# UN/SKAO Workshop
# Session 3: Satellite Constellation Projects Overview

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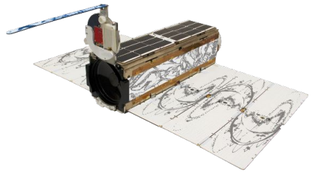
# Planet Labs Overview

- **Planet’s Constellations: imaging Earth’s landmass, every day.**

- **Target Visual Magnitude:** Planet's objective for future spacecraft is to achieve a visual magnitude of 7.0 or fainter during operational phases.
    - Currently operating spacecraft already meet the >7.0 standard in **over 90%** of conditions, with most satellites significantly exceeding this goal.

# Satellite Fleets

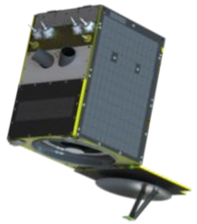
## Daily monitoring + HR/VHR + Hyperspectral



### SuperDove

**Always-on Monitoring**

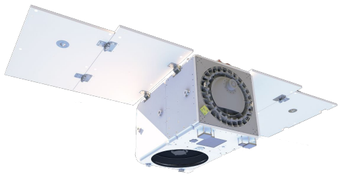
- Hundreds of satellites
- 3-5m
- Global scanning
- 8-band



### SkySat

**High-Resolution Tasking**

- ~15 satellites
- 50cm resolution
- RGB, NIR, and Pan bands
- Sub-daily tasking



### Pelican

**Very High Resolution Tasking**

- Initial fleet of up to 24 satellites
- 30cm resolution
- Pan + 6 RGB+NIR bands
- Up to 30 revisits/day

### Tanager

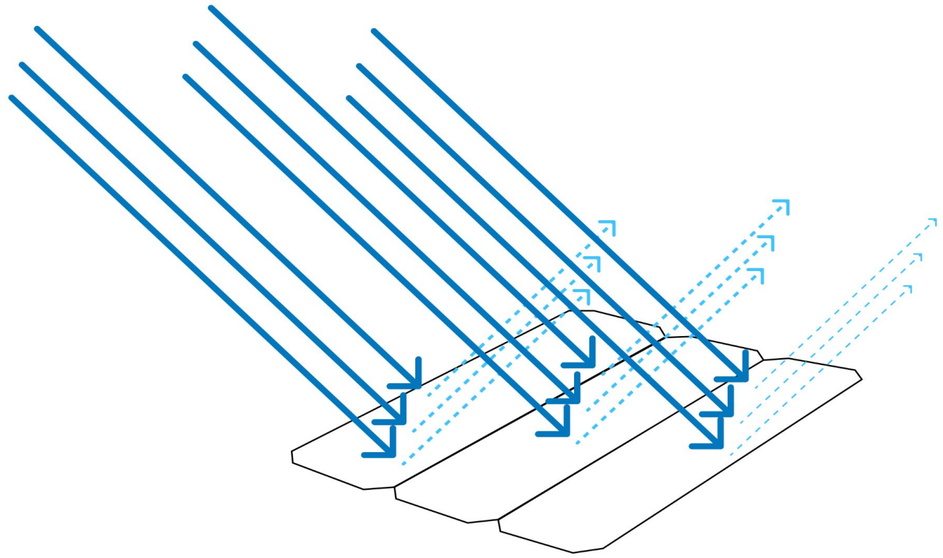
**Hyperspectral Tasking**

- Tanager-1 launched
- 400 - 2500 nm
- ~400 5nm bands

# Brightness Mitigation Efforts

## Research and Development

**Materials Exploration:** Investigating the use of specialized **retroreflective film or paint** to directionally reflect incoming solar energy either directly back to the sun or to deep space, thus minimizing reflection toward the ground and reducing visual magnitude.



