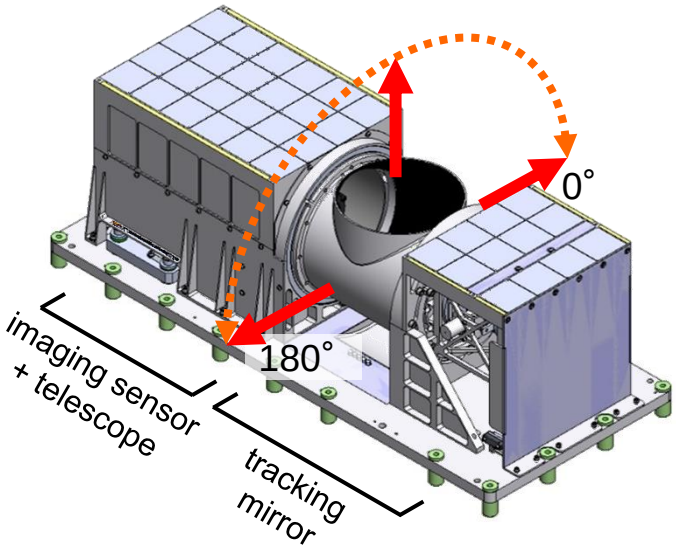
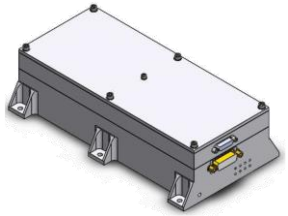
Telescopic CAmera for Phaethon (TCAP)

- TCAP = telescope + tracking mirror
- 3.5 m/pixel @500 km（closest approach）

Property	Value
Aperture	114 mm (blocked by a φ49.16-mm secondary mirror)
Focal length	787.7 mm
FOV	0.81 deg × 0.81 deg
Pixels per image	2048 × 2048 pixels
Pixel size	5.5 μm × 5.5 μm
Pixel FOV	7 μrad/pixel
Spatial resolution	Ensquared energy (2x2 pixels) ≧0.52
Max. imaging rate	1 fps for full image
Asteroid tracking	Yes
Mass	11.17 kg（TCAP-OH 10.0 kg, TCAP-E 1.17 kg）
Volume TCAP-OH TCAP-E	 D250 mm × W600 mm × H270 mm D120mm × W220 mm × H63.2 mm



TCAP-OH

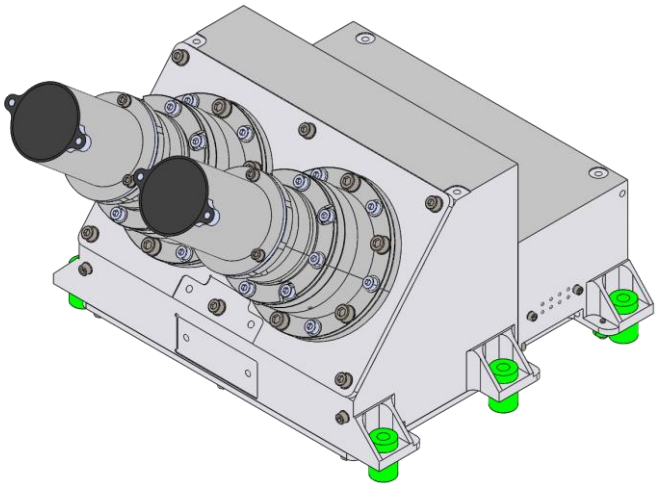


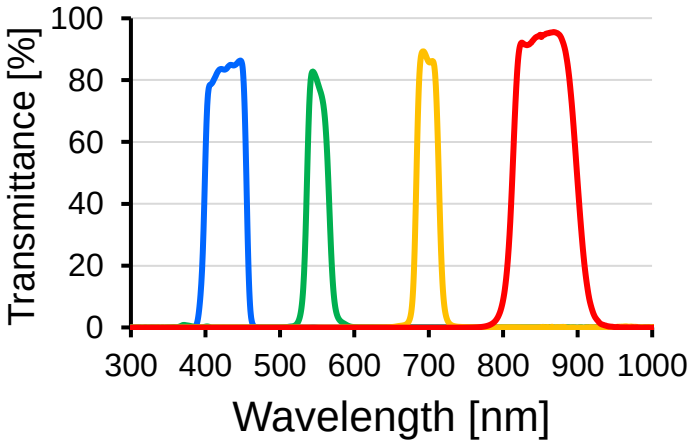
TCAP-E

Multiband CAmera for Phaethon (MCAP)

