planet.

# + TANAGER

## Planet's Visionary Hyperspectral Mission

**Born of a novel public-private partnership to help accelerate action on climate change, Planet's hyperspectral constellation is designed to help a range of industries monitor what can't be seen by the human eye.**

Planet is preparing to launch a groundbreaking hyperspectral satellite constellation called Tanager, beginning in 2024. We have joined forces with technology innovators, scientific researchers, and regulatory organizations as part of the Carbon Mapper Coalition, a philanthropically-funded, public-private partnership. Within the coalition, we have leveraged our agile aerospace experience and philosophy, combined with the proven space and instrument design expertise of the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), to develop a state-of-the-art commercial hyperspectral system. This collaboration also enables rigorous third-party verification and validation of our data.

Planet's hyperspectral sensors are designed to measure energy in the visible through shortwave infrared wavelengths, in over 400 spectrally contiguous bands. Tanager will join Planet's existing fleet, enabling customers to leverage PlanetScope's near-daily monitoring and high-resolution tasking on a unified platform. PlanetScope data also provides a deep temporal stack of multispectral data that – when paired with hyperspectral signatures – can enhance understanding of observed patterns on Earth.

### KEY PERFORMANCE PARAMETERS

This table reflects current product expectations, potentially varying with updated satellite components, launch plans, and altitude.

| | |
|---|---|
| Orbit Altitude | 406 km |
| Orbit Type | Sun synchronous |
| Spatial Resolution | 30 – 35 m |
| Swath Width | 18 km |
| Area Coverage per Satellite | up to 315,000 km / day |
| Spectral Range | 400 – 2500 nm |
| Spectral Sampling | 5 nm |
| SNR @ $CH_4$ Detection Band[1] | 300 – 600 |
| $CH_4$ Minimum Detection Limit[2] | 50 – 150 kg/hr |
| $CO_2$ Minimum Detection Limit[2] | 200,000 – 600,000 kg/hr |

[1] Signal-to-Noise Ratio achievable through increased effective integration time.
[2] Point source, single-detection, 3m/s wind, medium surface brightness. Source: carbonmapper.org

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## TANAGER CORE IMAGERY DATA PRODUCTS AND POTENTIAL APPLICATIONS

Core Imagery data products planned for Tanager include calibrated radiance and surface reflectance. Algorithms involved in the preliminary radiance processing pipeline perform a variety of radiometric corrections to process raw instrument data to calibrated top of atmosphere radiance data. These include standard operations such as dark field subtraction, as well as more sophisticated procedures such as optical ghost correction. Our radiance processing leverages open source algorithms developed by NASA JPL to ensure high scientific quality data from these Dyson-type imaging spectrometers. Planet plans to use the ISOFIT family of algorithms to retrieve surface reflectance as well as other important atmospheric properties, such as aerosol optical depth and water vapor. In addition to pre-launch instrument calibration and characterization in the laboratory, Planet is planning for scientific verification of the instrument's performance and validation of Core Imagery products on-orbit through vicarious calibration and monitoring.

### BIODIVERSITY ASSESSMENTS

Map vegetation species and functional types along with their abundance to monitor the encroachment of invasive species, assess rehabilitation efforts, quantify changes in carbon stocks, and support land use planning.

### MINERAL MAPPING

Detect the presence of alteration minerals like clays, carbonates, sulfates, and iron oxides to evaluate resource potential over large regions and discover previously overlooked mineral stockpiles.

### WATER MONITORING

Track contaminants in lakes, rivers, and coastal regions such as harmful algal blooms, acidic minerals, hydrocarbons, and other pollutants. Discriminate between ice, snow, and liquid water to understand the effects of a warming climate.

### EMISSIONS MANAGEMENT

Map methane emissions over well pads, mines, landfills, and other facilities to derive emission rates, mitigate losses, support safety initiatives, and improve compliance reporting.

### WILDFIRE RISK AND RESPONSE

Monitor fuel moisture indicators to assess fire risk, predict fire behavior, and plan suppression efforts. Assess post-fire burned areas to accelerate ecosystem recovery through informed management.

### AGRICULTURAL MANAGEMENT

Characterize soil properties and reveal root causes of crop stress to optimize planting strategies, enhance crop production, and meet growing global food demands.

### FREQUENT REVISIT AND BROAD COVERAGE

Regular revisits and large coverage areas facilitate time series analysis and pattern development.

### TRUSTED SCIENTIFIC HERITAGE

Developed in partnership with world-renowned experts at NASA JPL, Tanager's imaging spectrometer design is state-of-the-art.

### UNPRECEDENTED SENSITIVITY

3-6x more sensitive than comparable space-borne systems across the sensor's entire spectral range.

### MORE THAN HYPERSPECTRAL

Leverage Planet's diverse offerings across spectral, temporal, and spatial domains with tip-and-cue and co-collection strategies.

## GET IN TOUCH


**Learn more about Planet's Hyperspectral Mission**
planet.com/products/hyperspectral

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**Learn More**
www.planet.com