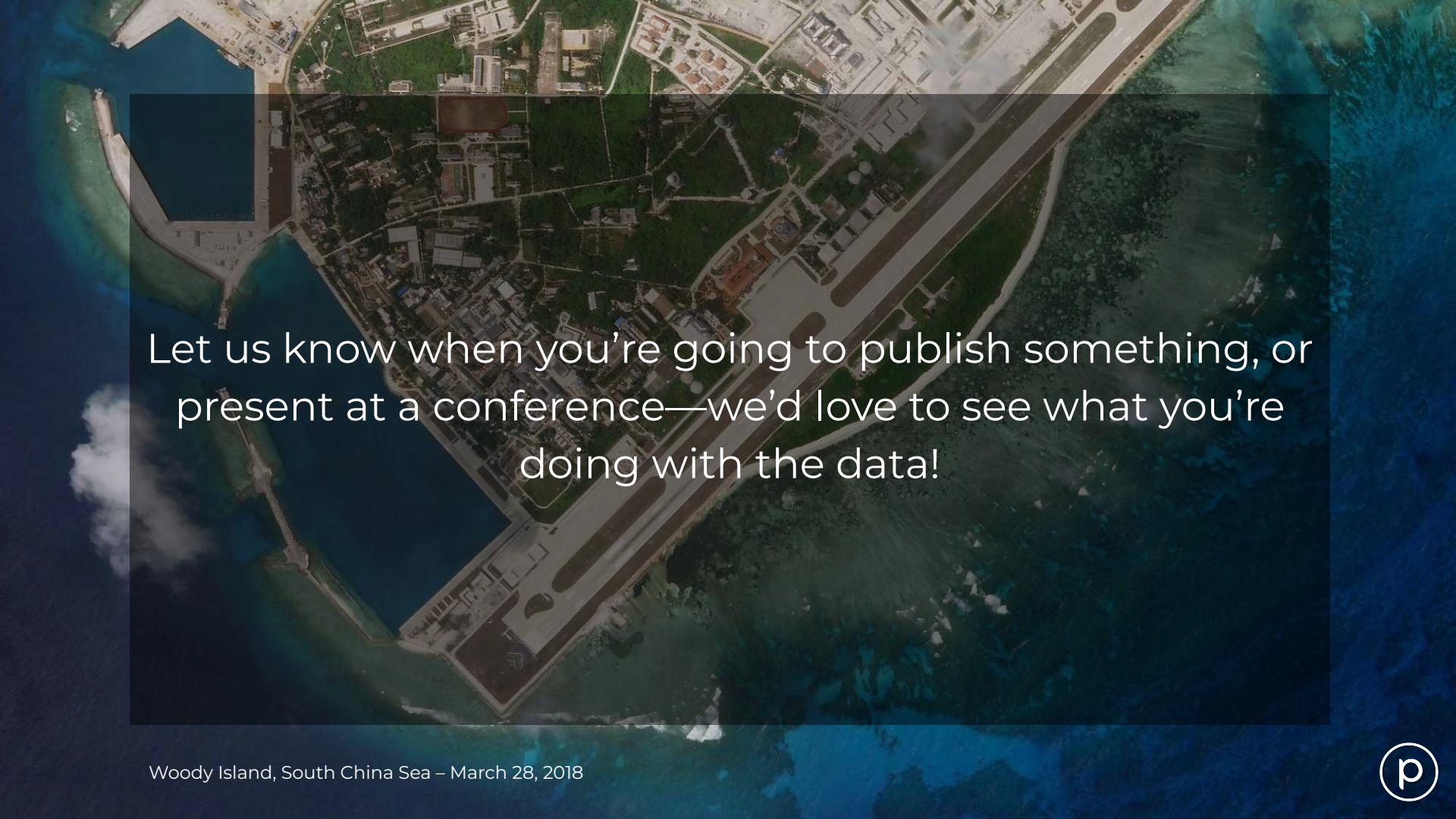


Let us know when you're going to publish something, or present at a conference—we'd love to see what you're doing with the data!

Woody Island, South China Sea – March 28, 2018

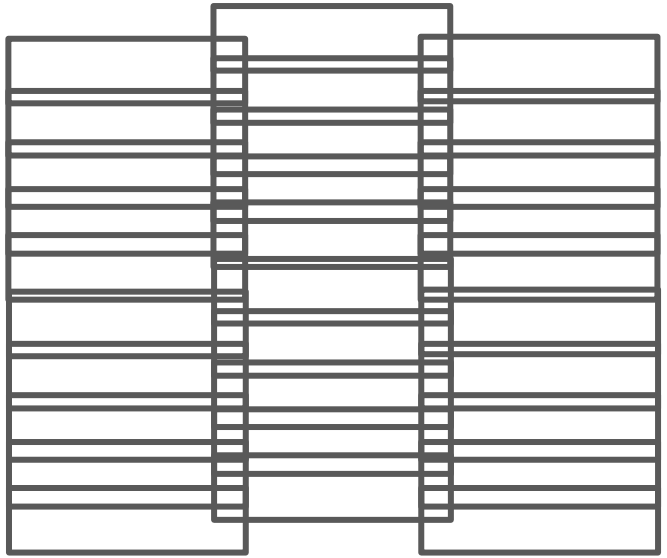
PlanetScope Imagery Basics

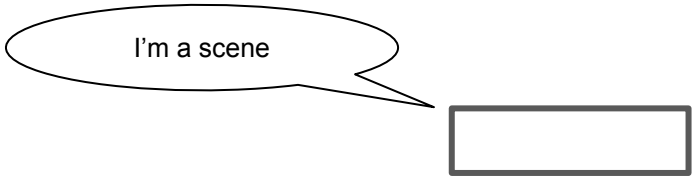
How our satellites collect images

Our satellites take many overlapping, images as they circle the Earth.

Overlaps are necessary to ensure we provide gap-free images.

Each image is called a scene.



