SIOS-Planet Call for Proposals
Demonstration of the HR data in the Arctic

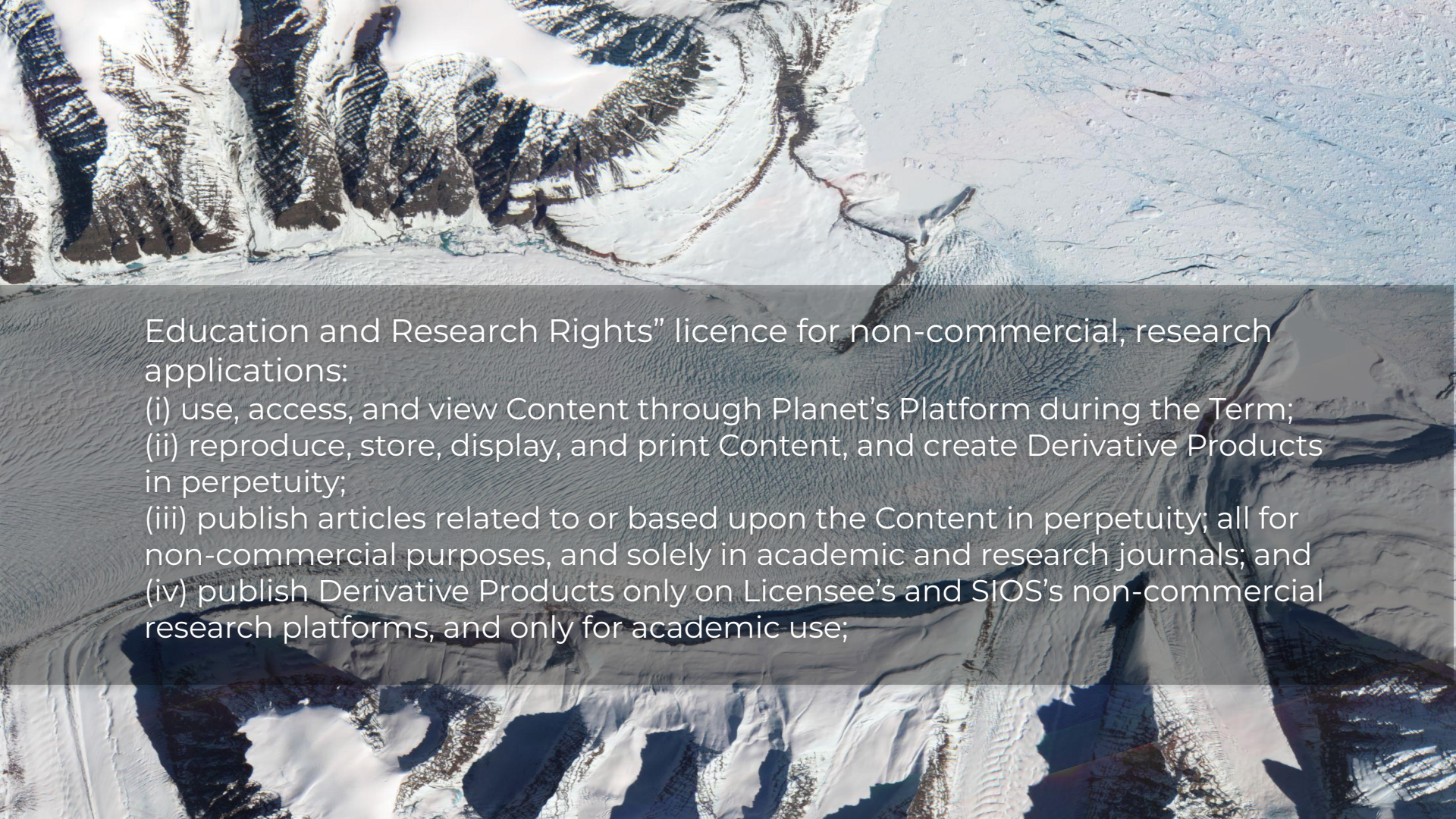
Rhodri Phillips & Regina Kozyra, Planet Labs Germany GmbH

20th January 2023

SkySat image, Svalbard - 16 May 2021

Data grant for selected projects:

- 200,000 km2 to be distributed between PlanetScope all-time imagery (archive + monitoring), RapidEye archive and SkySat archive, access and download, incl. premium clipping
- 5,000 km2 for SkySat flexible tasking
- Unlimited PlanetScope tile view bundle



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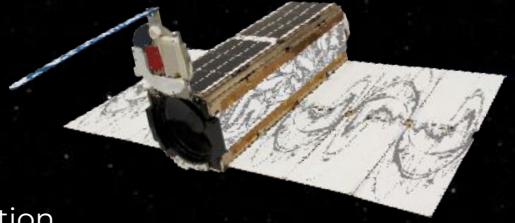
PLANET'S CONSTELLATIONS
LARGEST EO- SATELLITE FLEET

Always-on,
Broad Area Monitoring



- 3.0 meter resolution
- Daily imagery collection, no tasking required
- RGB and NIR bands
- Red-Edge, CB, Y, GI
- Archive back to 2014

150+

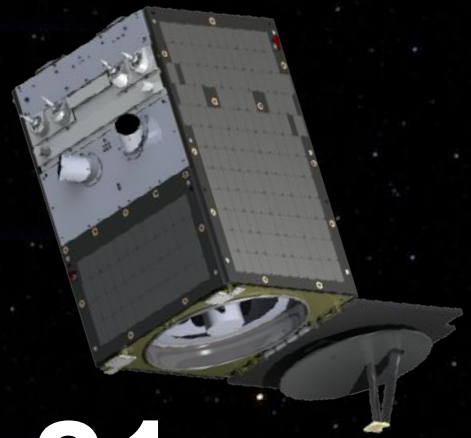
Dove Satellites

PlanetScope

21

SkySat

Satellites



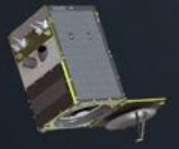
Rapid Revisit,
Targeted Monitoring

- 0.5 meter resolution
- Sub-daily imagery tasking
- RGB, NIR, and Pan bands
- Archive back to 2014

