PLANET: IMAGING THE EARTH EVERY DAY

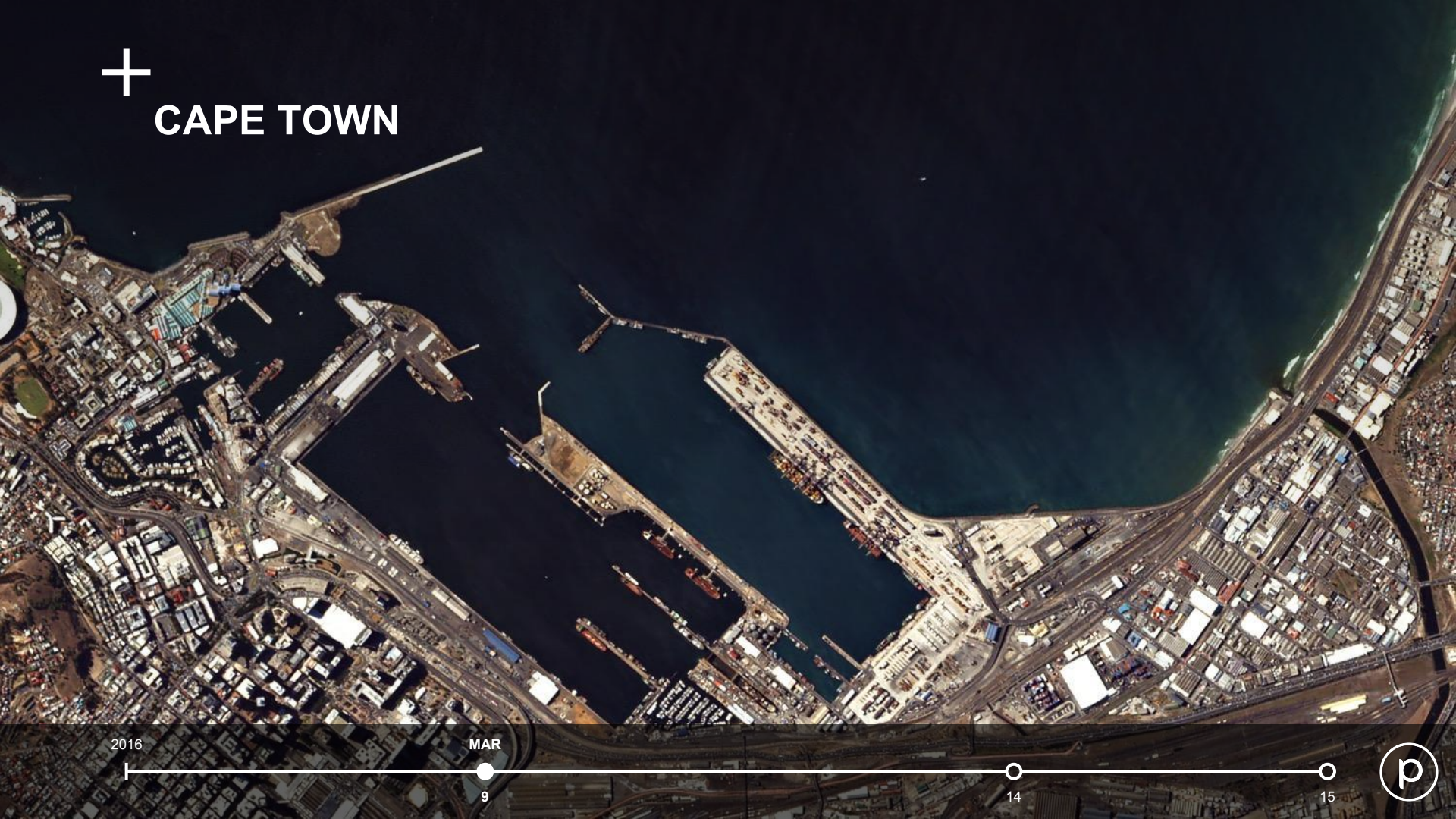
Benjamin Trigona-Harany

Mailiao Refinery, Taiwan – May 31, 2016

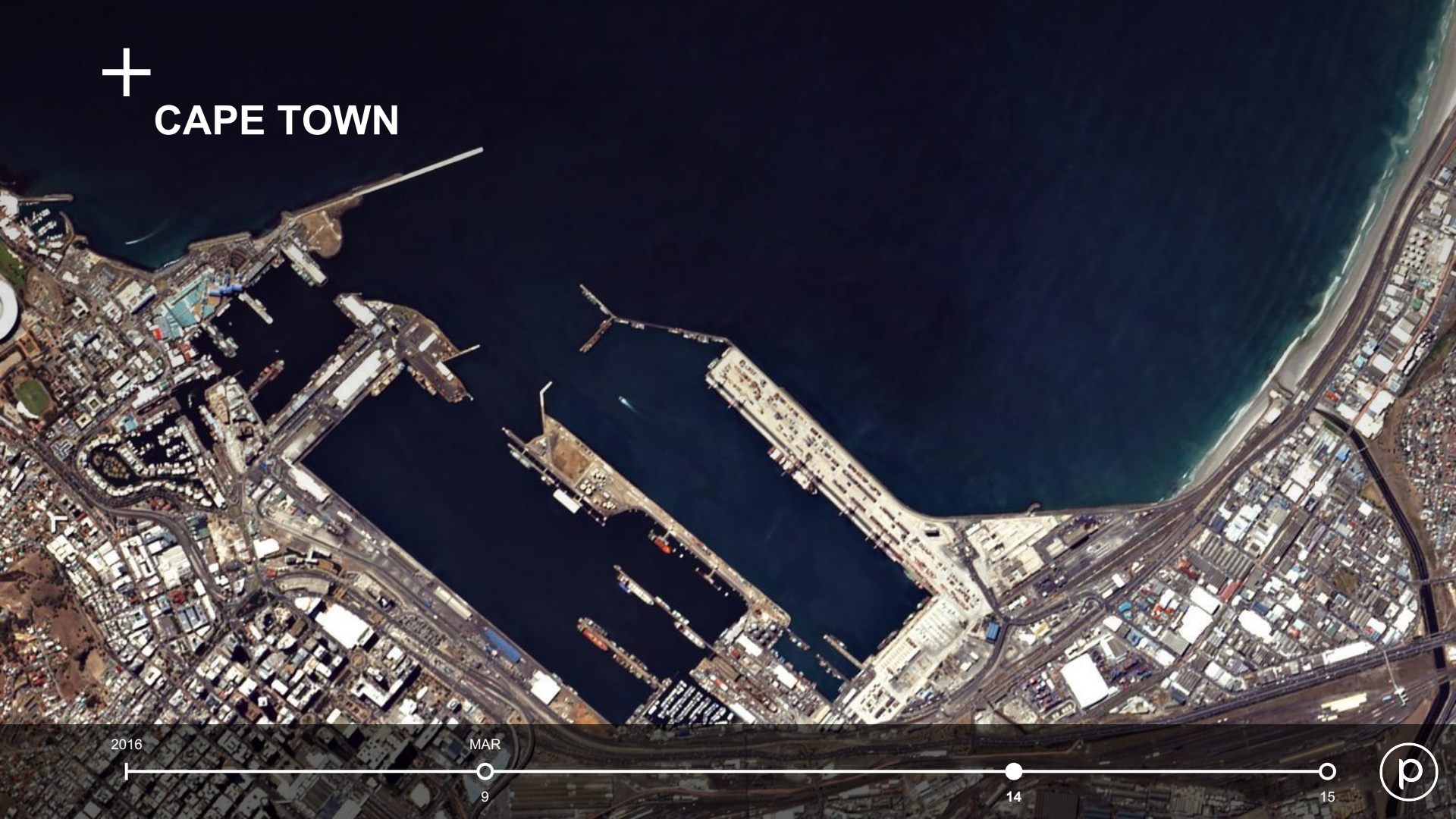
To image the whole world every day, **making change visible, accessible and actionable.**