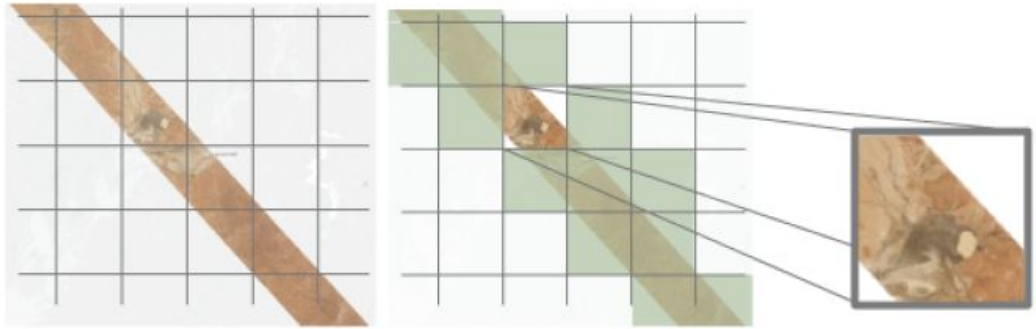


PlanetScope Data Products

Basic Scene	Ortho Scene	Ortho Tile
Scaled Top of Atmosphere Radiance (at sensor) No atmospheric or terrain correction Not map projected Designed for users with advanced image processing capabilities	Orthorectified Terrain corrected Scaled Top of Atmosphere Radiance (at sensor) product -**Visual (8-bit)** Surface Reflectance product -**Analytic (16-bit)** Atmospheric correction on Surface Reflectance products Map projected (UTM, WGS84 datum)	25 x 25 km tiles comprised of consecutively acquired scenes Orthorectified Radiometrically, sensor, and geometrically corrected Scaled Top of Atmosphere Radiance (at sensor) product -**Visual (8-bit)** Surface Reflectance product -**Analytic (16-bit)** Map projected (UTM, WGS84 datum)

PlanetScope Ortho Tiles

Striped Scenes Collection | Single RGB + IR Striped Scene | Scenes Strip



UTM Grid Overlay | PlanetScope Tiled Product | Single PlanetScope Tile

PLANET DATA ACCESS

Cancún, Mexico – August 18, 2016

Downloading Planet Data

Five main options depending on your needs

Planet Explorer

Best for: Browsing; small downloads (<100 images)
https://developers.planet.com/docs/apps/explorer/

Planet QGIS Plug-in

Best for: QGIS users; more advanced browsing; small & large downloads
https://developers.planet.com/docs/integrations/qgis/

Planet ArcGIS Plug-in

Best for: Easily searching for & downloading Planet data directly into your Arc projects
https://developers.planet.com/docs/integrations/arcgis/

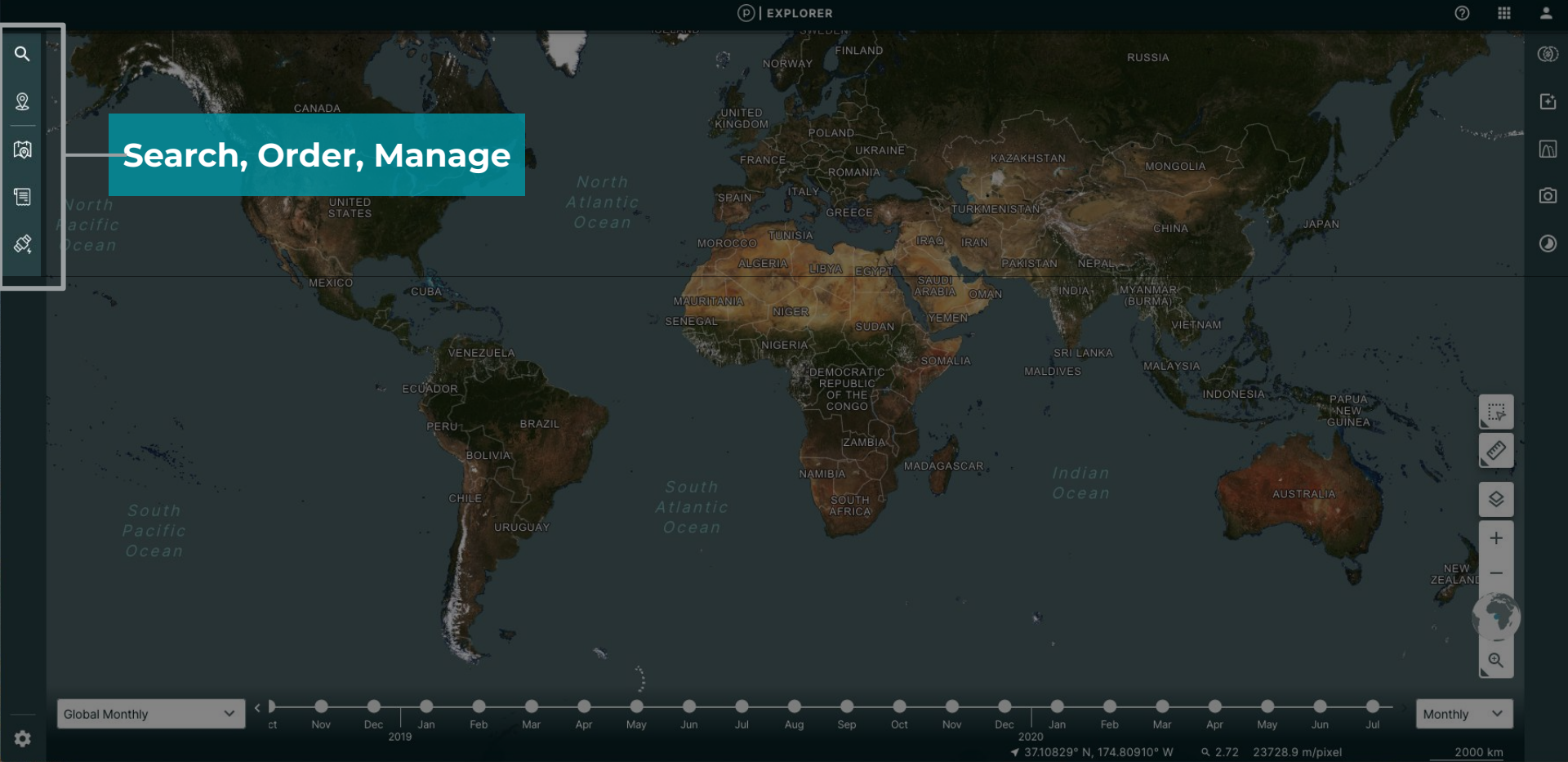
Planet Command Line Interface (CLI)

Best for: Heavy users that want fine-tuned controls
https://planetlabs.github.io/planet-client-python/cli/index.html

Planet Data API

Best for: Heavy users proficient in Python
https://developers.planet.com/docs/apis/

Say hello to Planet Explorer



Back

Filter Results

- [ ] **Medium Resolution (2m - 10m)**
  - [x] **PlanetScope Scene**
  - [ ] PlanetScope Ortho Tile
  - [ ] RapidEye Basic Scene
  - [ ] RapidEye Ortho Tile
- [x] **Non-Planet Datasets (> 10m)**
  - [x] **Sentinel-2 Tile**
  - [x] **Landsat 8 Scene**

PLANETSCOPE ONLY FILTERS

Spectral bands must include — Learn more

All results include blue, green and red bands.