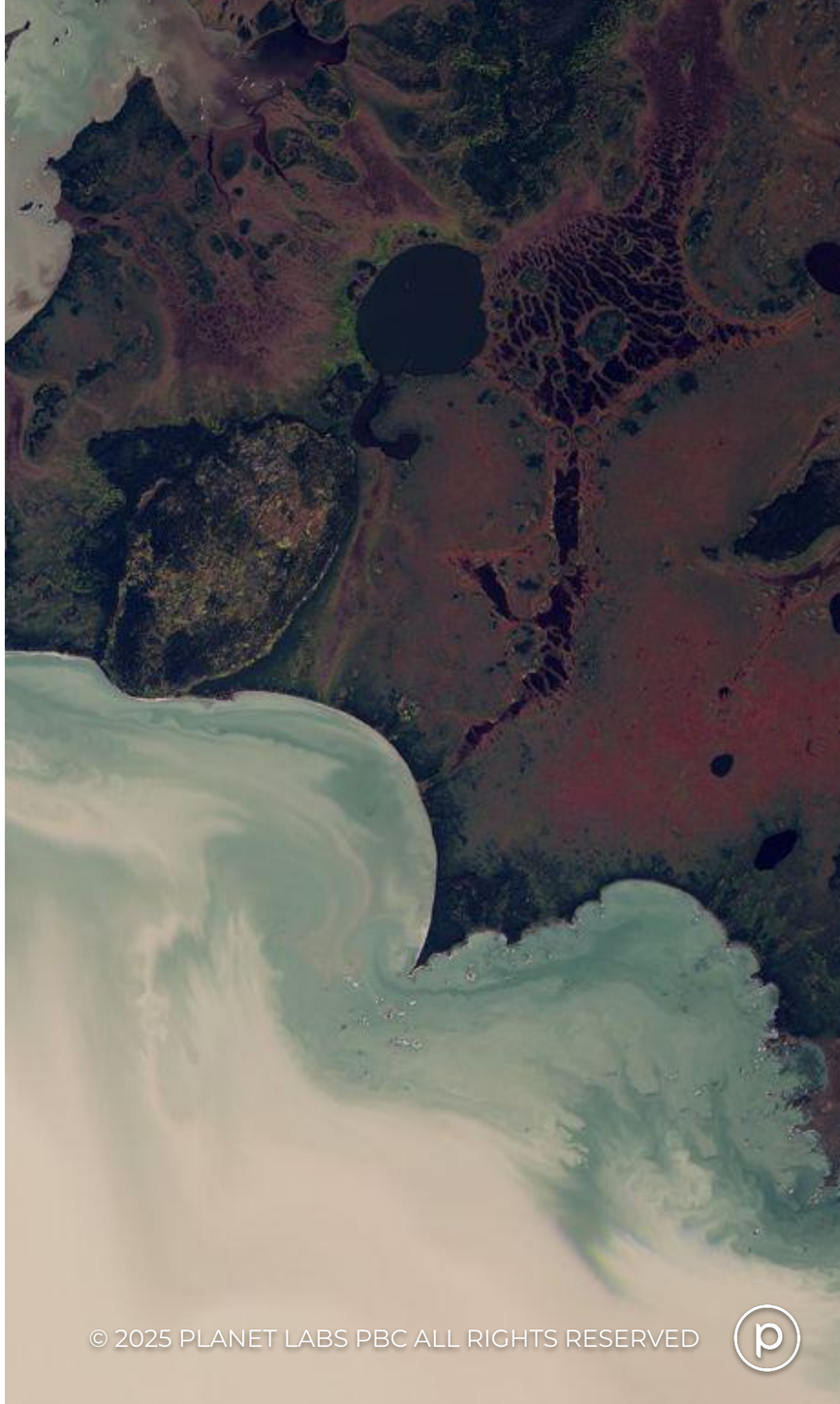
**TANAGER FIRST LIGHT** • Karachi, Pakistan • False Color Composite (SWIR, SWIR, NIR)

# Brightness Mitigation Efforts

## In Orbit

**Attitude Control Maneuvers:** Incorporate additional fuel usage considerations for attitude control (roll and pitch) maneuvers during orbital dawn & dusk to deflect reflected sunlight away from Earth.