HONG KONG
January 6, 2016

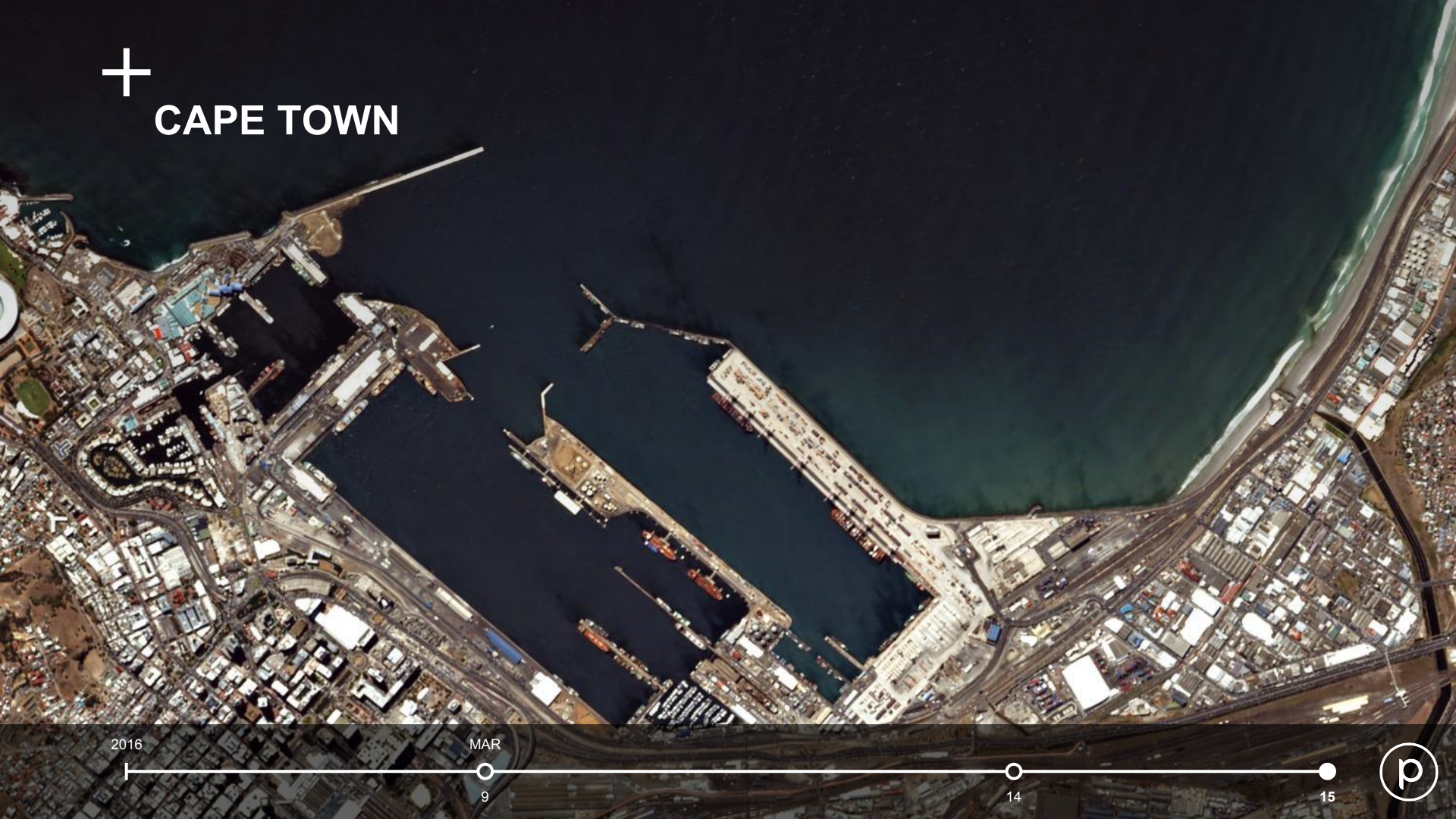
CAPE TOWN



CAPE TOWN



CAPE TOWN



SUGAR CANE HARVESTING
Rio Grande
2016
JAN
MAR
18
24

SUGAR CANE HARVESTING

Rio Grande

END-TO-END SYSTEM

150
Satellites

475KM
Sun Synchronous Orbit

25
Ground stations

9
Sites

1000s
of Virtual Machines

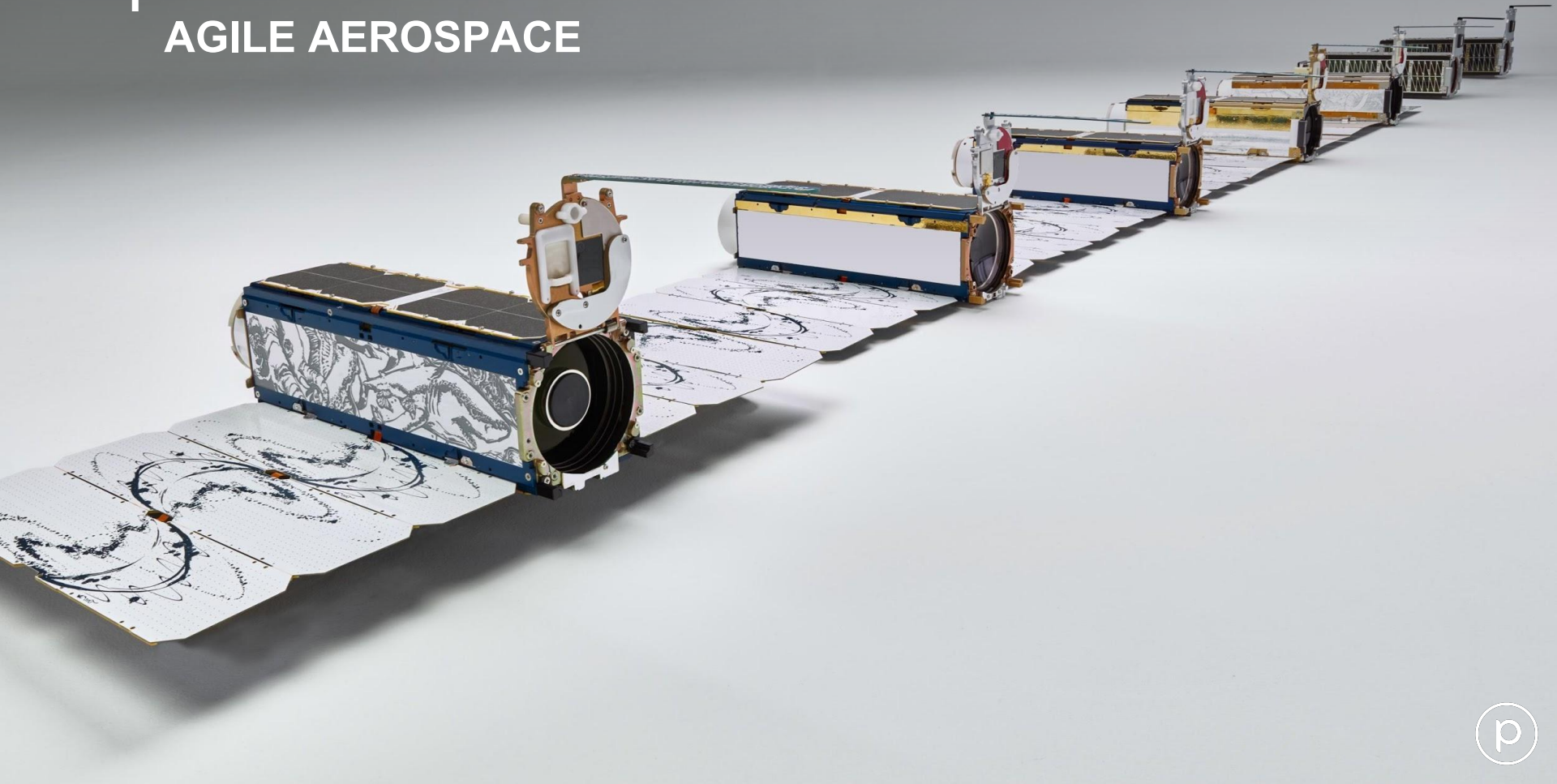
7TB
Downlinked Daily

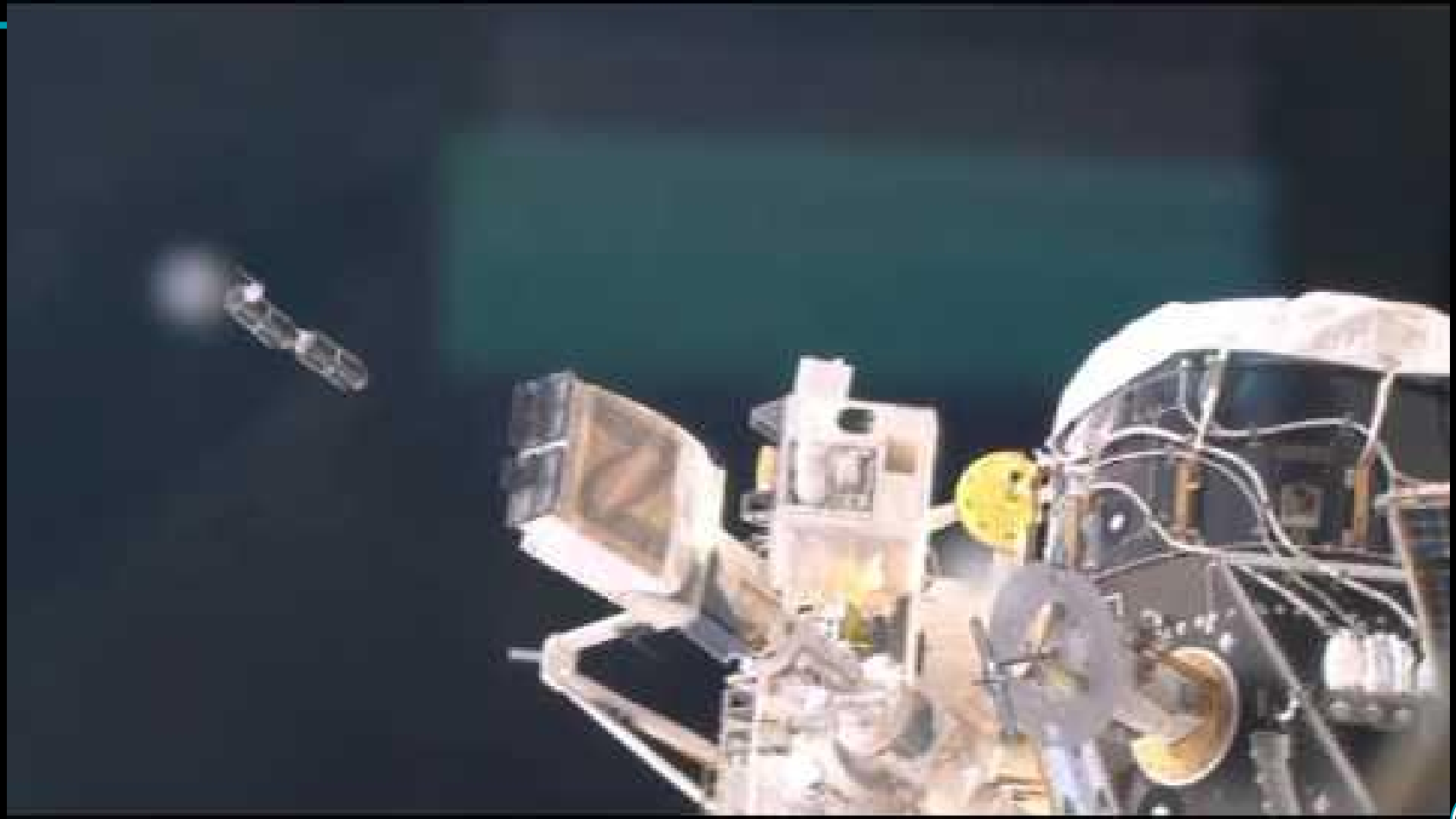
API & GUI
Planet Explorer, Developer Tools and Third-party Applications

Planet is 5 companies in one

1. Satellite design and manufacturing
2. Ground stations
3. Mission control
4. Image processing
5. Software

AGILE AEROSPACE





LAUNCH & MISSIONS
PSLV (88 doves) 14th of February, 2017

PSLV-C37 CARTOSAT 2 S MISSION

ONBOARD CAMERA

NANO SATELLITES P+ SIDE SEPARATION

LAUNCH & MISSIONS

Antares (26 doves) 28th of October, 2014

Tweets 200 | Following 1 | Followers 1,291 | Likes 1

Follow

Doves in space

@dovesinspace

We are in space.