- [x] Near-infrared (NIR)
- [ ] Coastal blue, green II, yellow, red edge

Instrument type — Learn more

- [ ] Dove Classic (PS2)
- [ ] Dove R (PS2.SD)
- [ ] Super Dove (PSB.SD)

ENVIRONMENTAL CONDITIONS

ADVANCED FILTERS

Show full catalog

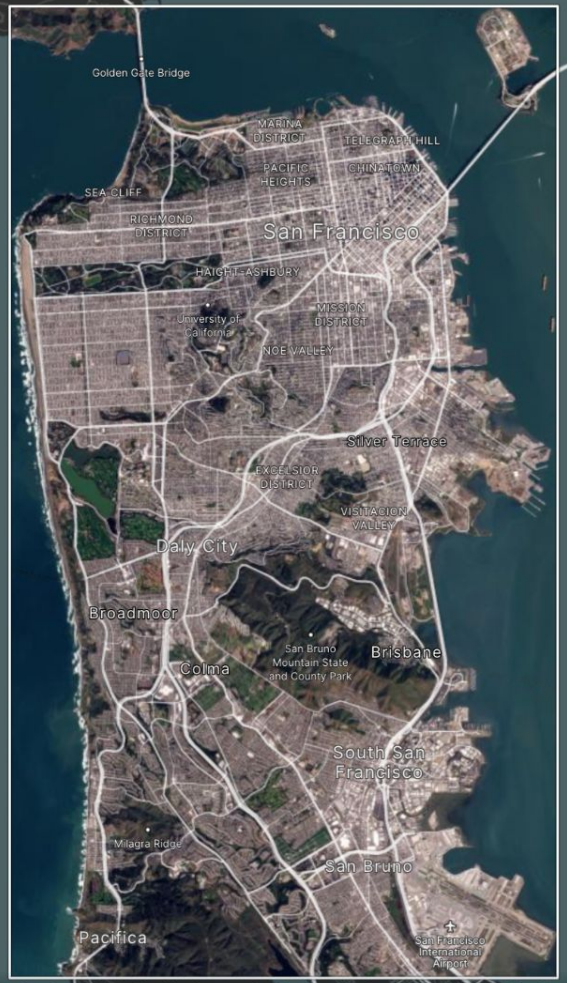
Include search results I only have preview access to (contact sales for additional access)

Include only surface reflectance

Only show me search results with surface reflectance assets available

Clear All

Apply filters



362.74 km²

24 25 26 27 28 29 30 31 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 01 02 03 04 05 06 07

Feb 2022 — Mar 2022

Daily

Order Imagery

1 Name order — 2 Select assets — 3 Tools & review

3 items
PlanetScope Scene

RECTIFIED ASSETS

Visual
Optimized for visual analysis - RGB only
(•) GeoTIFF ( ) NITF

Surface reflectance - 4 band
Corrected for surface reflectance; recommended for most analytic applications - includes RGB NIR
( ) GeoTIFF (•) NITF
UDM2

Surface reflectance - 8 band
Corrected for surface reflectance; recommended for most analytic applications - also includes coastal blue, green II, yellow, red edge
(•) GeoTIFF ( ) NITF
UDM2

Analytic radiance (TOAR) - 4 band
Calibrated to top of atmosphere radiance - includes RGB NIR
(•) GeoTIFF ( ) NITF
UDM2

Analytic radiance (TOAR) - 8 band
Calibrated to top of atmosphere radiance - also includes coastal blue, green II, yellow, red edge
(•) GeoTIFF ( ) NITF

← Back

Continue

Order Summary

Order name
User Guide

Orders to be placed
1
*Selections below will be placed as a separate orders

PlanetScope Scene

3 items
Surface reflectance - 4 band
NITF UDM2 Clipped Harmonized

Order

My Hosted Data

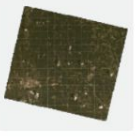
Iowa Fields Weather Impact

9 of 9 scenes

2 items
August 20, 2020
4-band PlanetScope S...
3m/px

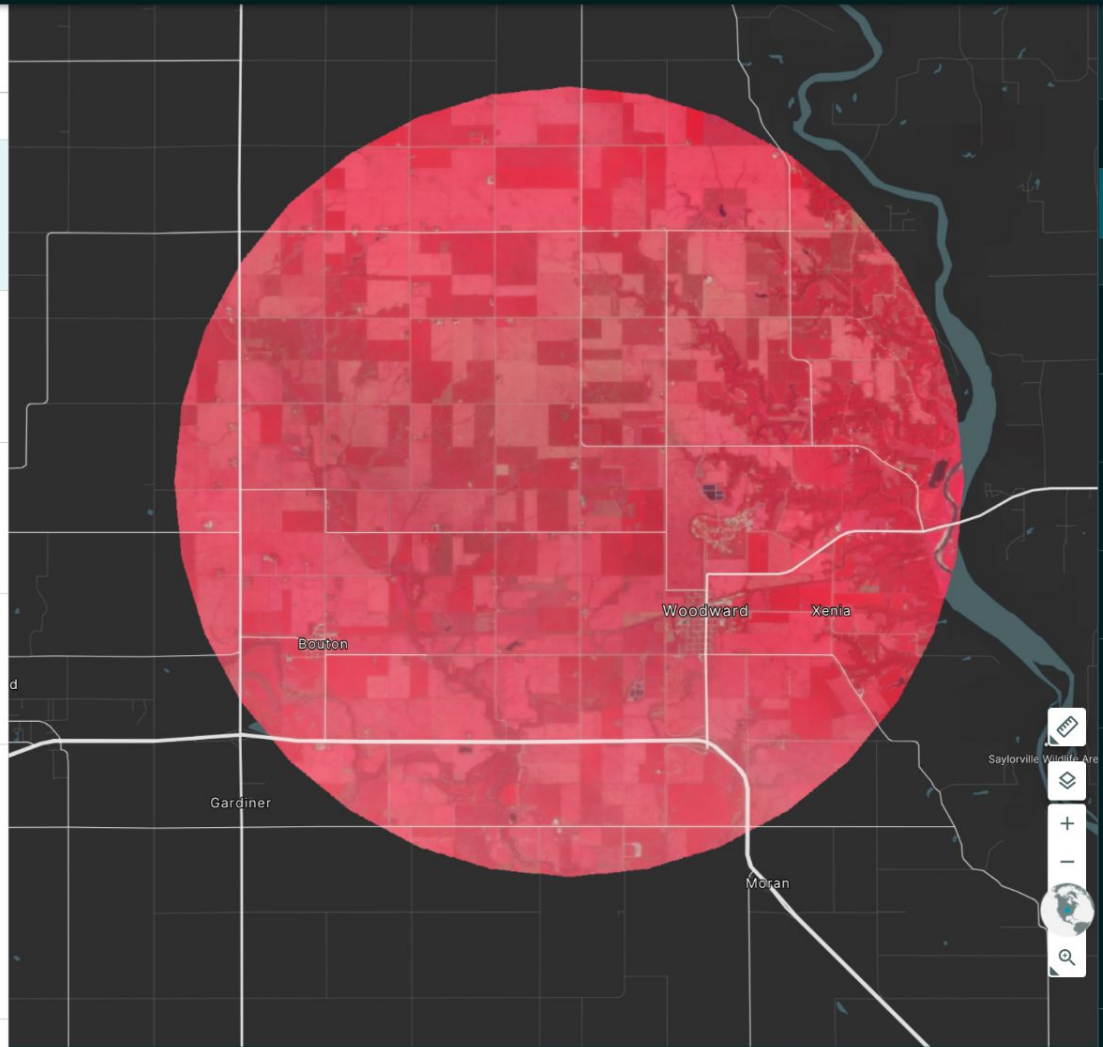
2 items
August 15, 2020
4-band PlanetScope S...
3m/px