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

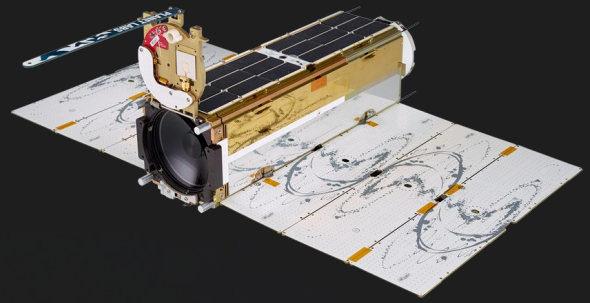
Planet SkySat Constellation

SkySats 1-15

~98º Sun-Synchronous Orbit

SkySats 16-21

~53º Inclined Orbit



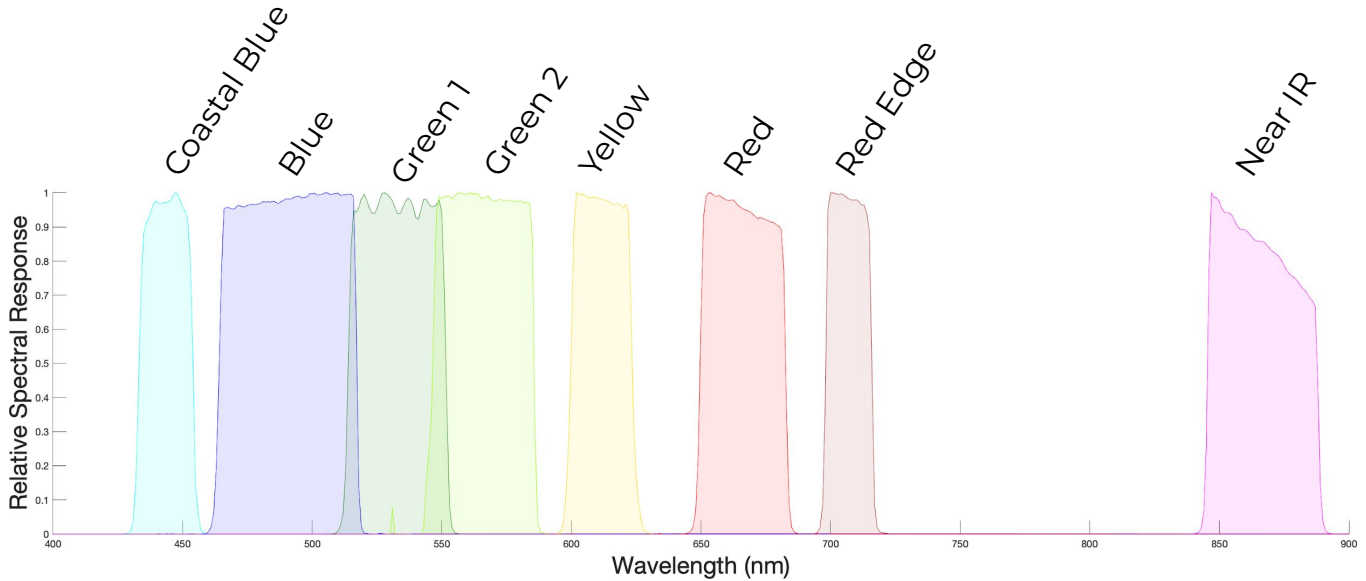
Doves

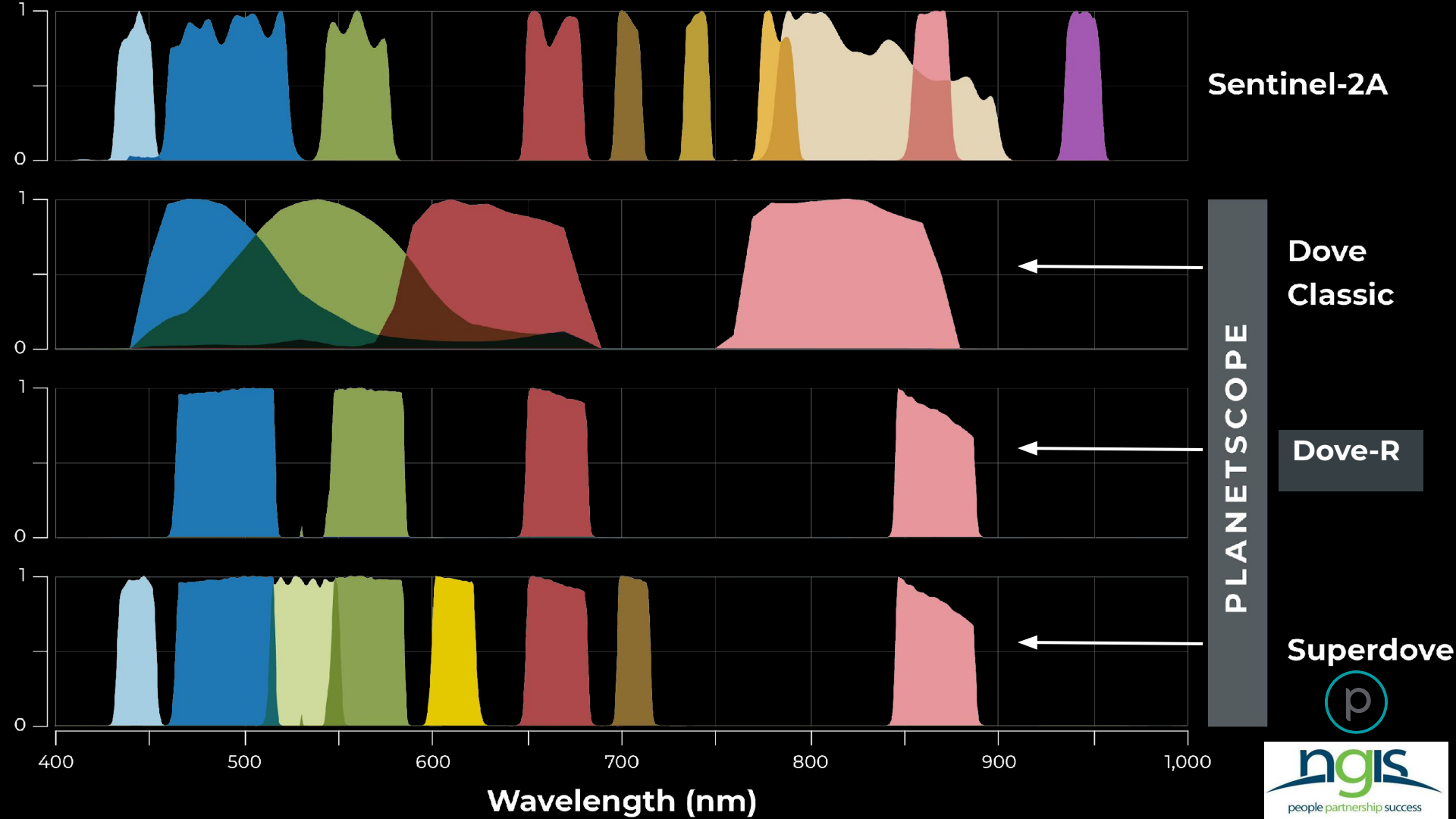
SATELLITES	GSD	CAPACITY
150+	**3.7 m**	**200 million km²**/day

ORBIT ALTITUDE	SPECTRAL BANDS
475 km	**RGB** and **NIR** + **GI, CB, Y & RE**

SuperDove Spectral Bands

From remote sensing perspective, the SuperDove bands offer insights that are land cover and application specific