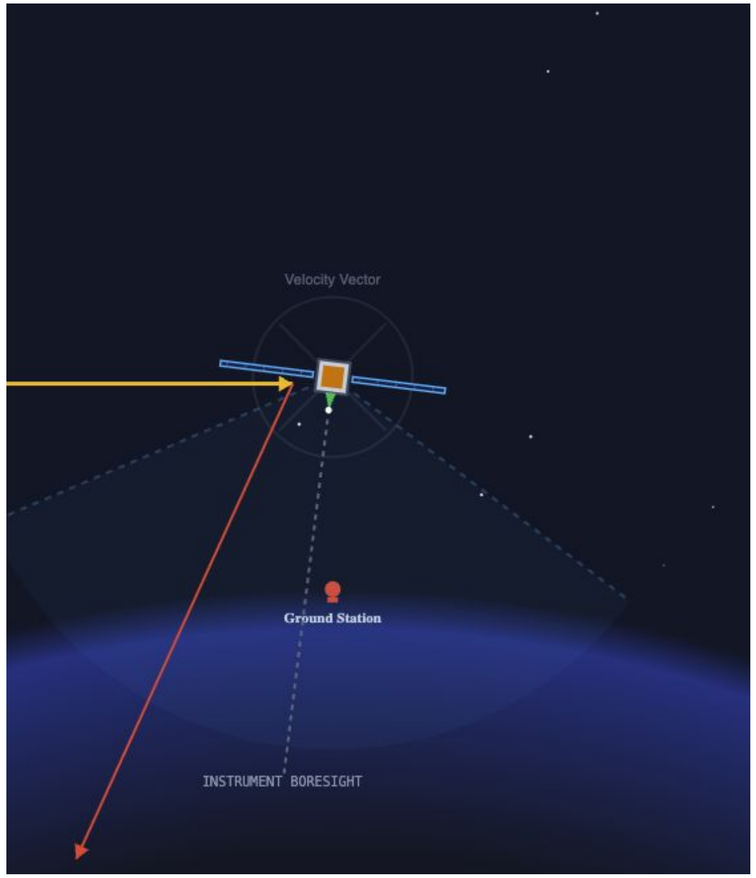
**Optimal Solar Array Orientation:** Roll the spacecraft around its velocity vector and pitch to orient solar arrays close to the sun while keeping instruments focused on nadir



# Brightness Mitigation Efforts

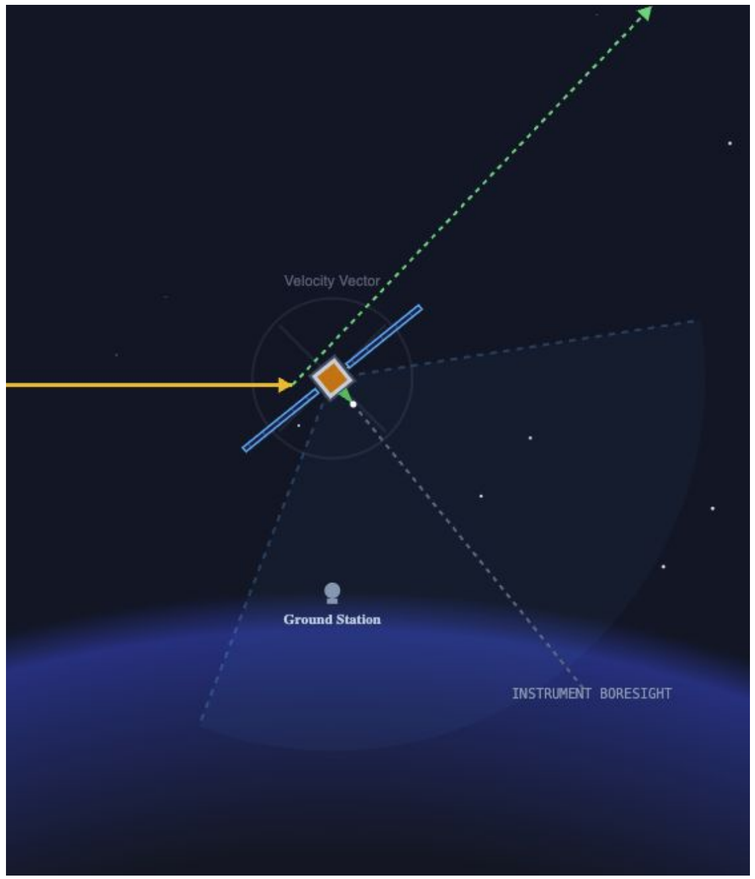
## In Orbit

**Nominal Nadir Pointing**




**Roll: <0°**
In standard orientation, the flat solar arrays act as a mirror. During twilight, the angle of sunlight can result in a direct reflection (glint).