2 items
August 7, 2020
4-band PlanetScope S...
3m/px



3 items
August 4, 2020
4-band PlanetScope S...
3m/px

Move Items | Order Scenes (2)



BAND COMBINATIONS

RGB
True color visualization (default)

CIR
Color Infrared

SPECTRAL INDICES

NDVI
Normalized Difference Vegetation Index

NDWI
Normalized Difference Water Index

VARI
Visible Atmospherically Resistant Index

MSAVI2
Modified Soil Adjusted Vegetation Index

MTVI2
Modified Triangular Vegetation Index

Not finding an index that meets your needs?

Simplified management with ‘PSScene’ Item Type

A unified catalog for PlanetScope data from all sensors, simplifying searches, access, and data management.

What’s included in PSScene

Access to 3, 4, and 8-band PlanetScope

Calibrated to Sentinel-2

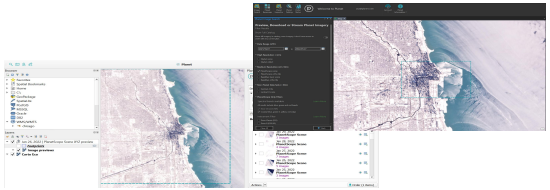
Accessible across the Data, Orders, and Subscriptions API

```
"name": "PSScene AssetFilter",
  "item_types": ["PSScene"],
  "filter": {
    "type": "AndFilter",
    "config": [
      {
        "type": "AssetFilter",
        "config": ["ortho_analytic_4b_sr"]
      },
      {
        "type": "AssetFilter",
        "config": ["ortho_udm2"]
      }
    ]
  }
}
```

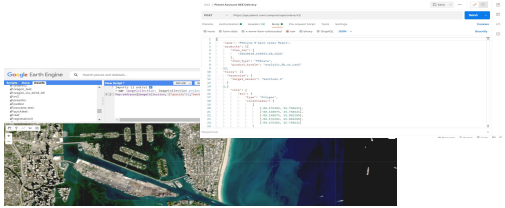
Integrations 101

developers.planet.com/integrations/

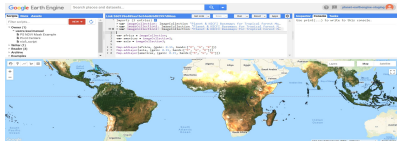
Planet's integrations extend the usability of Planet APIs and data products within popular work-tools in order to reduce friction in 3rd party application workflows



GIS Desktop Integrations: ArcGIS Pro & QGIS



GEE Delivery Endpoint



NICFI Basemaps in GEE

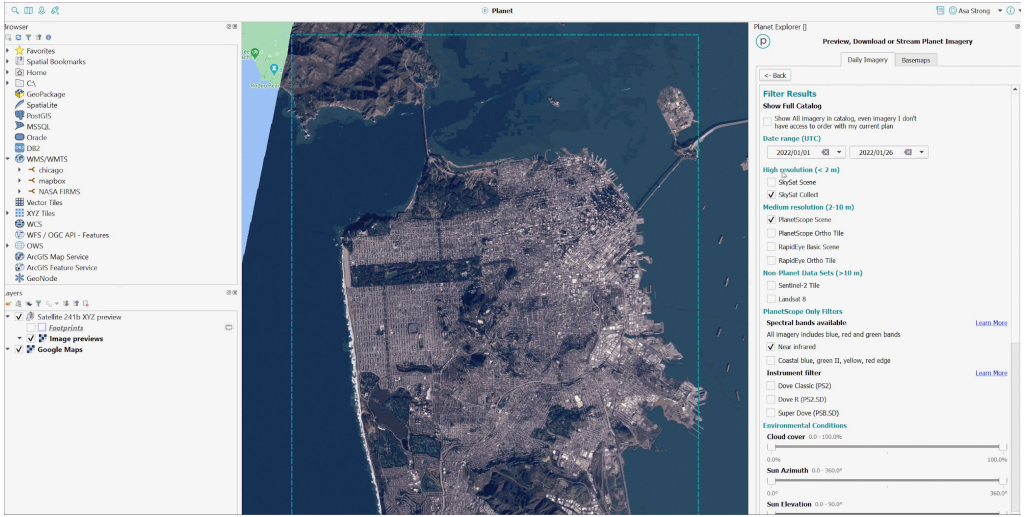
NICFI

Norway's International Climate and Forest Initiative

Planet GIS Integrations: V2.2 Released!