Space

planet.com

Joined July 2015

Tweets | Tweets & replies

Doves in space @dovesinspace · Jul 14

I'm in space now! Satellite Flock 2k Satellite 33 reporting for duty.

1 2 8

Doves in space @dovesinspace · Jul 14

I'm in space now! Satellite Flock 2k Satellite 30 reporting for duty.

4

LAUNCH & MISSIONS

ON BOARD SOFTWARE

Linux

ubuntu

BUILD 7

Build 7 — launched after just 2 years of development — was Planet's first mass-produced satellite. It consisted of a custom telescope mated to an 11-megapixel CCD camera.

FEB 19 — 2015 — NOV 5 — 2016 — SEP 4

BUILD 10

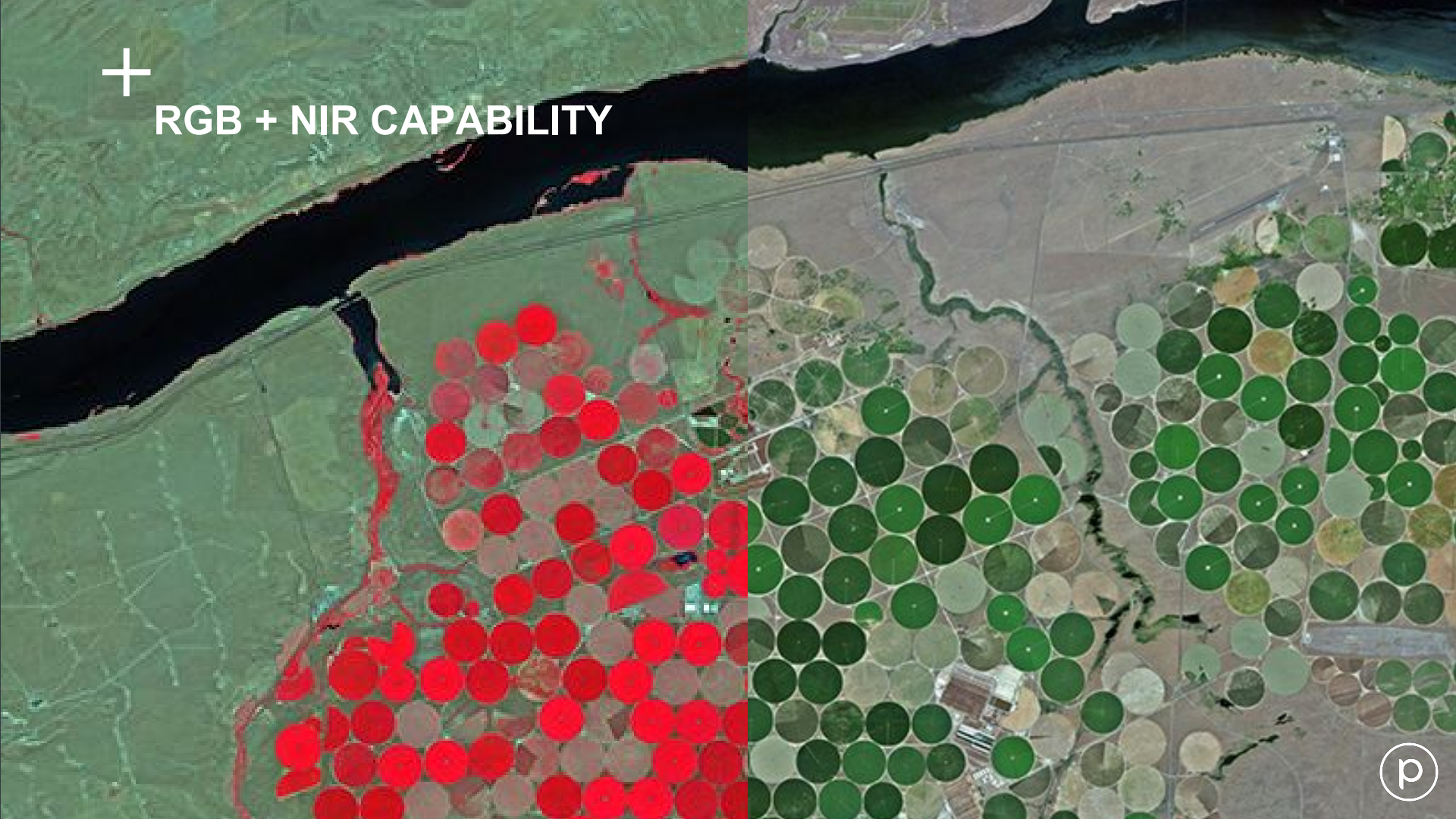
Build 10 introduced an improved carbon-fiber telescope and horizon sensors for more precise attitude control. These innovations resulted in a sharper image, increased signal to noise, and more usable pixels.

FEB 19 — 2015 — NOV 5 — 2016 — SEP 4

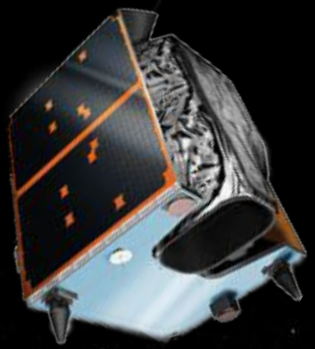
BUILD 13

Build 13 is Planet's most advanced satellite. It employs a 2nd-generation custom telescope, 29 megapixel camera, and star tracker. Together, these enhancements resulted in a greatly increased field-of-view and better edge-to-edge sharpness. In addition, a field programmable gate array processes data onboard, allowing the high throughput necessary for collecting near infrared data.