Sentinel-2A
Dove Classic
Dove-R
Superdove
PLANETSCOPE
1
0
400
500
600
700
800
900
1,000
Wavelength (nm)

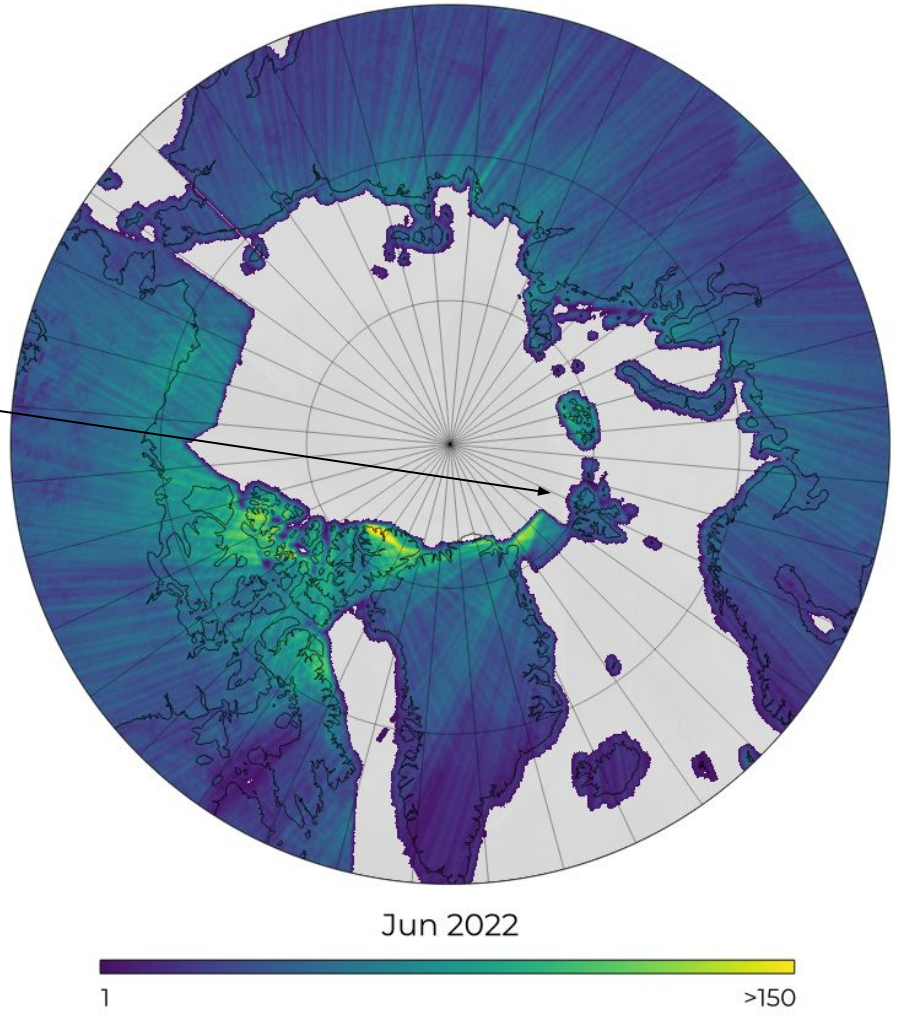
PS Arctic Coverage

June 2022

Current superdove orbits extend to 83N latitude

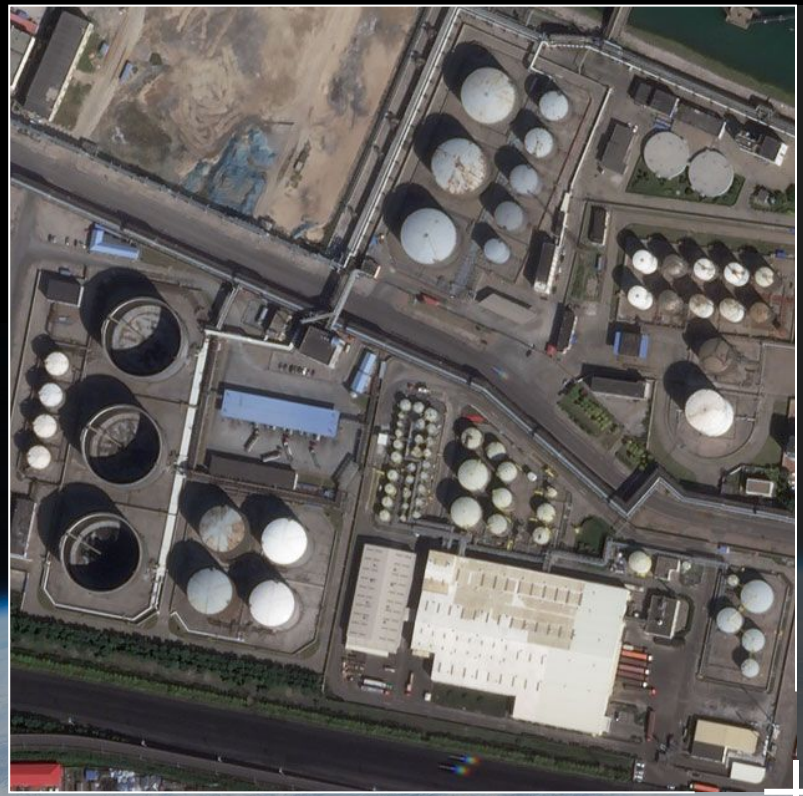
Full coverage of Svalbard

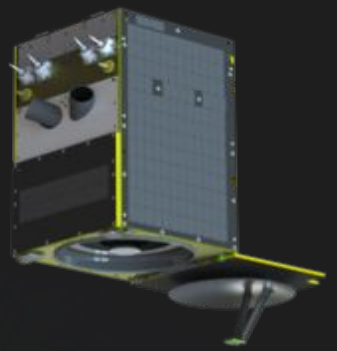
Best coverage Apr-Aug



PlanetScope image, Svalbard - 09 Aug 2021

PlanetScope image, Svalbard - 21 Aug 2022





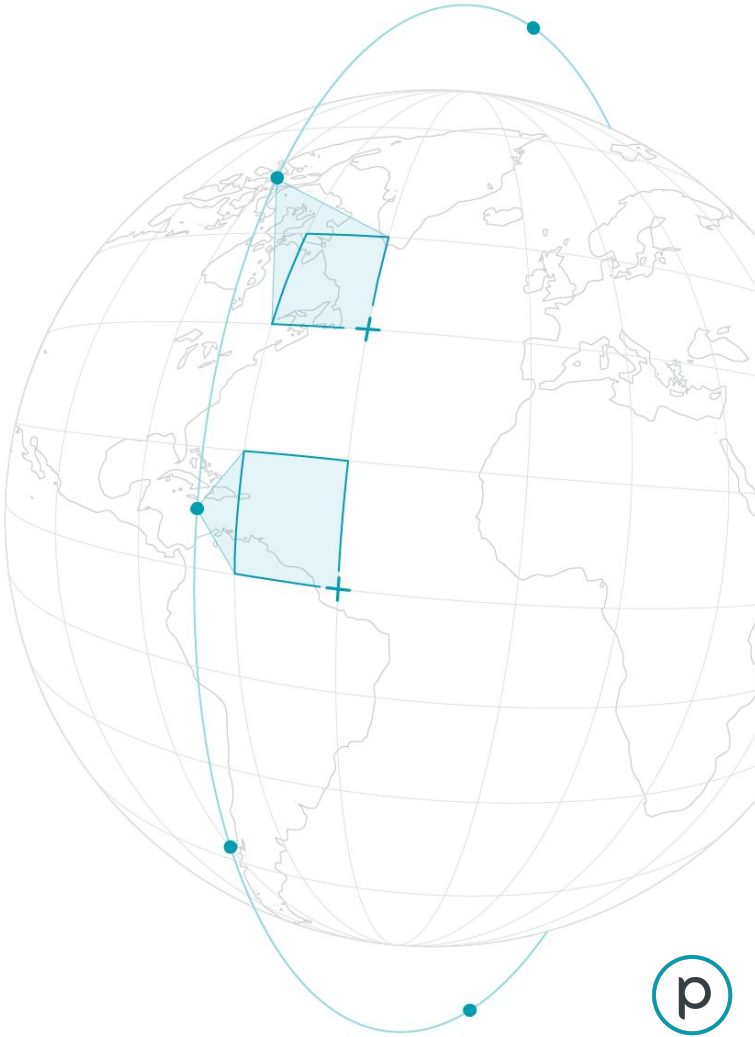
SkySat

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

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

High Resolution Tasking