**Mitigation Maneuver**



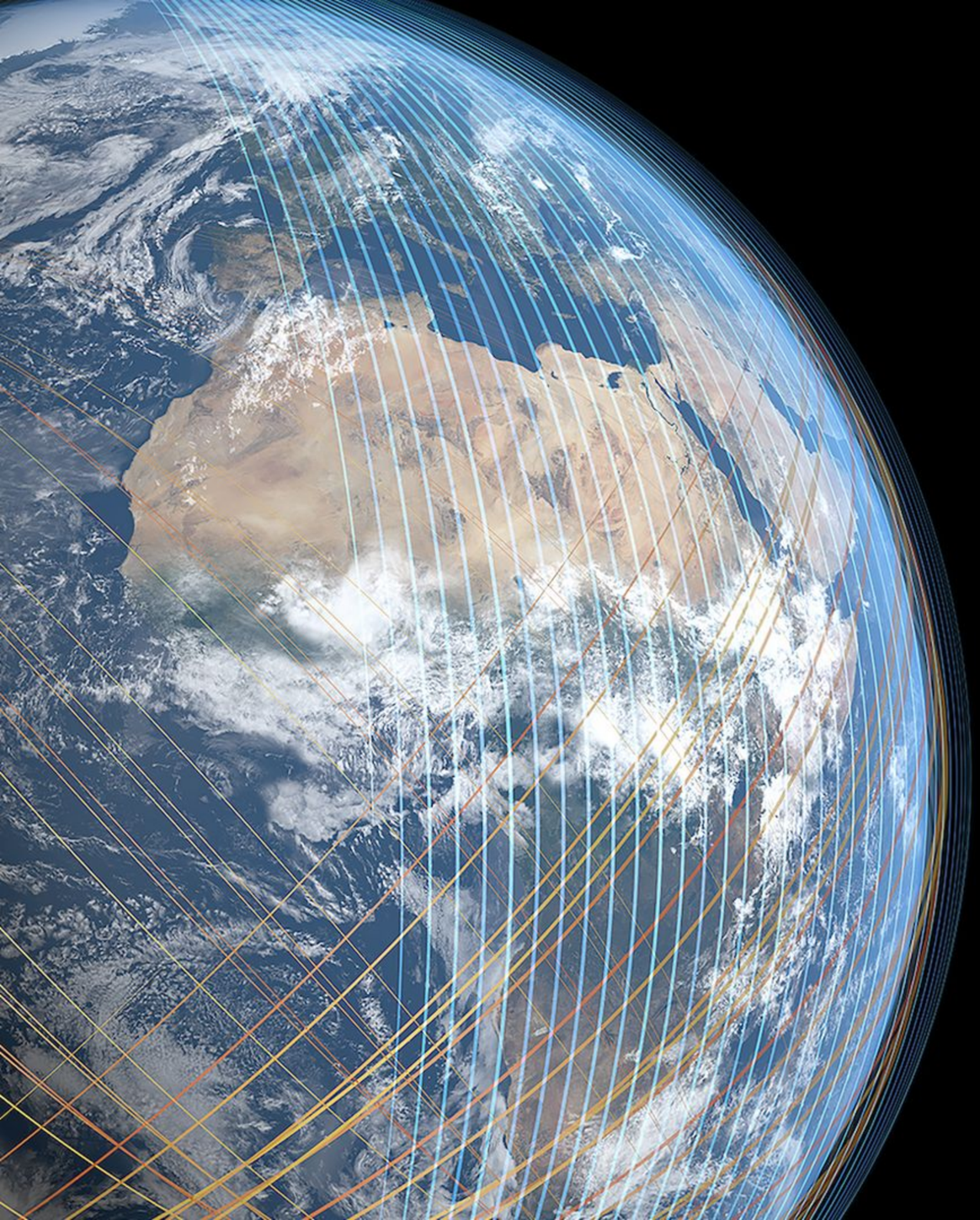

**Roll: 25°**
By rolling around the velocity vector, the normal vector of the array changes. The reflection can be safely deflected into space.

# Brightness Mitigation Efforts

## Collaboration

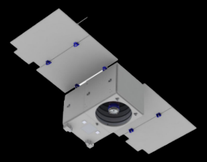
**Ongoing Work:** Planet continues to collaborate in observational campaigns with the **International Astronomical Union's Centre for the Protection of the Dark and Quiet Sky** and is working with the **U.S. National Science Foundation** on a coordination agreement aimed at protection of astronomy.

Planet further plans to work with academics with expertise in measuring and observing satellite reflectance and brightness to improve its understanding of how different materials in space are observed by astronomers.



# Thank You.

Please reach out with any questions.



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