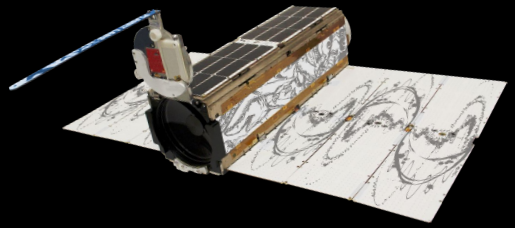
FEB 19 — 2015 — NOV 5 — 2016 — **SEP 4**


RGB + NIR CAPABILITY

PLANET'S CONSTELLATIONS

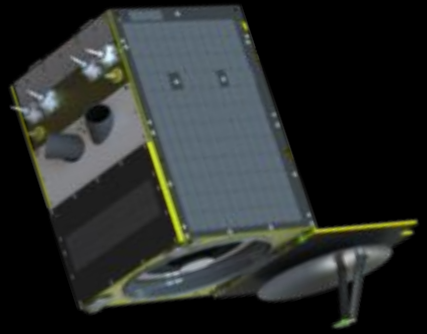


5 RapidEye Satellites



140+

PlanetScope Build 13 Satellites



7 SkySat

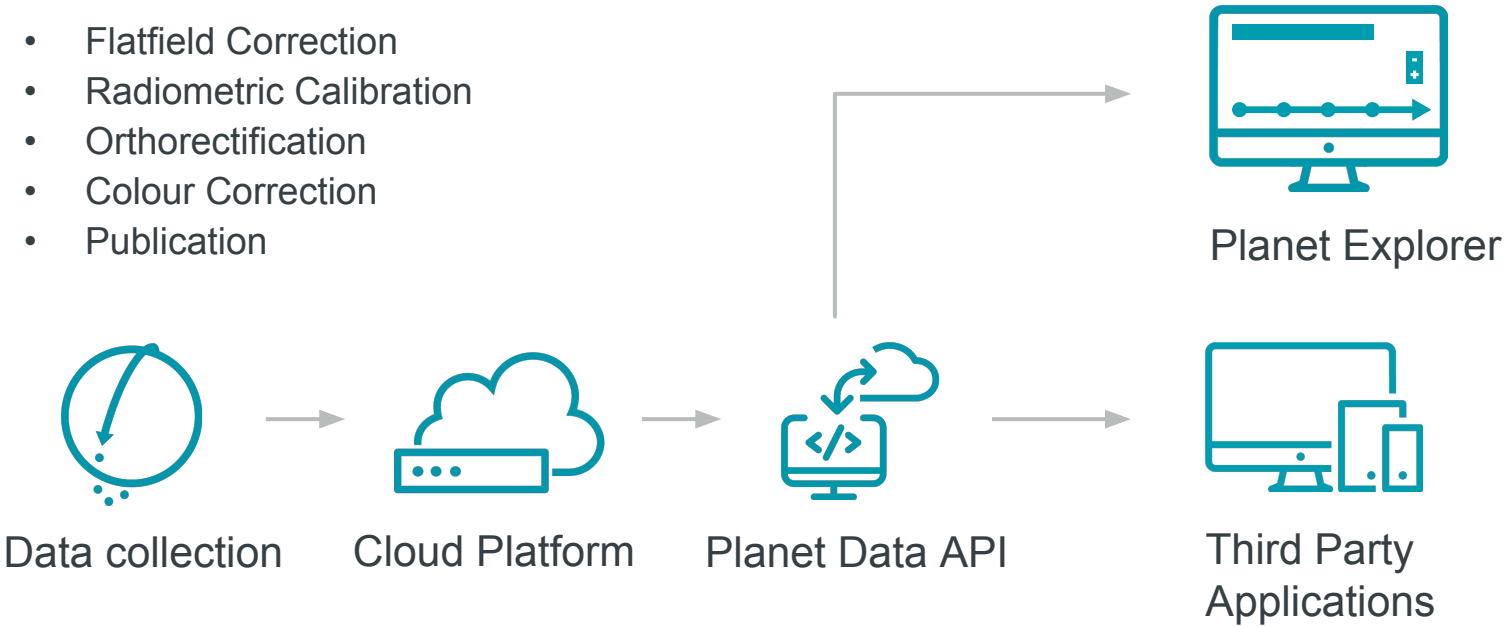
6 More to be launched in 2017

SAMPLE IMAGERY
SkySat A: Frankfurt, Germany

IMAGE PROCESSING

100m individual images in RGB from doves ~40m RE Images

- Flatfield Correction
- Radiometric Calibration
- Orthorectification
- Colour Correction
- Publication