Updates to Search

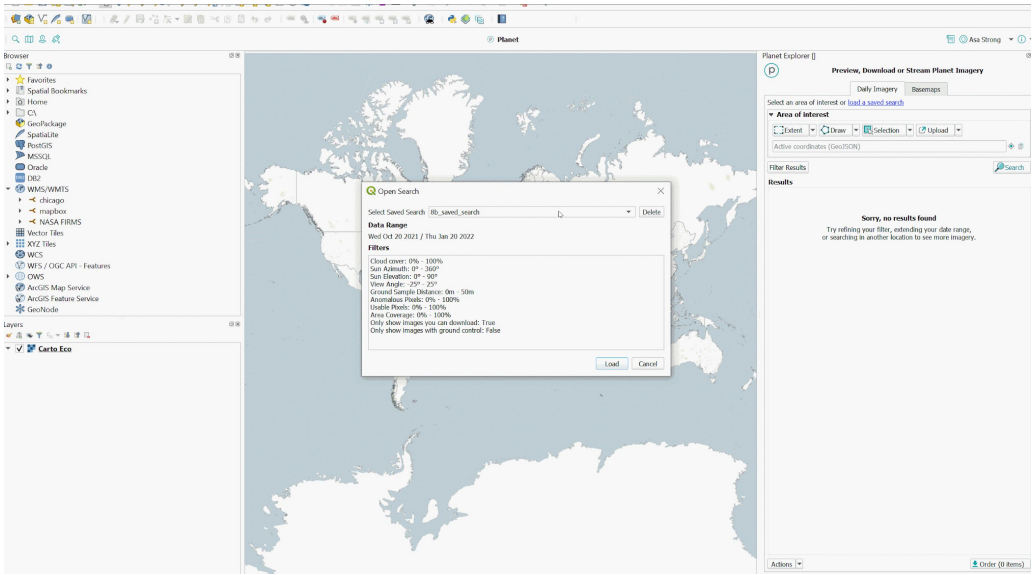
- Users can search for PlanetScope Scene and apply NIR or 8-band filters
- Users can preview any image as a RGB tile in their GIS map
- Users can still filter for specific satellite sensors if needed (e.g., SuperDove)
- Additionally users can filter for SR assets so that results are limited to only images with SR assets



Planet GIS Integrations: V2.2 Released!

Updates to Search

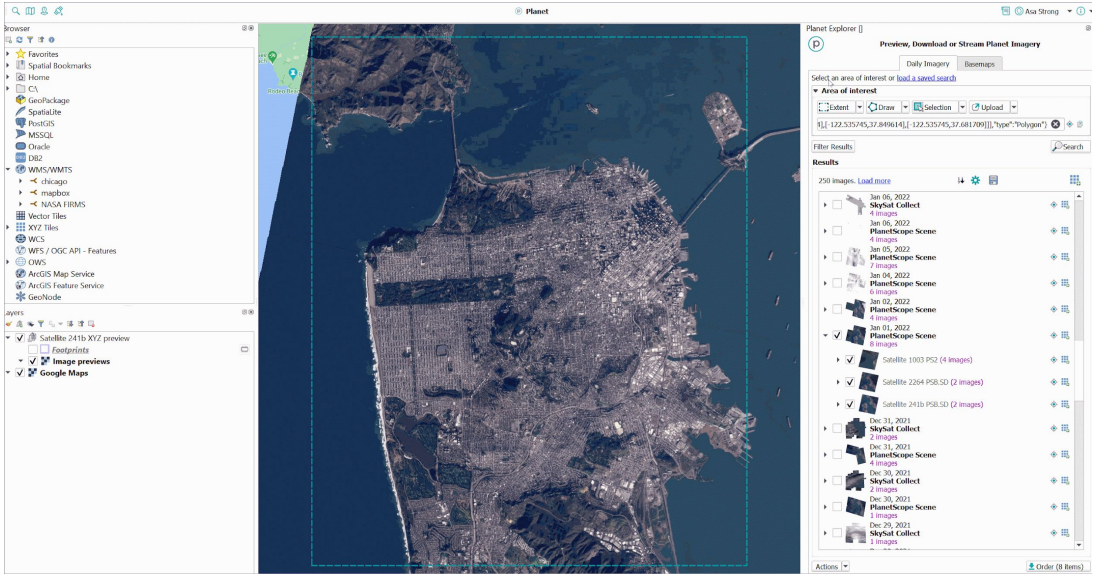
- Users can still access and order their legacy image types via their saved searches
- Users will be prompted to update their legacy saved searches to the new PSScene item type



Planet GIS Integrations: V2.2 Released!

Updates to Order

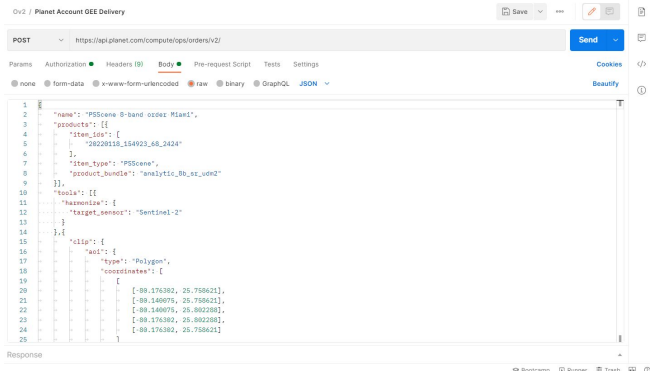
- What users can order is reflective of what they filtered for
- E.g., if the “NIR” filter is applied you will be able to order 4-band and 8-band assets
- Users can apply the harmonization and clip tools to their orders at check out

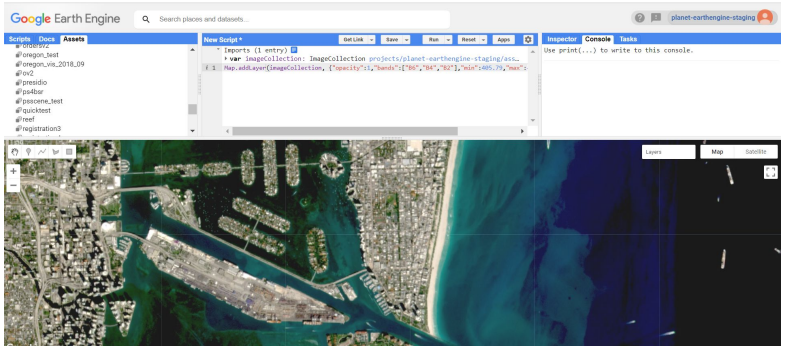


Planet GEE Delivery Integration

Updates to the Orders API

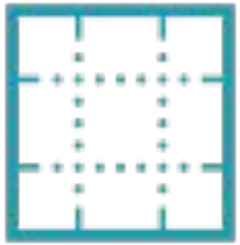
- Users can deliver PSScene AND PSScene4Band item types via the GEE Delivery destination from the Orders API
- Users can also apply the harmonization tool and clip tool to their GEE deliveries
- We also added delivery support for a few new assets like pansharpened and sr assets for SkySat item types





