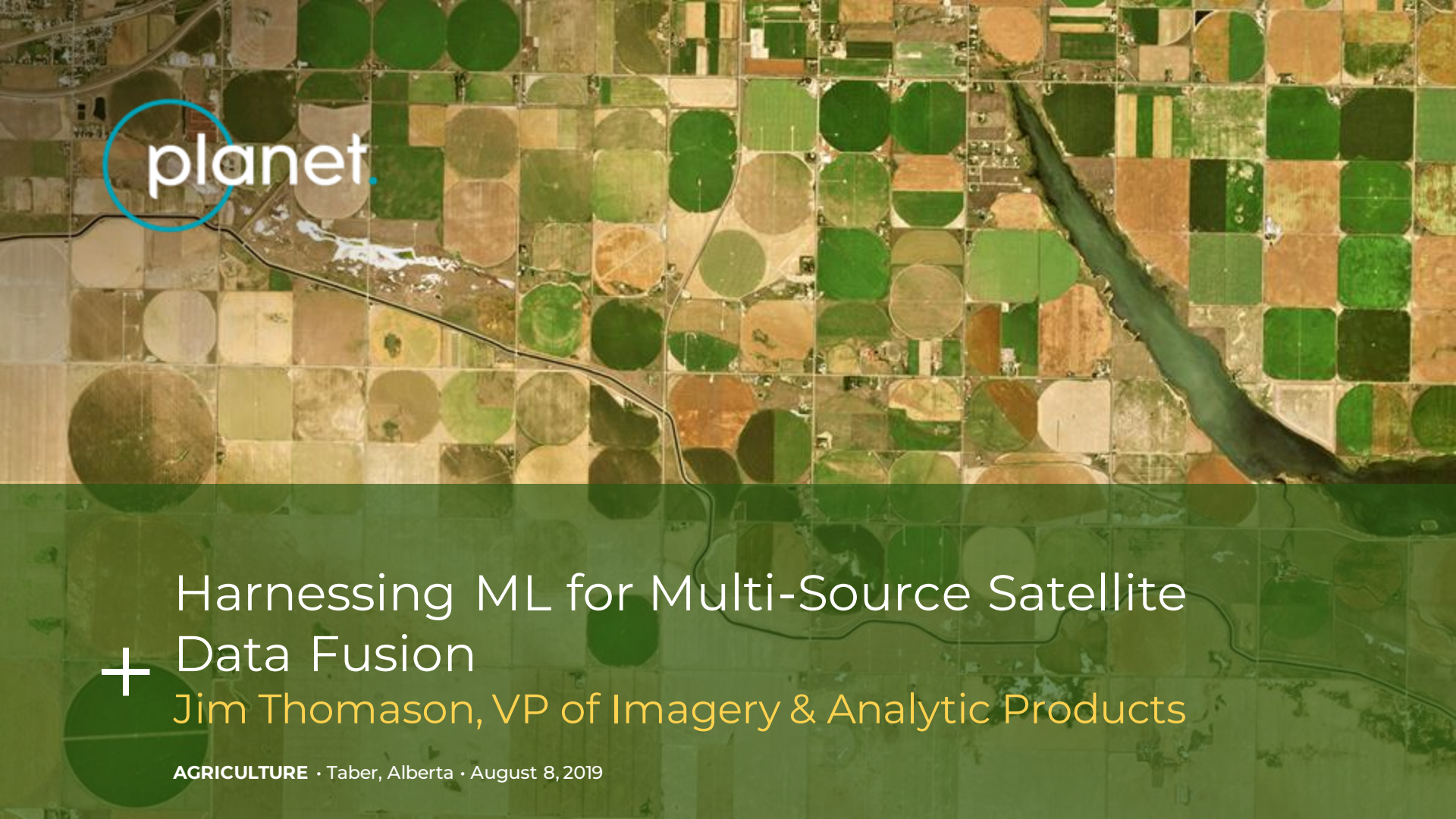


Harnessing ML for Multi-Source Satellite Data Fusion

Jim Thomason, VP of Imagery & Analytic Products

AGRICULTURE · Taber, Alberta · August 8, 2019

ML for Earth Observation

Machine learning at global scale with fresh, daily imagery of Earth.