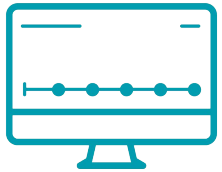
- **Image any point on Earth** at 50 cm resolution
- **Intra Day** revisit - Multiple captures per day
- **On-demand** collection via Tasking API
- **Monthly, weekly, or daily** monitoring of AOIs
- **Rapid access** to 10M+ sq km of SkySat archive dating to 2014



DELIVERY OPTIONS

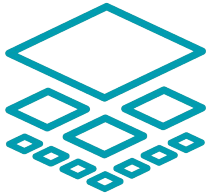
PLANET API

REST API access to Planet imagery



PLANET EXPLORER

Web-based user interface for browsing & downloading Planet imagery

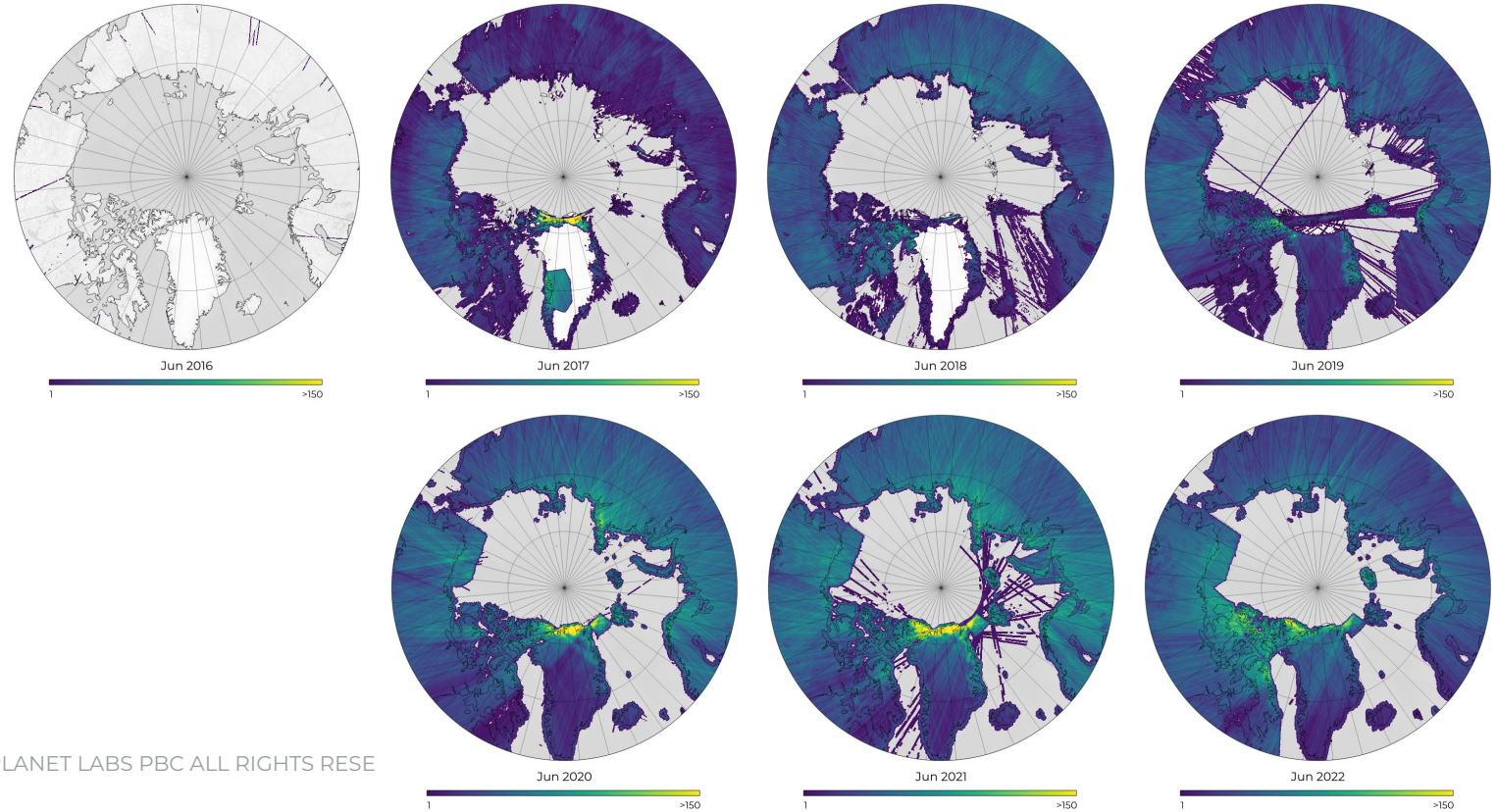


WMTS

Integrate with WMTS compliant application, i.e. ArcGIS, QGIS, InterGraph, and more.