Planet APIs

The bedrock of the Planet Platform

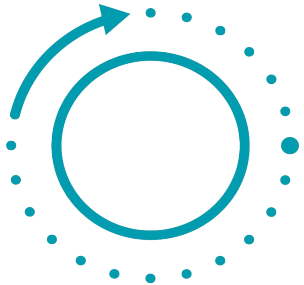


Data API

Discovery of available PlanetScope data

Orders API

One-time bulk delivery of PlanetScope data



Subscription API

Archive & ongoing delivery of PlanetScope data

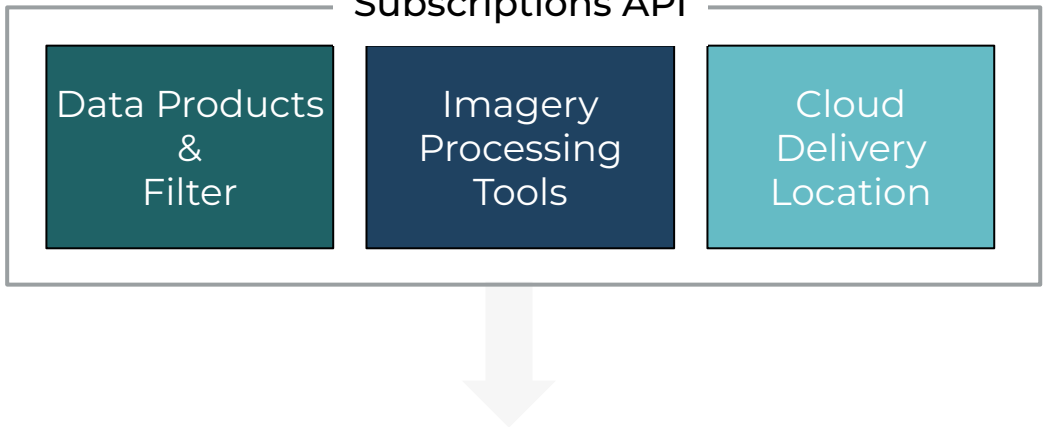
Scale with Subscriptions API

Create A Single Subscription

Search, Processing, and Delivery in a single API.

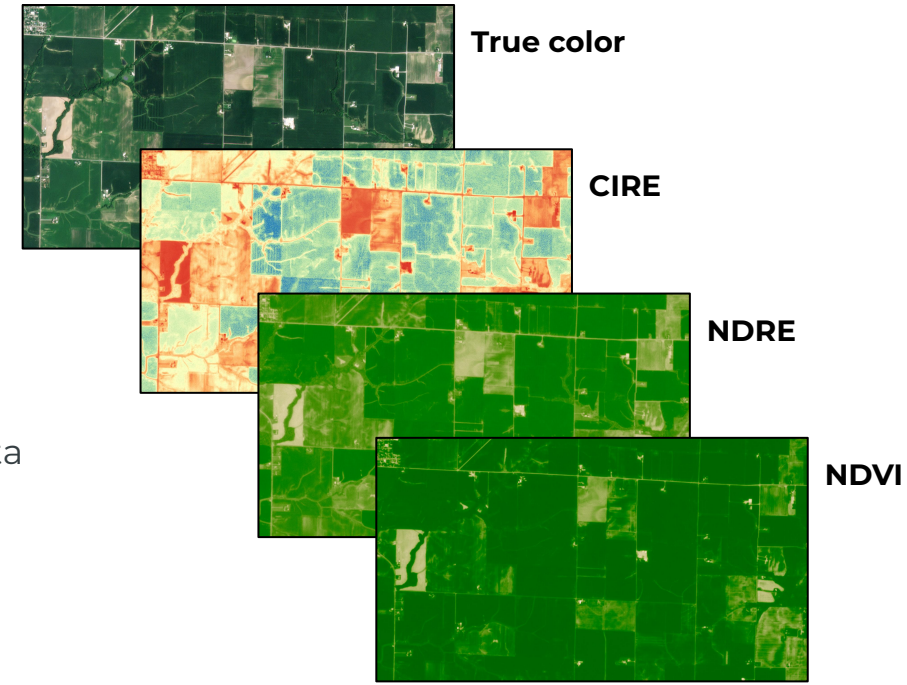
With one API call, get continuous delivery of the imagery and metadata that meet your criteria.

Set-it-and-forget-it ordering that powers scale and efficiencies



Band math, delivered

Orders &
Subscriptions
APIs



- Band math handled by Planet API and calculated indices delivered directly to you
- Simplified imagery management with raw data and indices stored in the same raster
- Up to 15 different calculations per order

Harmonization

New sensor target in the APIs

- Haromization to Sentinel-2 radiometry handled by Planet API and delivered directly to you
- Drive consistency within your workflows by having Planet deliver harmonized imagery at scale
- Available in the Orders & Subscriptions API

```
"tools": [{
  "type": "harmonize",
      "parameters": {
      "target_sensor": "Sentinel-2"
      }]
```