Our mission

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

Planet's Virtual Constellation

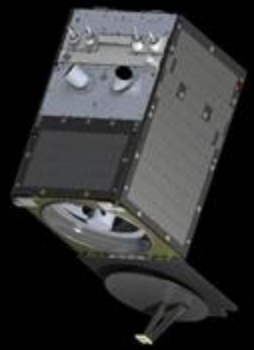
Hyperspectral

SPECTRAL RANGE 400-2500 @ 5NM SPACING

(IN DESIGN)

SkySat

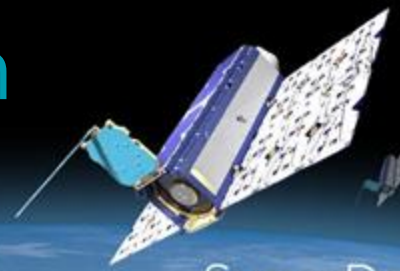
50CM TASKING



Pelican

VERY HIGH-RESOLUTION RAPID REVISIT

(IN DESIGN)



SuperDove

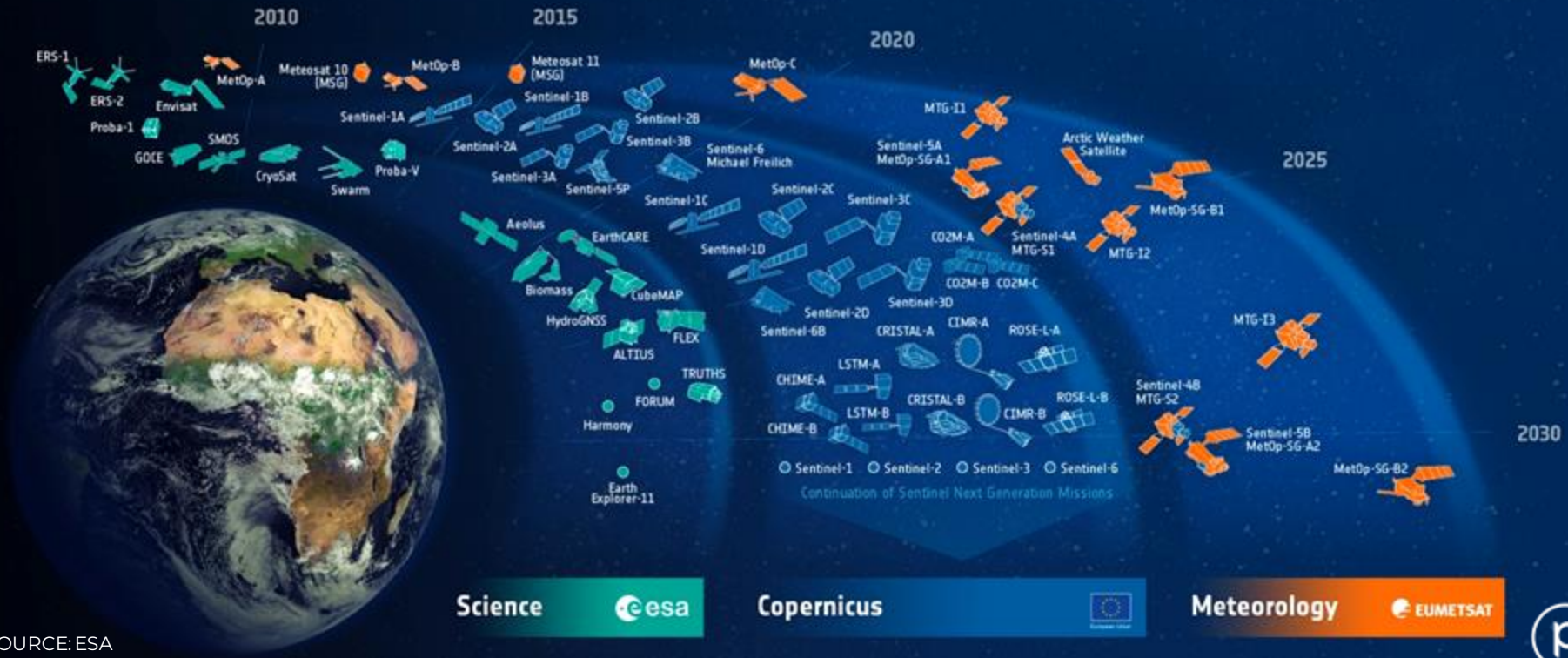
3-5 M MONITORING

Automated Mission Control

Planetrary Scale Processing Pipeline

Not shown to scale

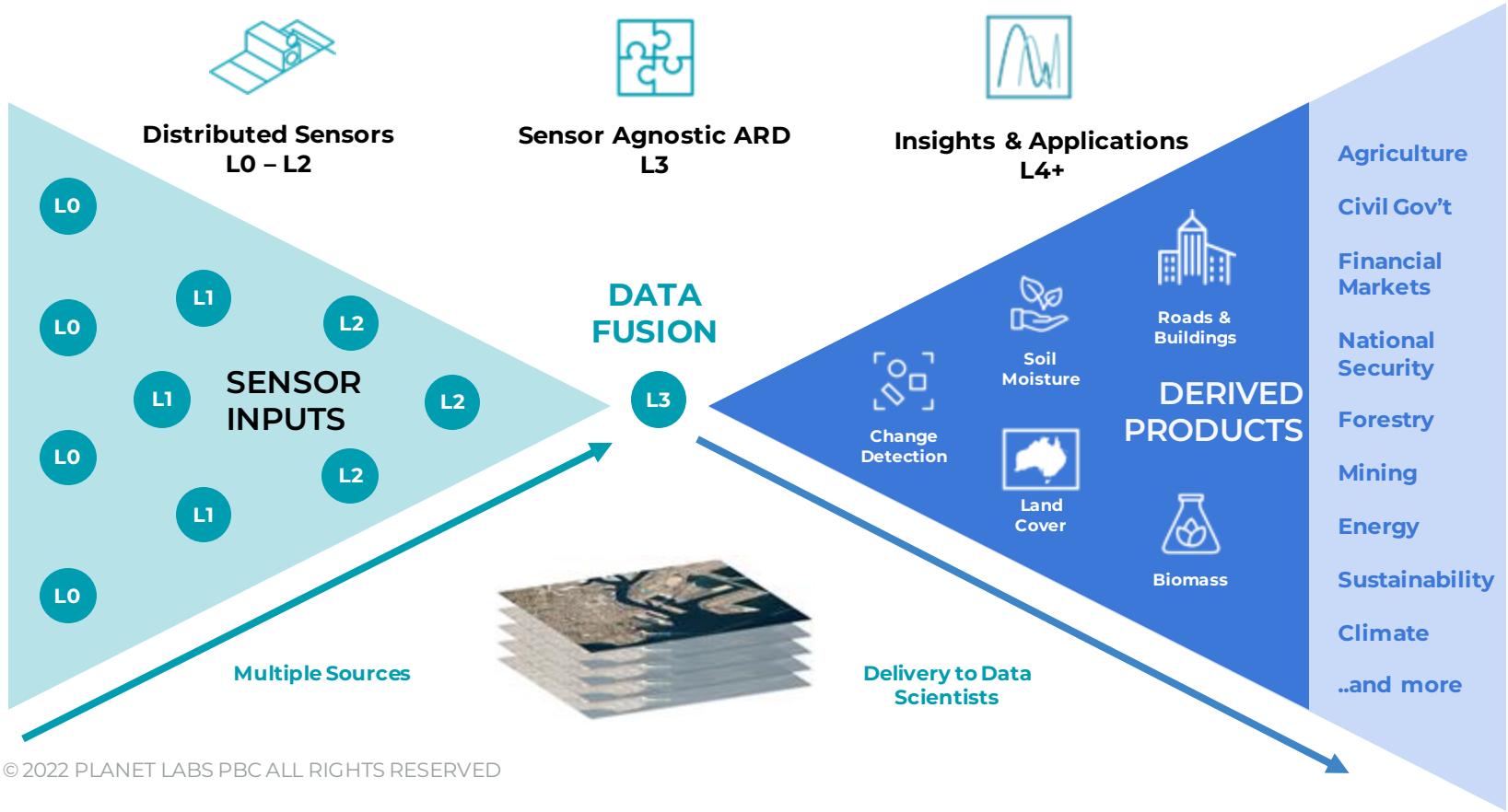
ESA-DEVELOPED EARTH OBSERVATION MISSIONS