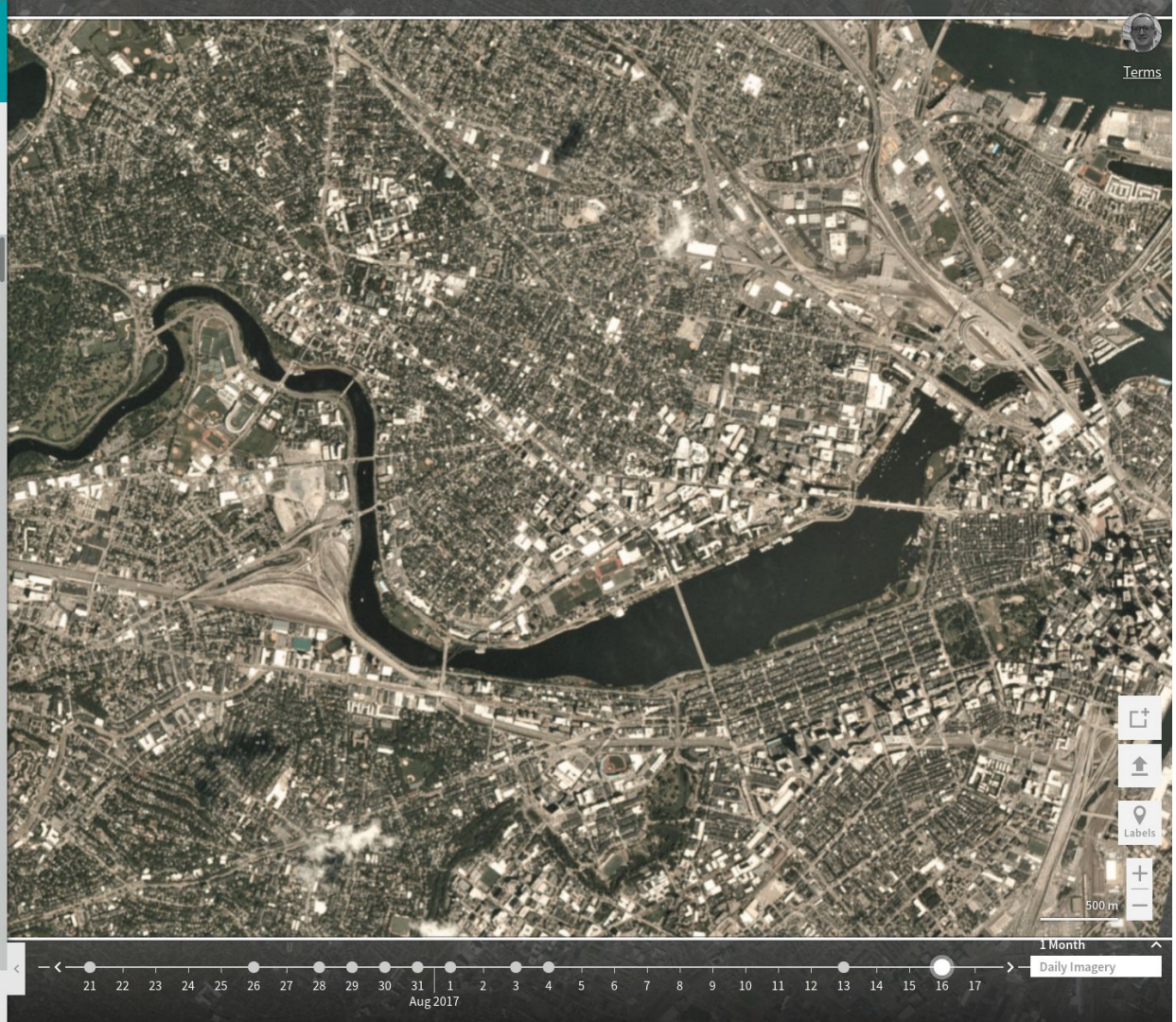


DELIVERY

Reference application: Planet Explorer
Delivery via API

- Search
- Preview
- Download

API responses are GeoJSON & imagery via GeoTIFF



Boston

No date ranges defined

Save search

Daily Imagery - Aggregate of image captures

Cloud cover 0 – 25 %

Area coverage 10 – 100 %

Source 1 source

All filters

All (107)

Most recent

August 16, 2017
3-band PlanetScope Scene (3 m)
99 % area coverage
4 images

August 13, 2017
3-band PlanetScope Scene (3 m)
100 % area coverage
8 images

August 4, 2017
3-band PlanetScope Scene (3 m)
100 % area coverage
2 images

August 3, 2017
3-band PlanetScope Scene (3 m)
100 % area coverage
4 images

August 1, 2017
3-band PlanetScope Scene (3 m)
98 % area coverage
6 images

July 31, 2017
3-band PlanetScope Scene (3 m)
100 % area coverage
3 images

July 30, 2017
3-band PlanetScope Scene (3 m)
100 % area coverage
4 images

July 29, 2017
3-band PlanetScope Scene (3 m)
47 % area coverage
3 images

API { : }

Compare days

Order items (2)

PLANET IMAGERY

4-Band RGB & NIR
3.5m

PLANETSCOPE

13-Band, Multispectral & SWIR
10m-60m

SENTINEL-2

4-Band RGB & NIR
.78m-2.07m

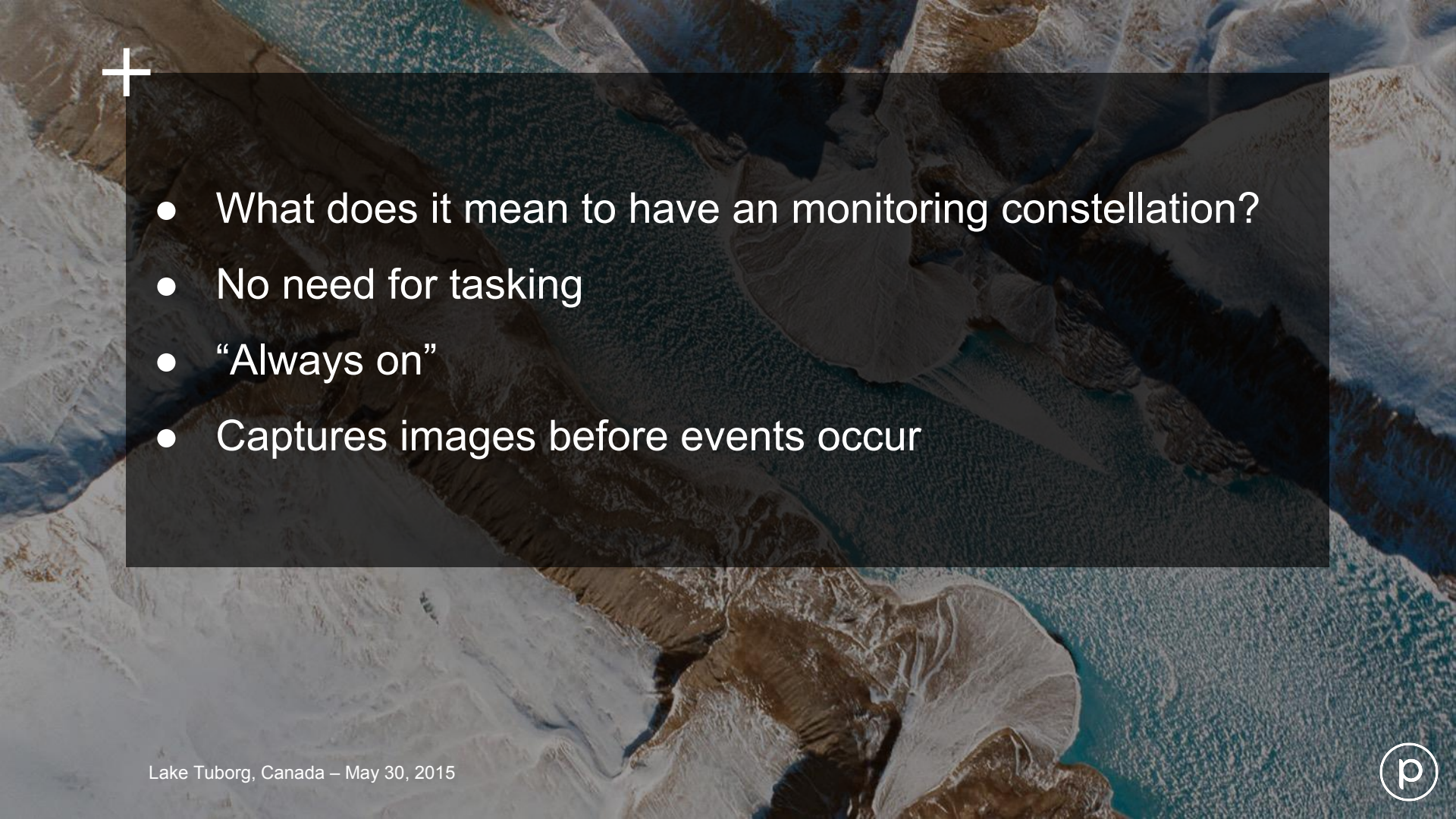
SKYSAT

11-Band, Multispectral, & Thermal IR
15m-30m (100m)

LANDSAT 8

5-Band RGB, NIR & Red Edge
6.5m

RAPIDEYE



- What does it mean to have an monitoring constellation?
- No need for tasking
- “Always on”
- Captures images before events occur