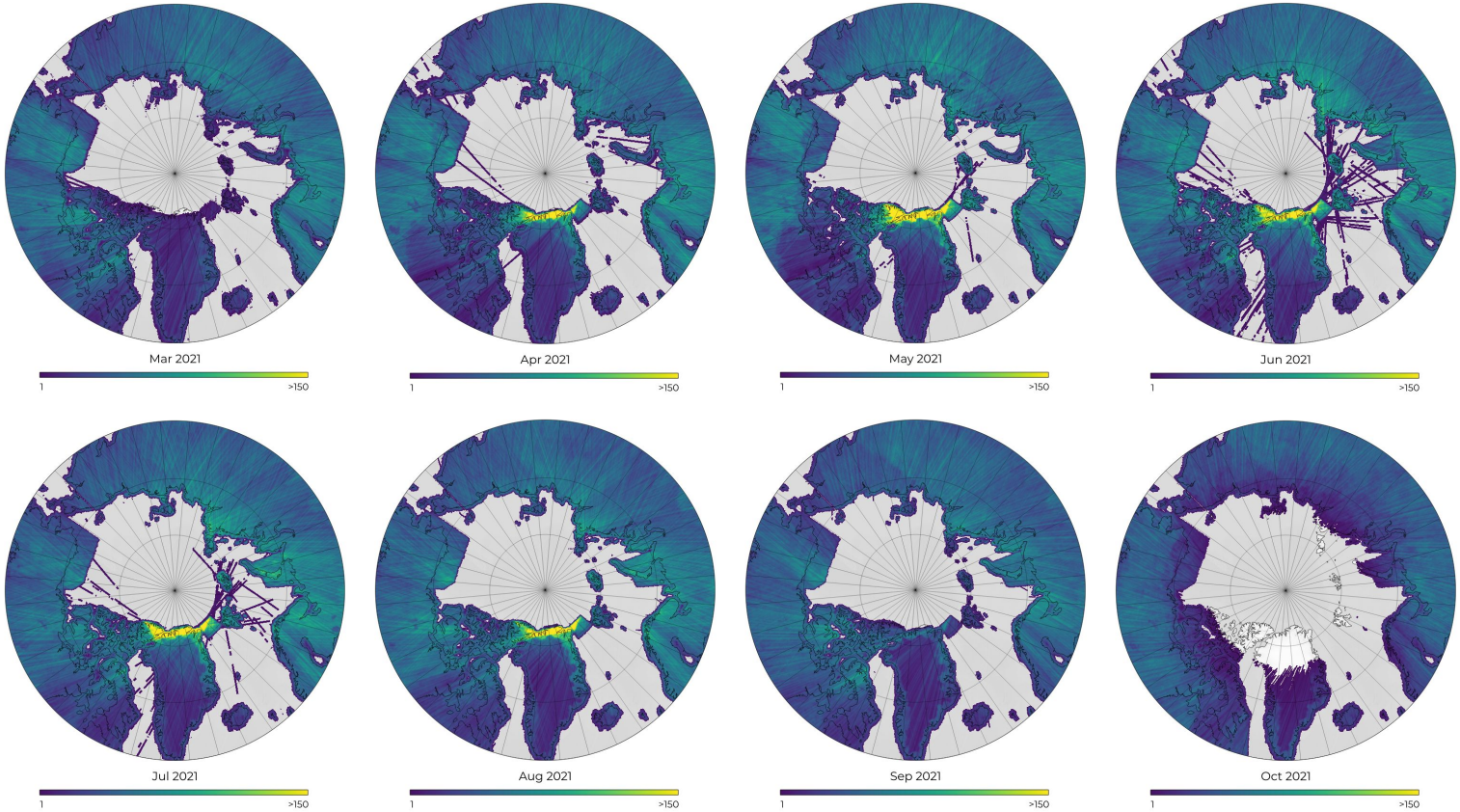
Good Coverage to 2020, Some Coverage to 2017

Published Coverage for June 2017-2022



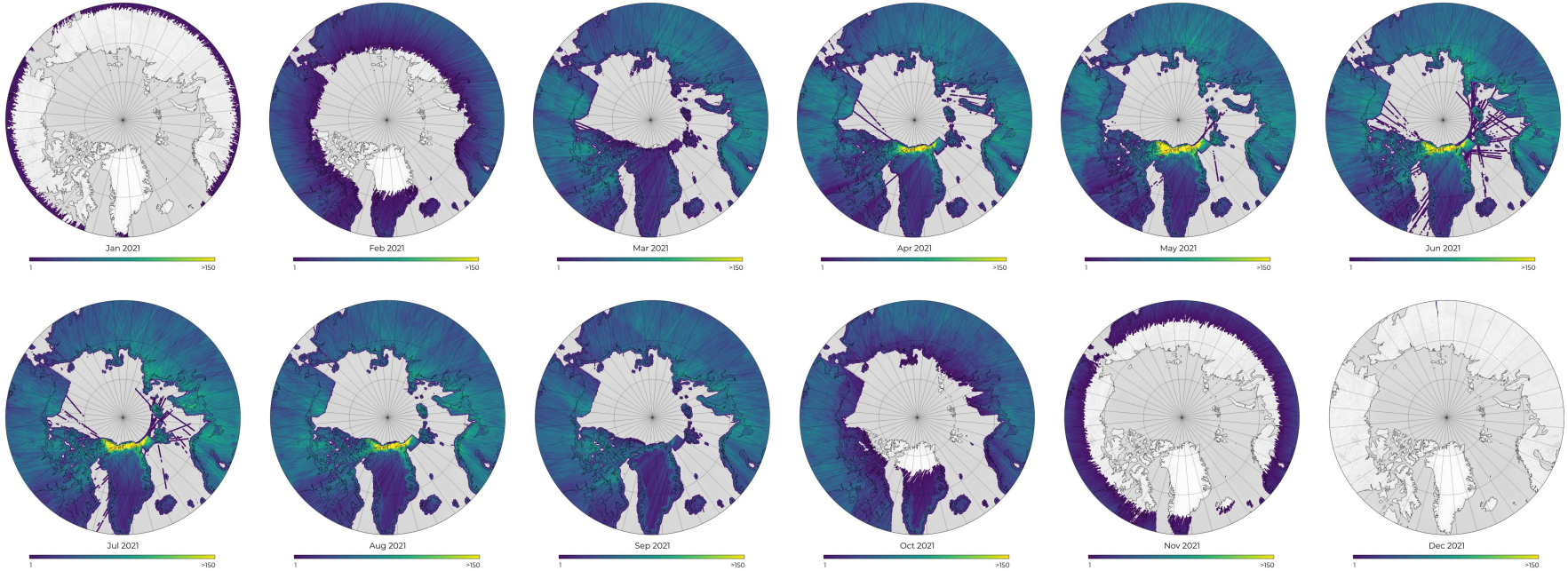
Good Coverage in Summer

Published Coverage 2021, note marginal coverage in March and October



Little Coverage in Nov-Feb

Published coverage for 2021, controlled by sun angle (no imaging below 10 deg)



Seasonal and Historical Coverage

Summary:

- Daily multiple captures over higher latitudes
- Arctic coverage archive from 2017
- Best coverage in April-August
- Marginal coverage in March+October
- Limited coverage in Nov,Dec,Jan,Feb
- Limited open water coverage