SOURCE: ESA

SOURCE: ADOBE STOCK

Fusion Enables Insights and Applications



The Building Blocks of Planet Fusion

SENSOR DATA FUSION

PlanetScope

LANDSAT-8

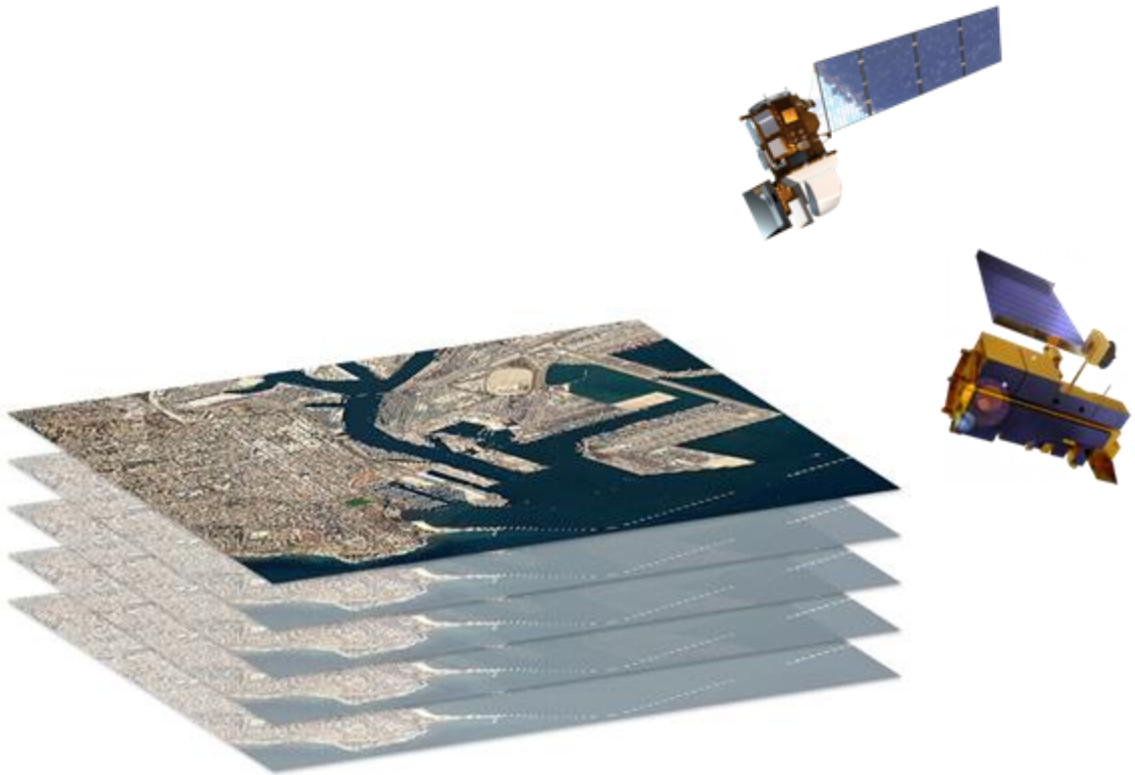
Sentinel-2

Sentinel-1

MODIS

Sentinel-3

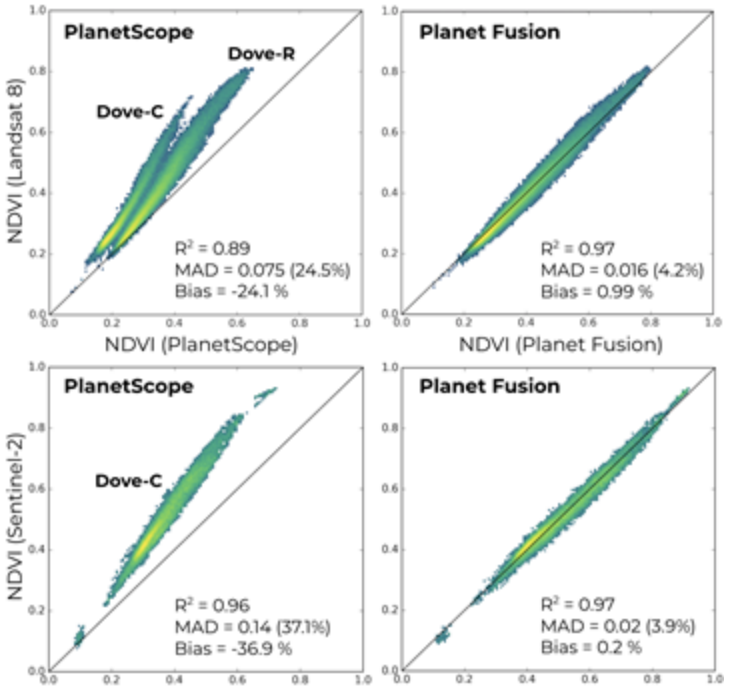
VIIRS



Radiometric harmonization

Fusion attempts to take ARD to the next level

- Fusion uses an implementation of CESTEM to align all sensor inputs to Sentinel 2 radiometry.
- The Framework for Operational Radiometric Correction for Environmental Monitoring (FORCE) is used to generate a combined L8/L9 and S2 Surface Reflectance product to use as the target “gold” reference.