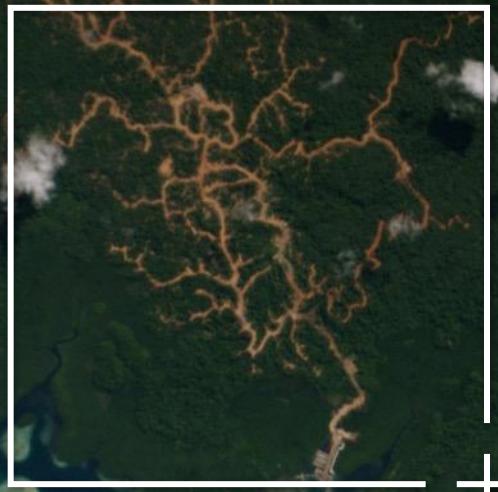
Lake Tuborg, Canada – May 30, 2015

PULAU PINI, INDONESIA

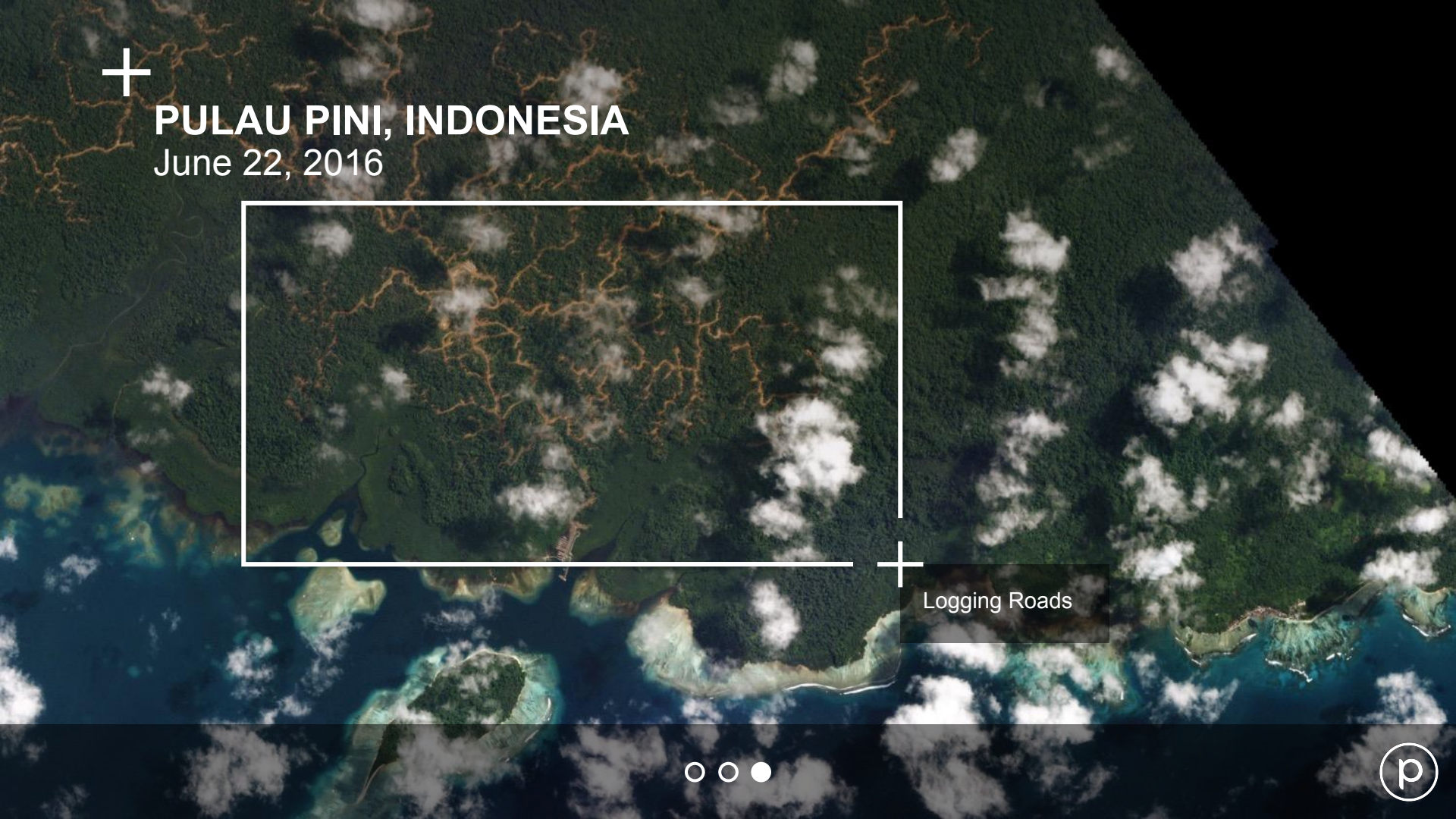
Undated – Google Earth Image

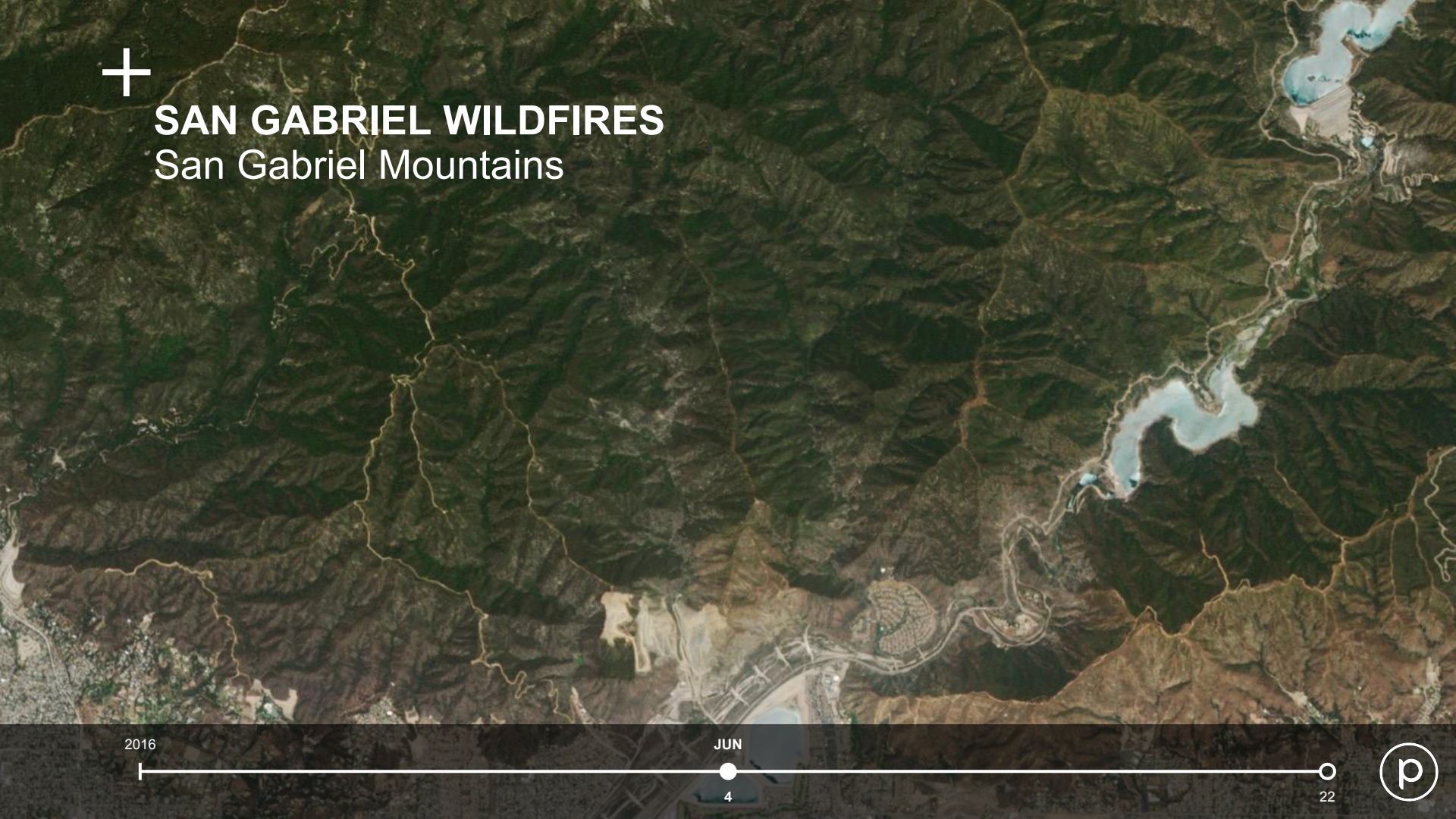
PULAU PINI, INDONESIA

May 16, 2016



Logging Roads


PULAU PINI, INDONESIA
June 22, 2016
Logging Roads


SAN GABRIEL WILDFIRES
San Gabriel Mountains
2016
JUN
4
22

SAN GABRIEL WILDFIRES
San Gabriel Mountains
Vegetation
- dense
- moderate
- sparse
- bare
2016
JUN
4
22

SAN GABRIEL WILDFIRES
San Gabriel Mountains
Fire retardant lines are in red
2016
JUN
4
22

SAN GABRIEL WILDFIRES
San Gabriel Mountains
False Color Composite
reveals burn scars
2016
JUN
4
22

Lets users think about Earth Observation imagery with a new dimension ...