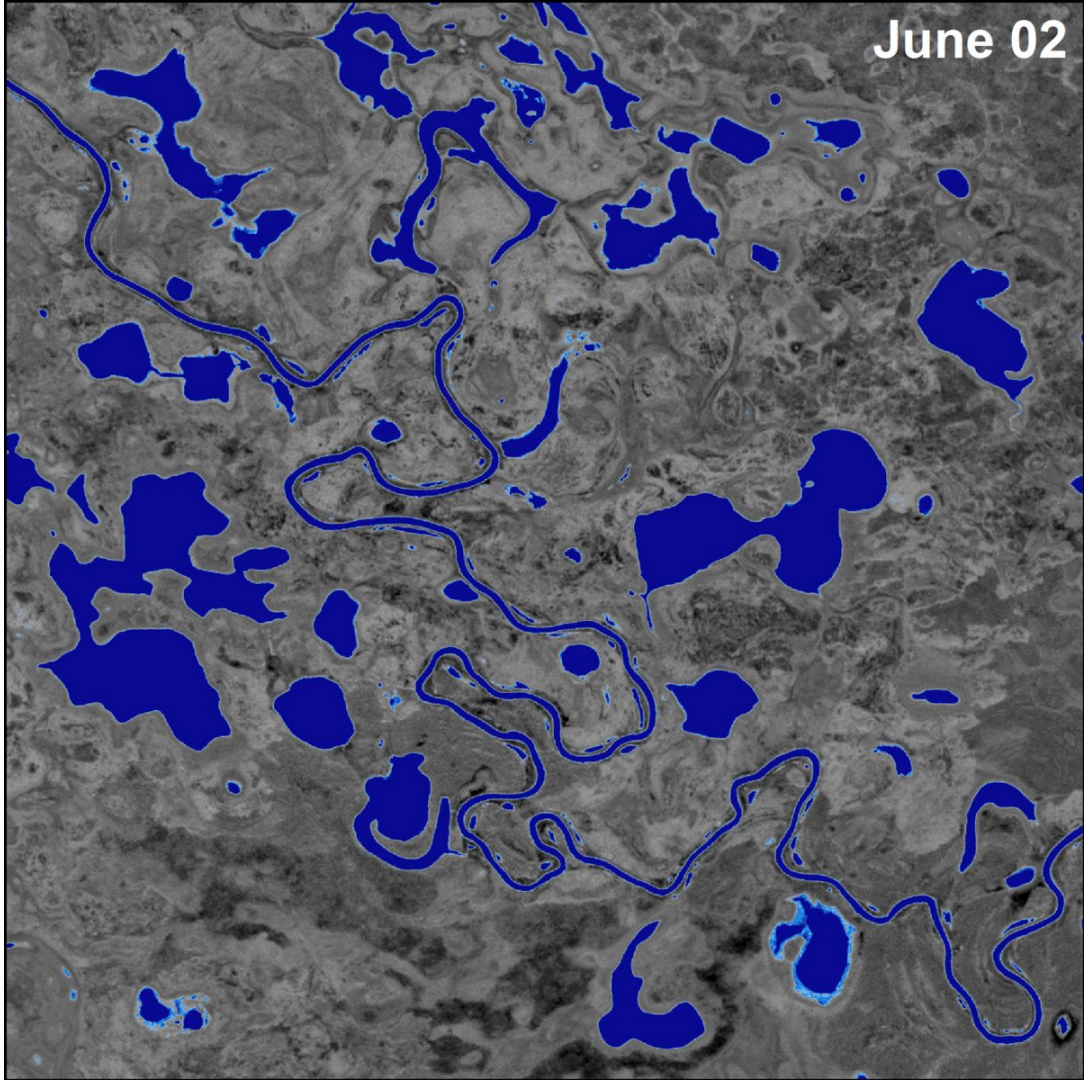
LONDON ARRAY WIND FARM · United Kingdom · April 17, 2016

Explorer Demo

Lake Tuborg, Canada – May 30, 2015

Seasonal changes of high-latitude lakes

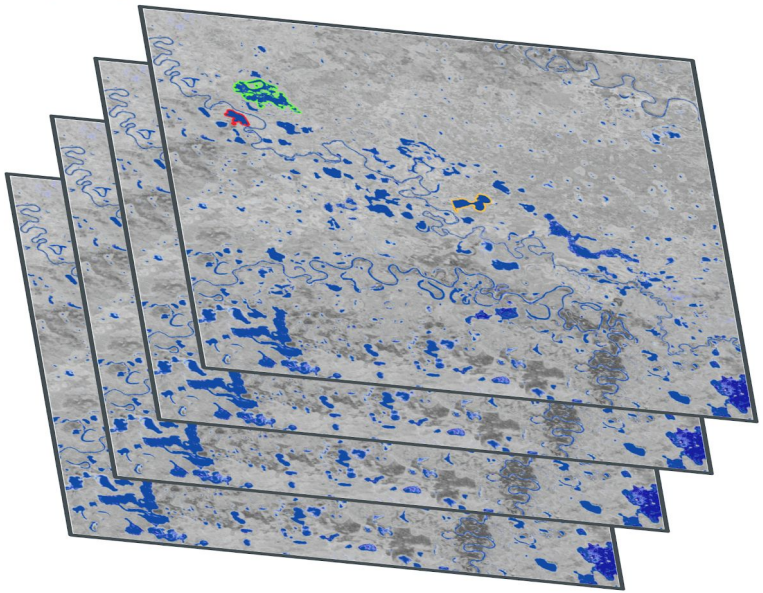
- Used **thousands** of Dove images to track near-daily changes in water extent via machine learning across Alaska and Northern Canada
- Revealed that in some areas, lake shorelines **fluctuated much more widely than previously known**
- Suggests these lakes are potentially **emitting more greenhouse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



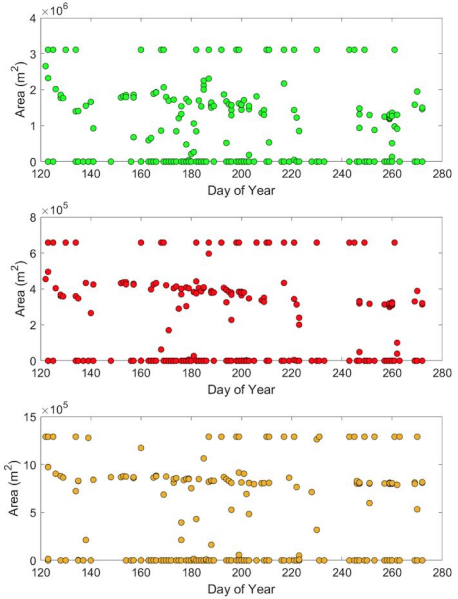
Lake Classification and Tracking Method

Initial image selection → Create initial buffered mask → Classify water fraction → **Create lake area time series** → Filter lake area time series