- The harmonization is spatially and temporally explicit and can account for significant spectral non-linearities between the input and target radiometry.

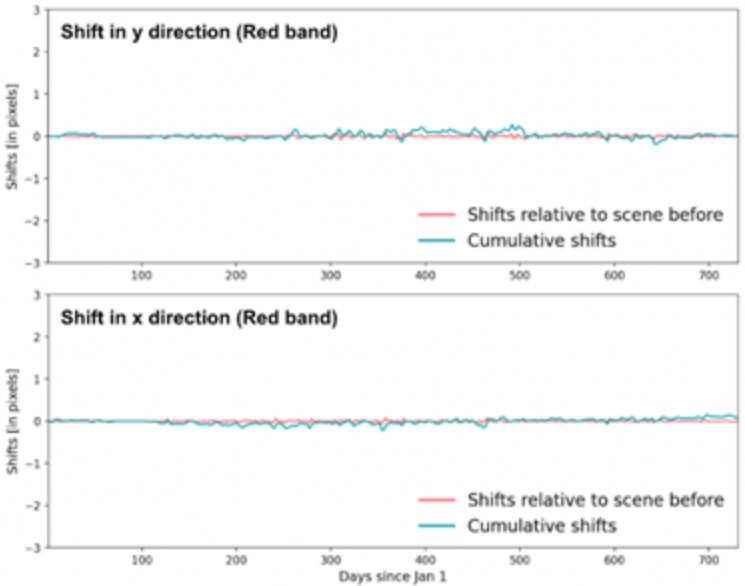


Geometric harmonization

Fusion attempts to take ARD to the next level

- Geometric harmonization is applied, using co-registration and bundle adjustment routines to ensure pixel aligned imagery.

- Planet Fusion attempts to preserve as much of the temporal information content as possible.



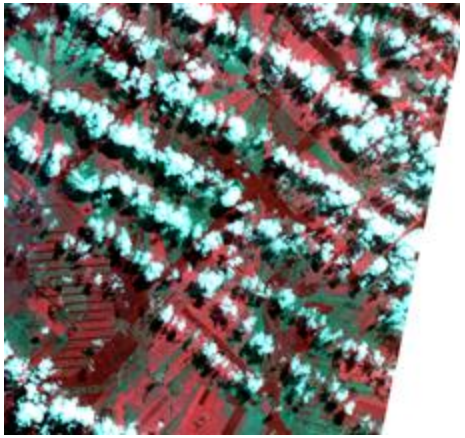
Deep Cleaning: Cloud and Shadow Masking

Fusion attempts to take ARD to the next level

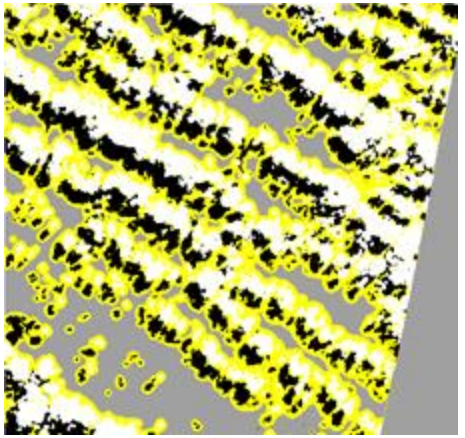
- A great deal of work has gone into producing a cloud detection algorithm that minimizes omissions issues while reducing commission (over detection) issues.