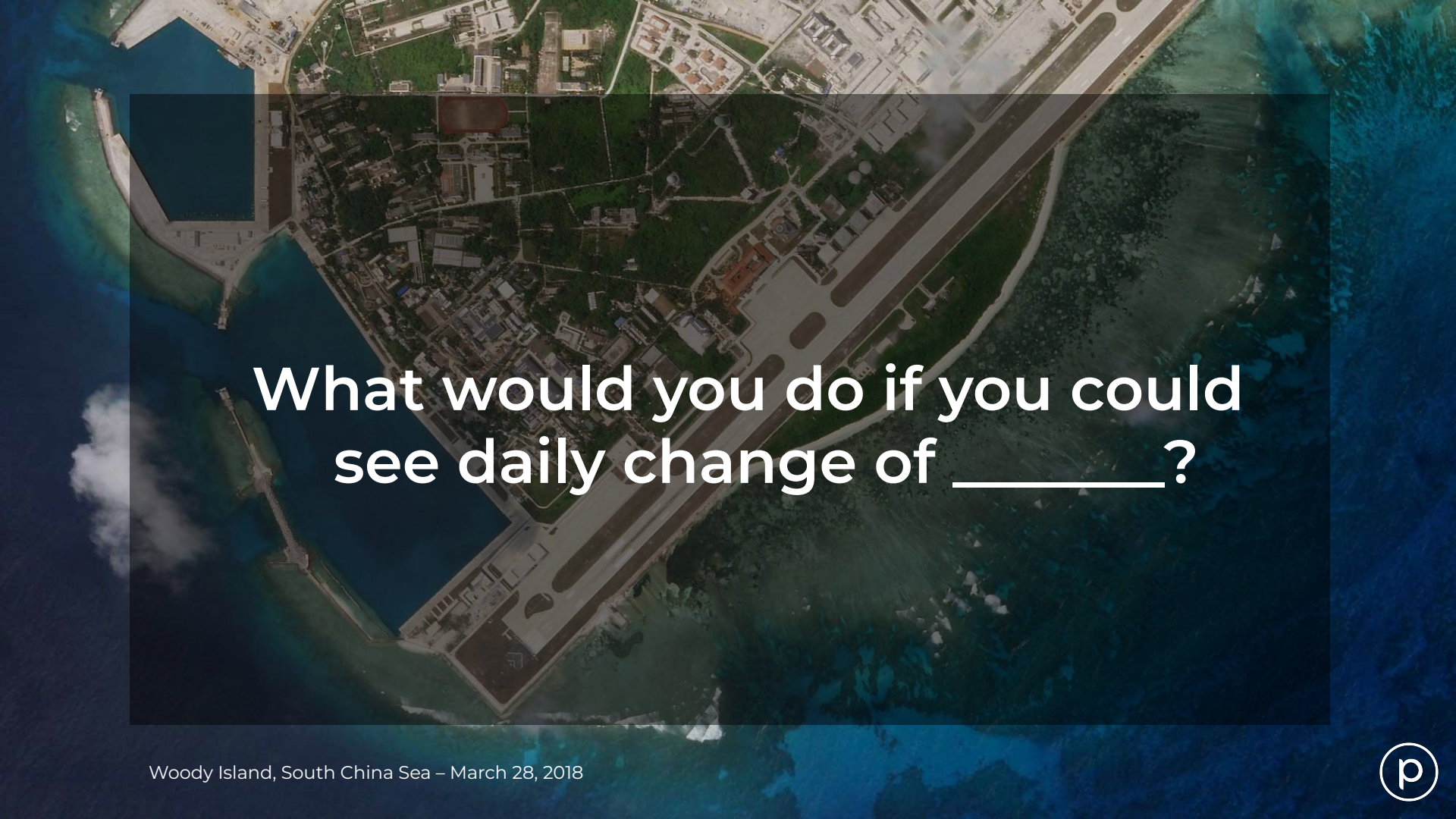
Resources to Get Started

- Planet Imagery Product Specifications Guide
- Planet Technical Support Help Center
- Planet Developer Resource Center
- Planet Documentation
- Dove Harmonization Technical Information
- Dove On-Orbit Radiometric Calibration
- Sign up for Planet Science Updates
- NASA CSDA Program

Upcoming Trainings (1–2x/month)

- **April 28, 9AM PT/12PM ET** - Radiometric Calibration of PlanetScope and SkySat Data
  - Dr. Hannah Bourne, Scientific Geospatial Software Engineer at Planet, will describe the process for radiometric calibration of our PlanetScope and SkySat data using near-simultaneous crossovers with Sentinel-2.
  - Register here

- Sign up for our monthly Science Update to be notified of future training sessions, new papers from the research community, and more!



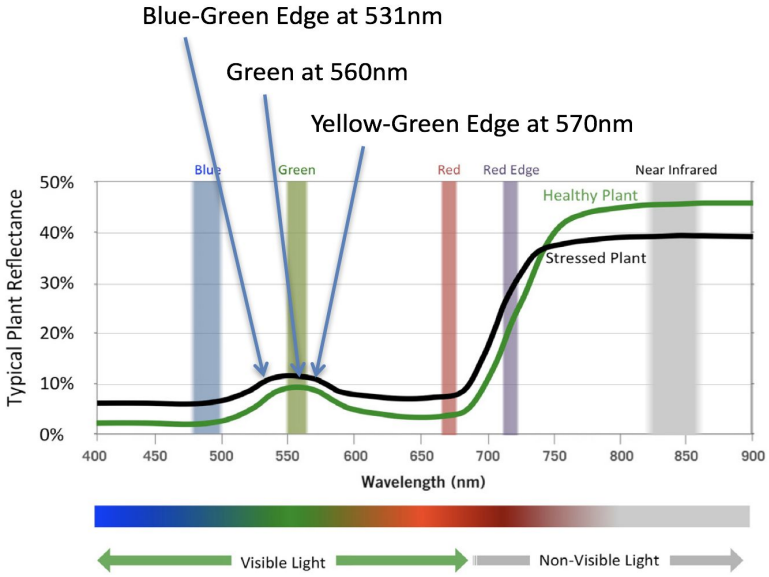
Woody Island, South China Sea – March 28, 2018

Questions?

tanya@planet.com

BACKUP SLIDES

WHY 2 GREEN-EDGE BANDS?



- When vegetation undergoes stress (loss of chlorophyll due to nitrogen or water stress), the **peak** of the green reflectance noticeably **shifts towards yellow**.
- Research strongly suggests that this shift is observable **earlier** than the red-edge shift towards Red.

What new vegetation indices can be calculated?

1. PRI (Photochemical-Response-Index) (Gamon, et al. 1992)
   - index uses 2 green-edge bands on either side of the green peak in order to observe this shift at 531nm and 570nm respectively.
   - PRI is also related to LUE (Light Use Efficiency). LUE drives photosynthetic fixation of CO2 and determination of GPP (Gross Primary Productivity) for biomass growth modeling.
2. CCI (Chlorophyll-Carotenoid-Index) (Gamon, et al. 2016)
   - CCI is sensitive to seasonally changing chlorophyll / carotenoid pigment ratios, and is a suitable method for tracking photosynthetic activity in evergreen conifers.
   - Helps to improve carbon uptake models