Create time series of lake area by calculating the total water area contained within the initial buffered mask for every image



Raw Time Series of Lake Area

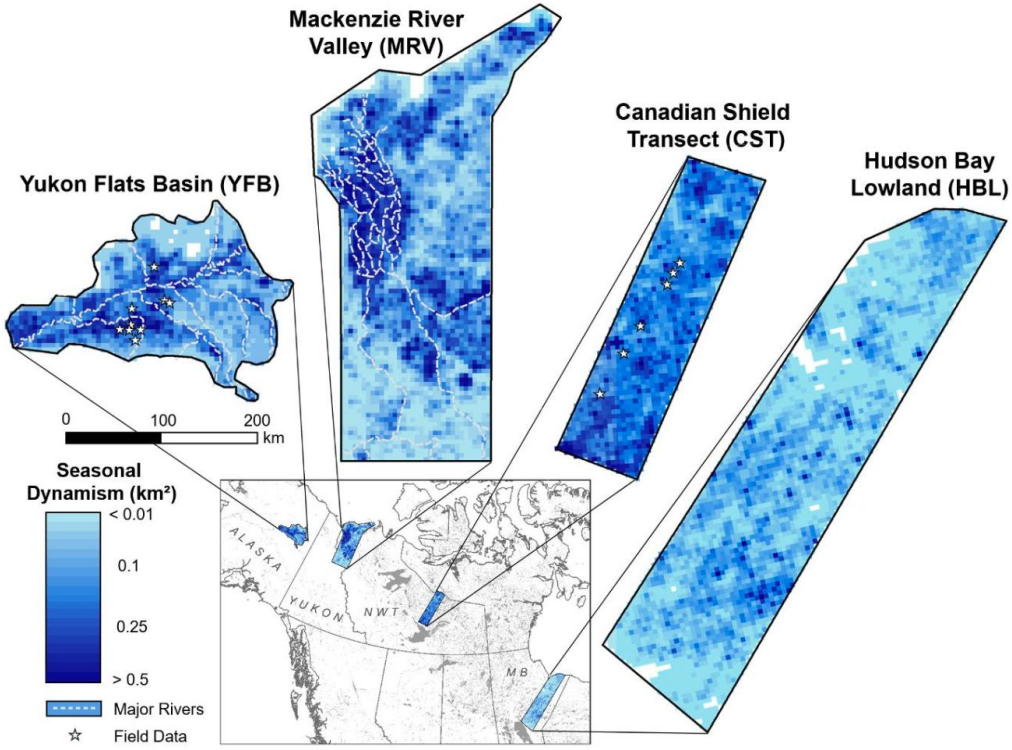


Sarah Cooley, Brown University

Seasonal dynamism of high-latitude lakes

- 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



Cooley et al. (2019)

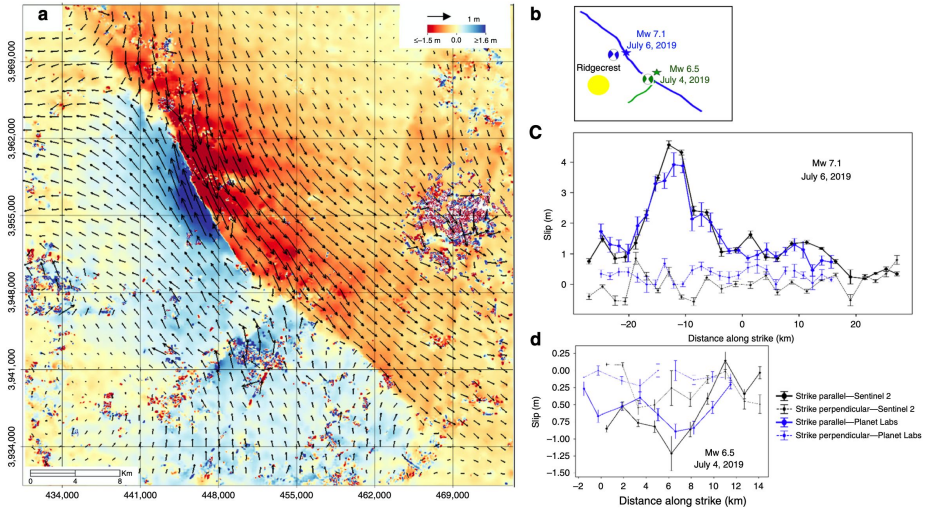
Planet Publications across the Earth System

More than 1200 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

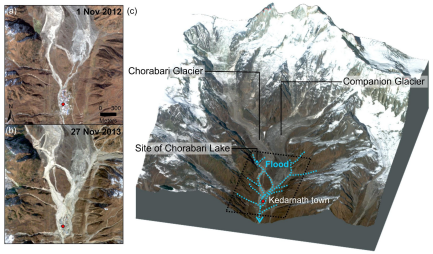
Planet data used to understand surface deformation and other displacement events in near-real time, in combination with other sensors



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.

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.

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.



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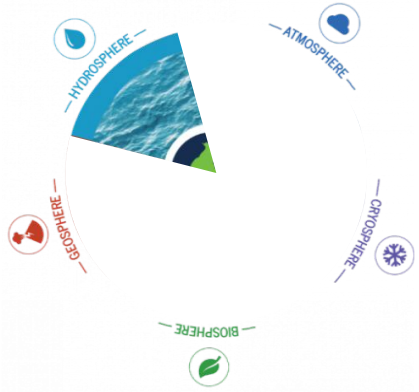
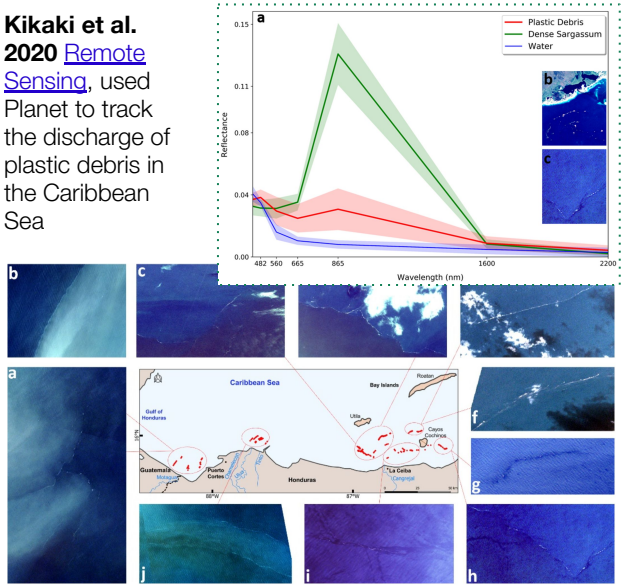


