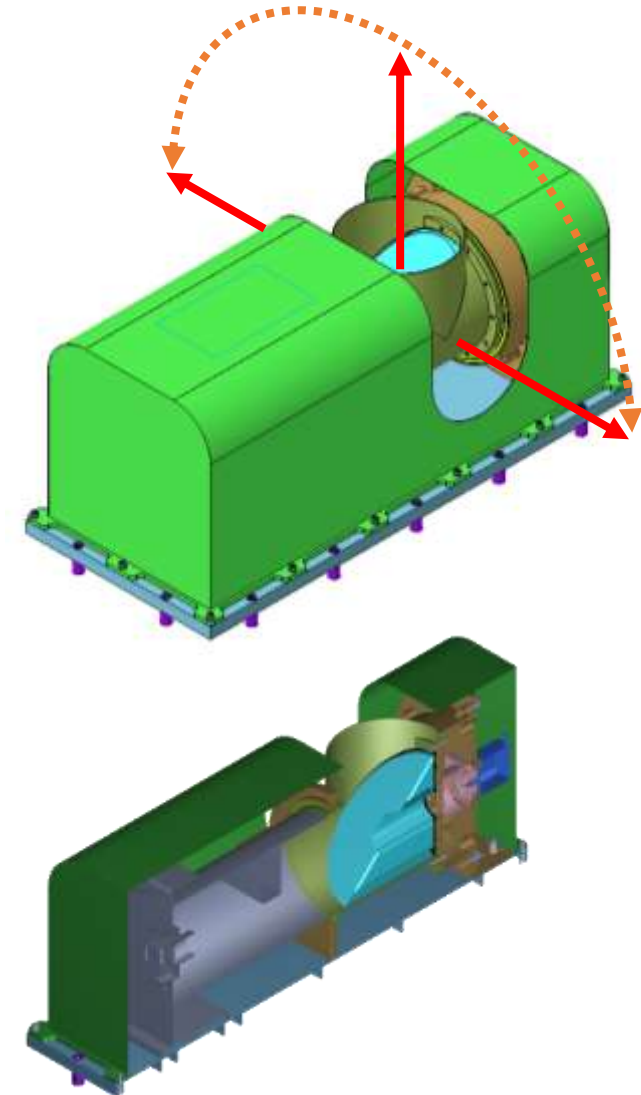


Conceptual design of TCAP

- **TCAP = Telescopic camera + Tracking mirror**

7 μ rad/pixel \rightarrow 3.5 m/pixel @500 km

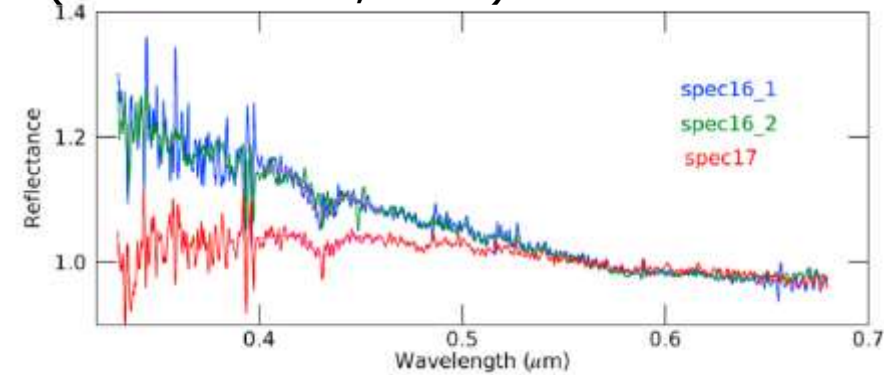
Property	Value
Aperture	114 mm
Focal length	790 mm
FOV	0.82 deg \times 0.82 deg
Pixels per image	2048 \times 2048 pixels
Pixel size	5.5 μ m \times 5.5 μ m
Pixel FOV	7.0 μ rad/pixel
Spatial resolution	MTF \geq 0.2 @Nyquist
Wavelength range	400-800 nm
Max. Imaging rate	1 Hz for full image
Tracking	Yes (by tracking mirror)



Conceptual design of MCAP

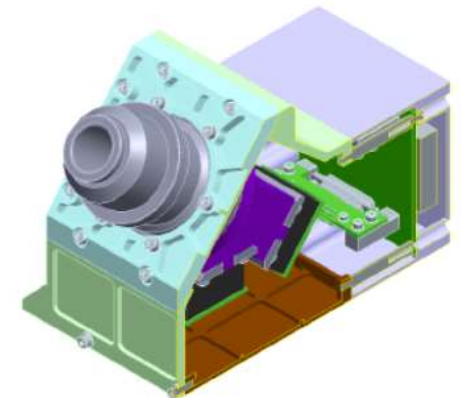
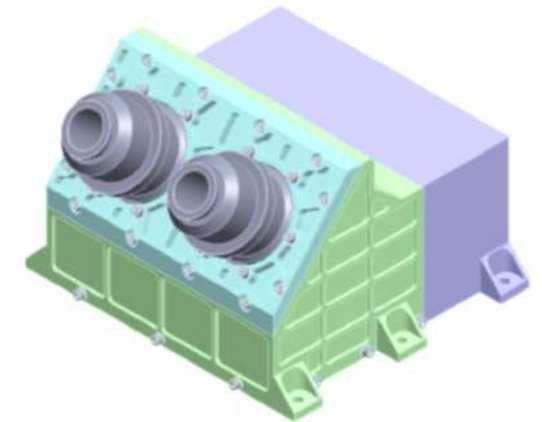
- Multiple optical systems and sensors to take images of all the bands simultaneously.
- Branching-type optical systems reduce the size and mass of MCAP.
- $100 \mu\text{rad}/\text{pixel} \rightarrow \leq 100 \text{ m}/\text{pixel}$ at $\leq 1000 \text{ km}$

(Lazzarin et al., 2019)



Center λ	FWHM	Req. SNR	Purpose
425 nm	50 nm	≥ 30	UV drop off
480 nm	50 nm	≥ 30	UV drop off
550 nm	50 nm	≥ 50	Slope of spectrum reference
700 nm	50 nm	≥ 30	Slope of spectrum
850 nm	70 nm	≥ 30	Slope of spectrum
950 nm	70 nm	≥ 30	Olivine absorption

Property	Value
Aperture	21 mm
Focal length	100 mm
FOV	$6.5 \text{ deg} \times 6.5 \text{ deg}$
Pixels per image	2048×2048 pixels
Pixel size	$5.5 \mu\text{m} \times 5.5 \mu\text{m}$
Pixel FOV	$100 \mu\text{rad}/\text{pixel}$
Spatial resolution	MTF = 0.3 @Nyquist
Bands	425, 550, 700, 850 nm
Max. imaging rate	1 Hz for full image
Tracking	No



Flyby imaging with TCAP and MCAP

For 36 km/s relative velocity