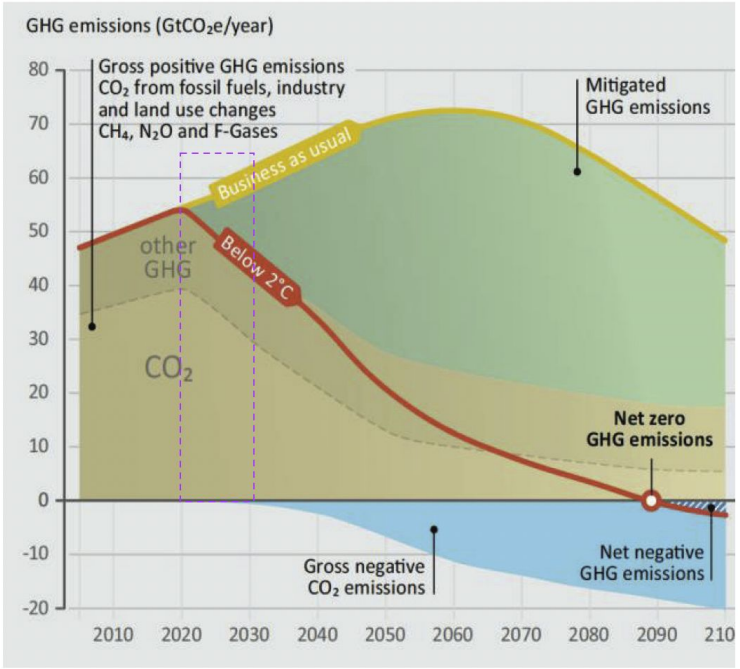
Carbon Mapper

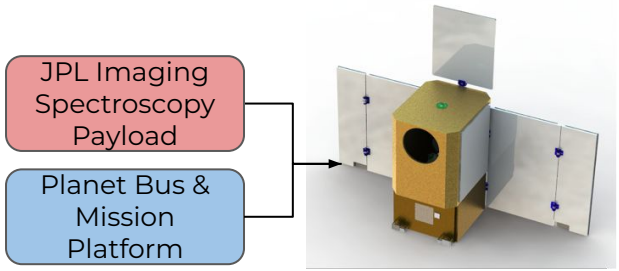
SATELLITES	GSD	CAPACITY
TBD	**30 m**	**93k - 315k km²**/day/satellite

ORBIT ALTITUDE	SPECTRAL BANDS
400 km	**400-2500 nm @ 5 nm spacing**

What's Next? Carbon Mapper

- Accelerate near-term mitigation of methane (CH4) super-emitters - critical 10 year window to meet Paris climate objectives
- Builds upon decades of NASA/JPL heritage in imaging spectroscopy and methane research in collaboration with CARB
- This high sensitivity at the methane absorption band makes this data useful to regulators, oil & gas, dairy and landfill operators to directly mitigate methane emission
- Aligns with Planet's values to do good





Carbon Mapper enhances and complements Planet's current capabilities

Spatial

The linear dimension on the ground represented by each pixel

2015: 3.7m pixel Dove

2017: 0.72m pixel SkySat

2020: 0.5m pixel SkySat

Spectral

The ability of a sensor to define fine wavelength intervals

2015: 4 bands (BGRN) Dove

2016: 5 bands RapidEye

2020: 8+ bands Dove

2023: ~400 bands Carbon Mapper Tasking

Temporal

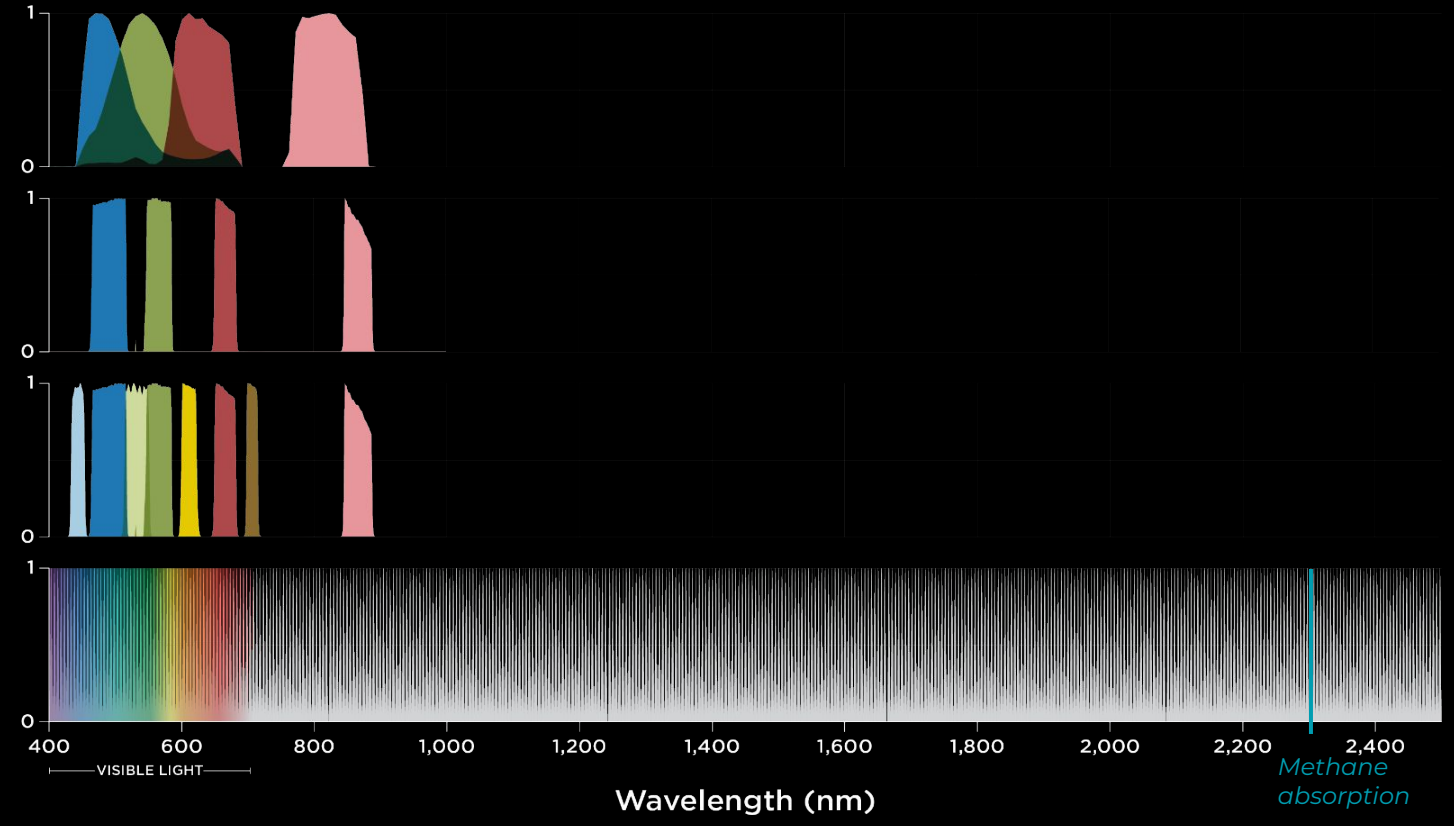
The amount of time needed to revisit and acquire data for the exact same location

2015: Dove Weekly

2017: 2x SkySat; Dove Daily

2020: ~10x Daily SkySat Tasking

Carbon Mapper enhances and complements Planet's current capabilities



PLANETSCOPE

Dove Classic

Dove-R

Superdove

Carbon Mapper

For spectral range comparison purposes only – sensor does not provide uniform reflectance across spectrum.