- We aim for rigorous, temporally driven, cloud and cloud shadow detection, as well as data clean-up.

PlanetScope - TOAR



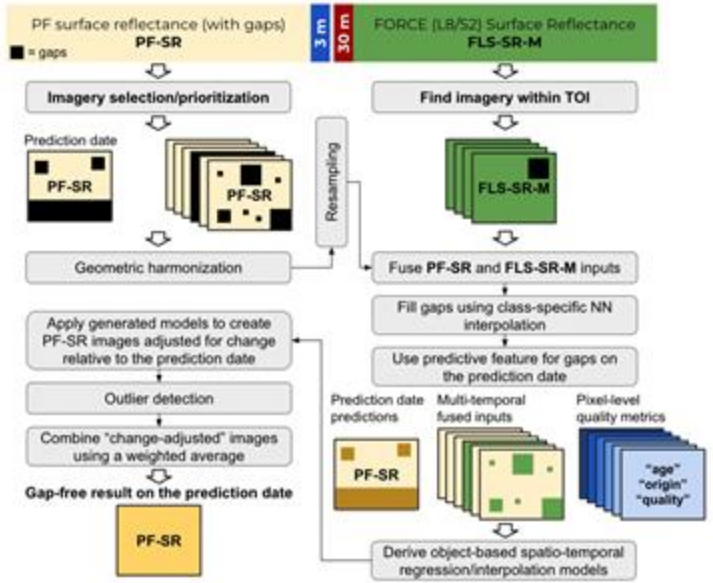
Planet Fusion - cloud mask



Gap-Filling

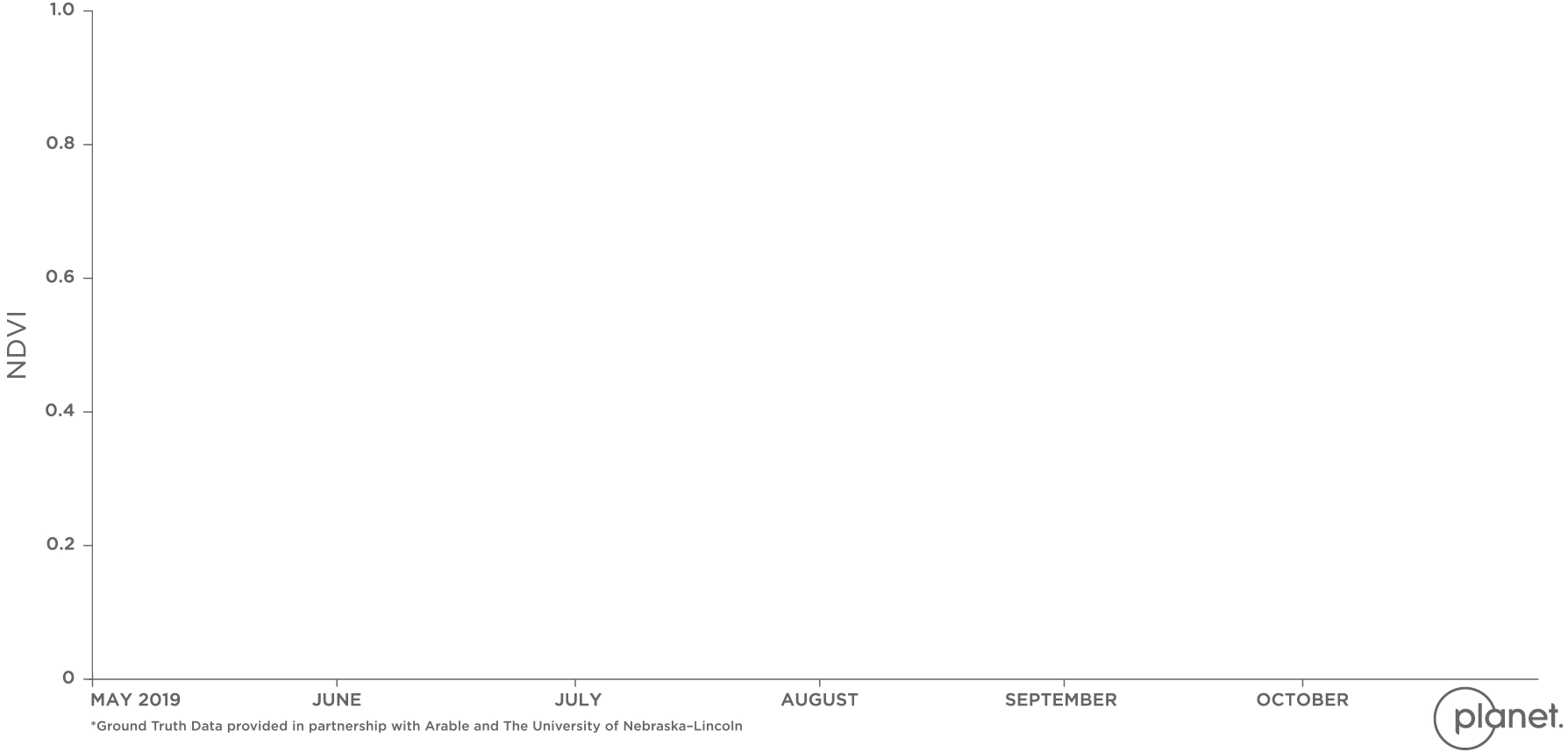
Fusion attempts to take ARD to the next level