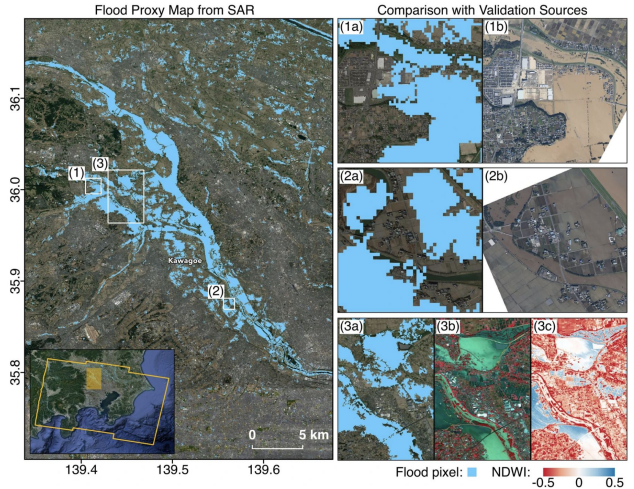
Coral reef bathymetry, habitat classification;
Flooding;
Stream discharge and sediment transport;
Marine ecosystems;

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

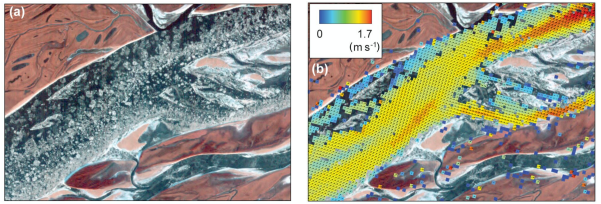
Kikaki et al. 2020 Remote Sensing, used Planet to track the discharge of plastic debris in the Caribbean Sea





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.



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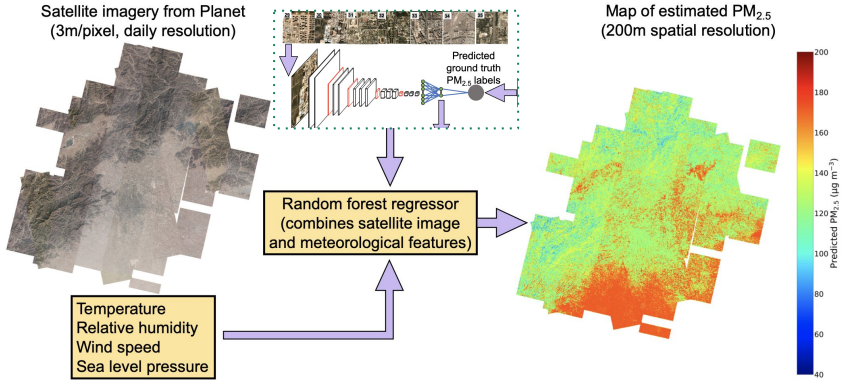
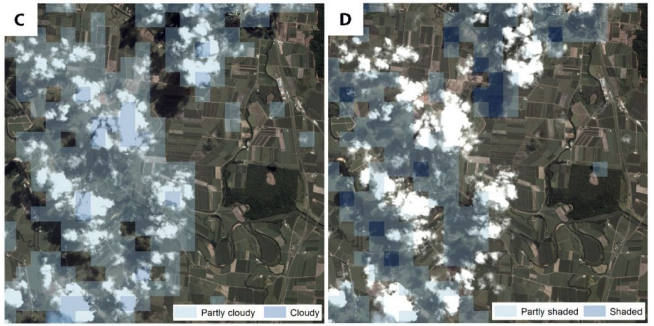
Atmospheric correction;
Air quality;
Cloud masking

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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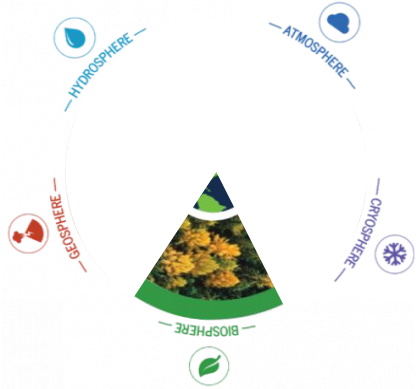
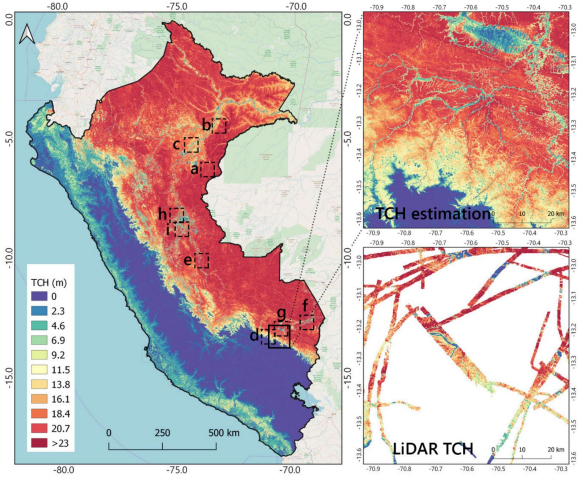


Ecosystem structure, properties and biodiversity;
Crop yields;
Vegetation phenology;

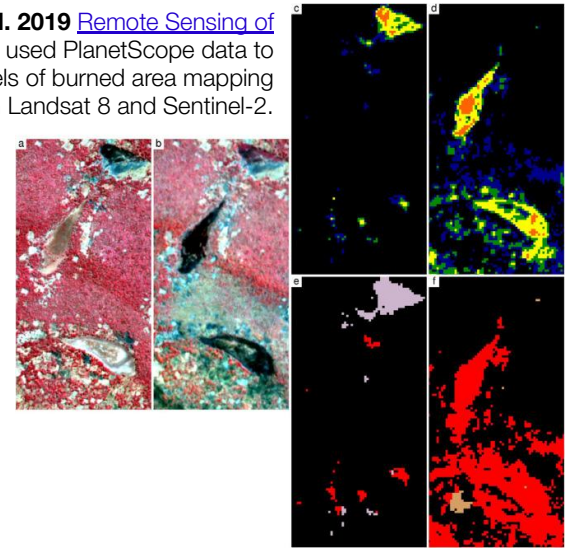
See also, e.g.,
Räsänen et al. 2019, Remote Sensing of Environment

Planet data fused with LiDAR, Landsat, Sentinel for large-scale and accurate exploration of ecosystem properties including forest structure and vegetation phenology

Csillik et al. 2020 Remote Sensing, fused Planet data with airborne LiDAR estimates of top-of-canopy height for large scale (>100M ha), high-resolution (1ha) forest structure mapping in Peru. NASA is now evaluating similar fusion with GEDI LiDAR data from the ISS.



Roy et al. 2019 Remote Sensing of Environment, used PlanetScope data to validate models of burned area mapping created with Landsat 8 and Sentinel-2.



Aguilar and Kuffer 2020 Remote Sensing, used Planet imagery to assess performance against UN Sustainable Development Goals for open space in urban centers.