- Planet imagery has temporal resolution
- Think of imagery in a time series
- Large ML training data set

Desert Patterns, Saudi Arabia – May 30, 2016

PLANESNET
https://github.com/rhammell/planesnet-detector

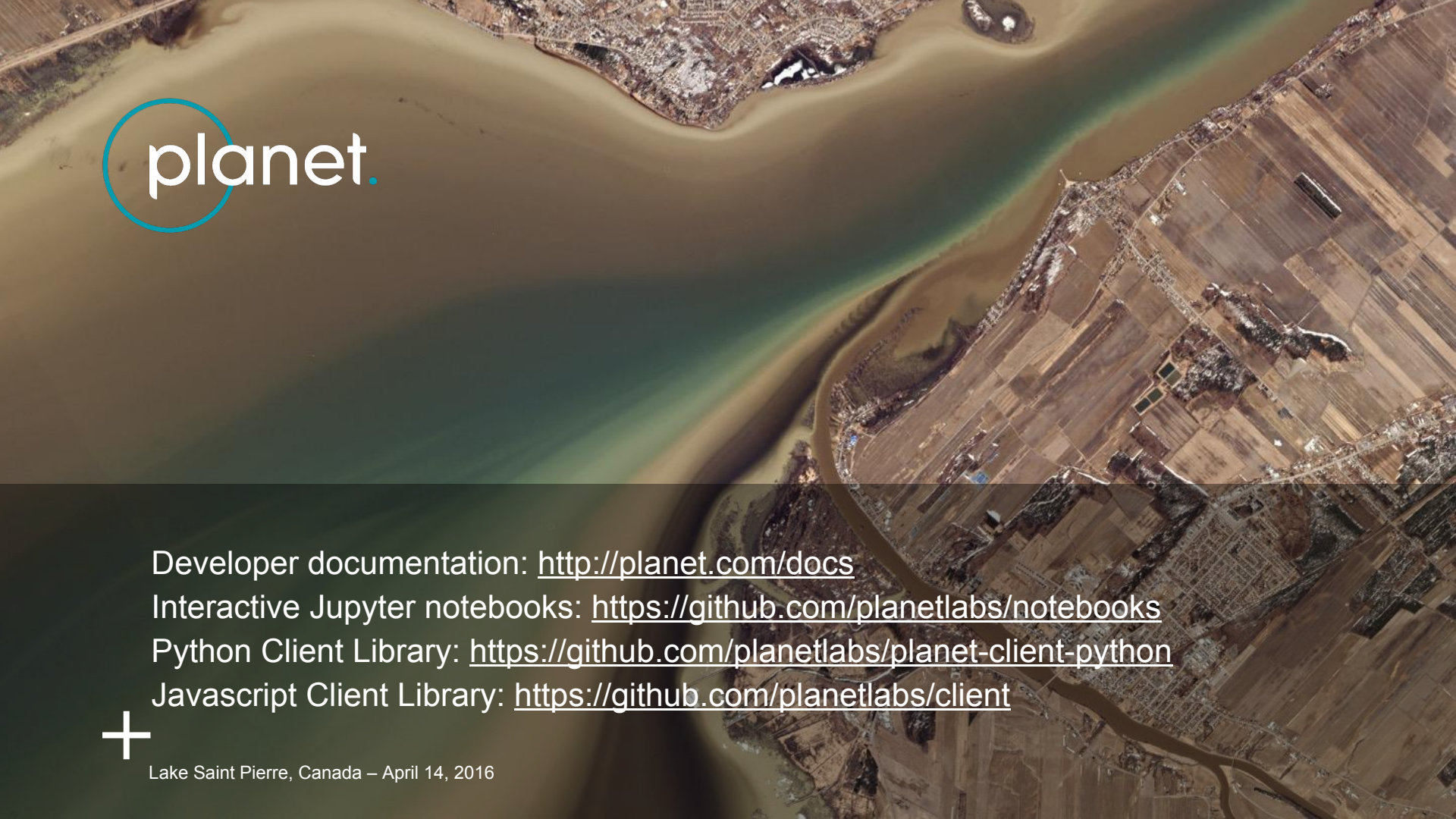
OPEN CALIFORNIA

Full archive of CA imagery available to anyone

- **PlanetScope**
- **RapidEye**
- **Landsat**
- **Sentinel**

Sign up at: planet.com/explorer

CC BY SA


planet.
Developer documentation: http://planet.com/docs
Interactive Jupyter notebooks: https://github.com/planetlabs/notebooks
Python Client Library: https://github.com/planetlabs/planet-client-python
Javascript Client Library: https://github.com/planetlabs/client
Lake Saint Pierre, Canada – April 14, 2016