- Fusion incorporates gap-filling techniques with a predictive element.
- Daily (3 m) SR estimation with a spatio-temporal interpolation approach and predictive component give us near real-time production.
- The integration of S-2a/b, L8/L9 and SAR helps fill gaps in PlanetScope coverage.




NORTH PLATTE, NEBRASKA
SOUTH PLATTE RIVER
NORTH PLATTE
NDVI
1
0.5
0
2019
APRIL 1
MAY 1
JUNE 1
JULY 1
AUG 1
SEPT 1
OCT 1
planet.

NORTH PLATTE, NEBRASKA



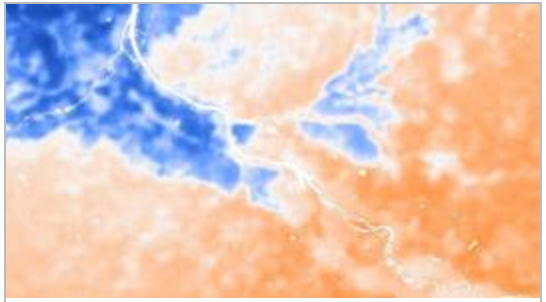
*Ground Truth Data provided in partnership with Arable and The University of Nebraska–Lincoln

planet.

Introducing Planetary Variables

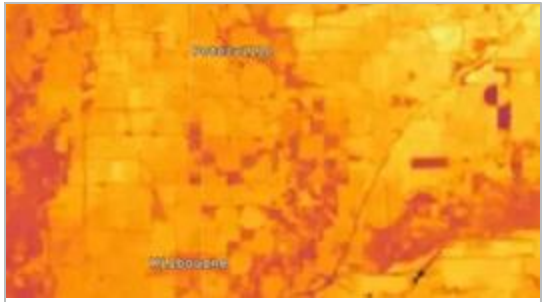
Three Key Measurement Products Now in our Portfolio

SOIL WATER CONTENT



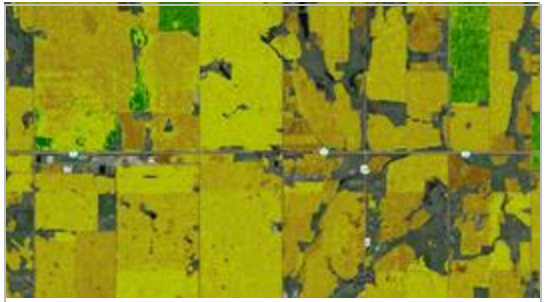
100 x 100 m
Near Real Time
20 year archive

LAND SURFACE TEMPERATURE



100 x 100 m
Near Real Time
20 year archive
Global

BIOMASS PROXY



10 x 10 m
Near Real Time
4-year archive
Global

ML for Earth Observation

Going beyond imagery to unlock unparalleled insights into our ever-changing planet.

Thank You.

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jim@planet.com

planet.