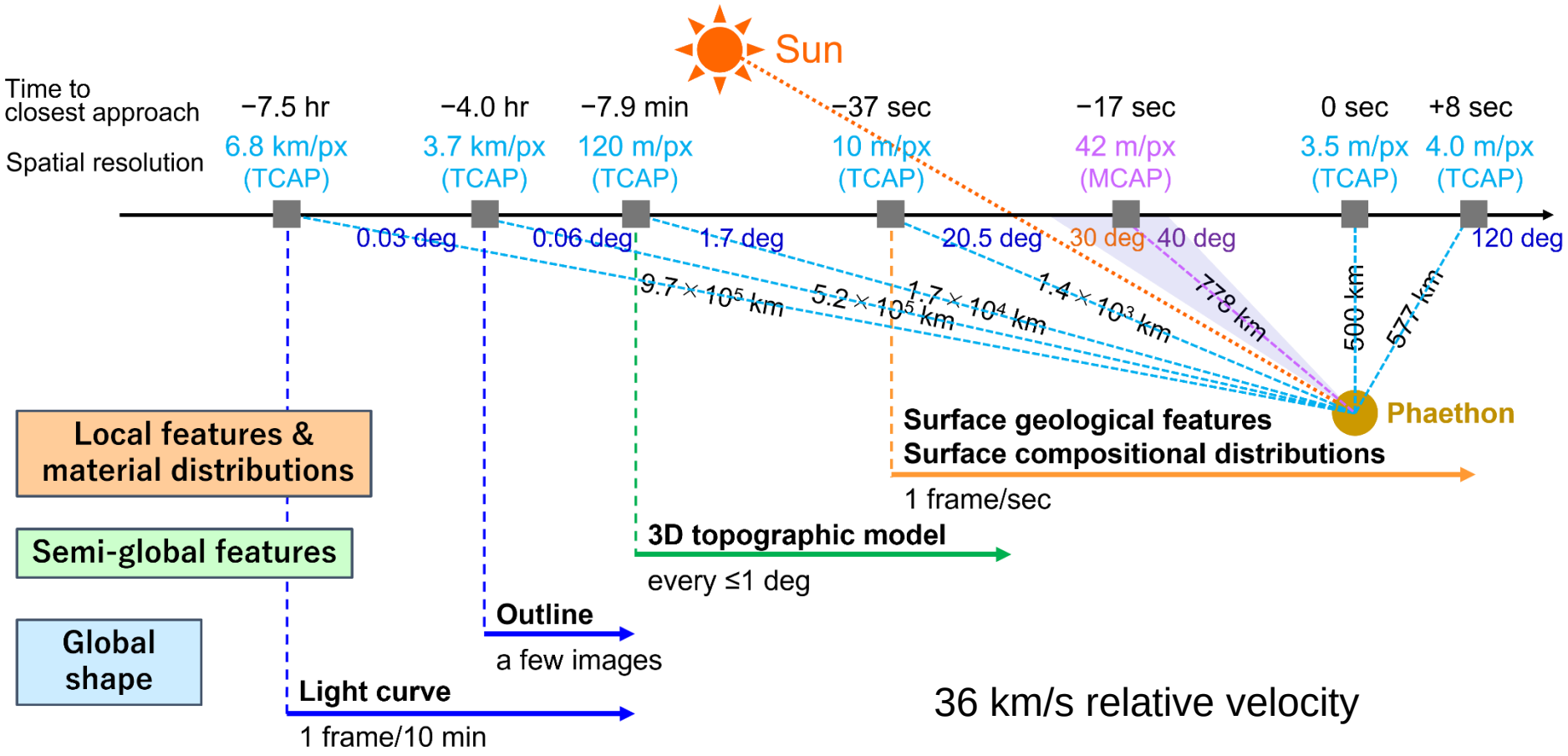
- Having multiple optical systems and sensors to take images of all the bands simultaneously.
- 42 m/pixel @778 km（nominal distance of MCAP imaging）

Property	Value
Wavelength	425, 550, 700, 850 nm
Aperture	20.8 mm
Focal length	99 mm
FOV	6.54 deg × 6.54 deg
Pixels per image	2048 × 2048 pixels
Pixel size	5.5 μm × 5.5 μm
Pixel FOV	54 μrad/pixel
Spatial resolution	≦0.11 mrad for ≦1.0 deg angle of view ≦0.13 mrad for ≦1.9 deg angle of view ≦0.16 mrad for ≦2.5 deg angle of view ≦0.55 mrad for >2.5 deg angle of view
Asteroid tracking	No
Mass	2.7 kg
Volume	D247 mm × W204 mm × H166 mm



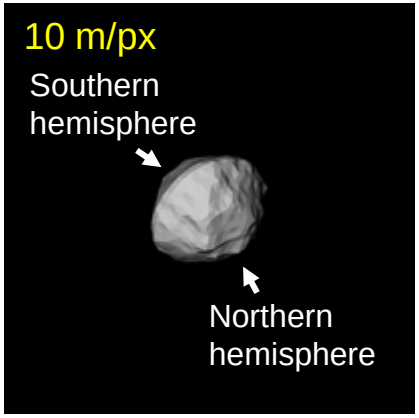


Flyby imaging with TCAP and MCAP

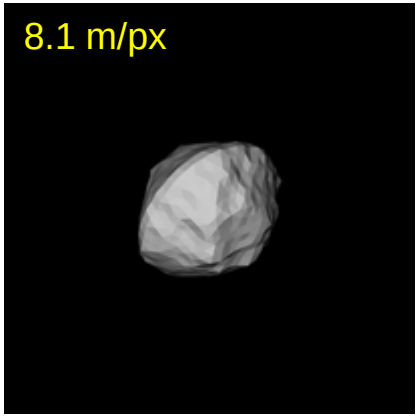


Expected TCAP images

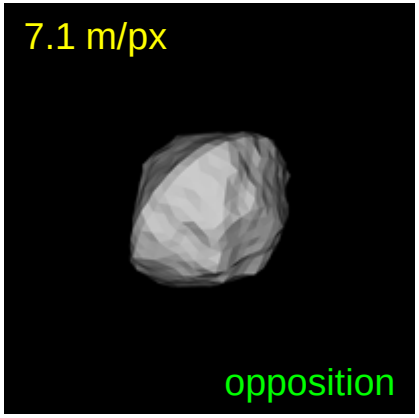
−40 sec
phase angle = 9 deg



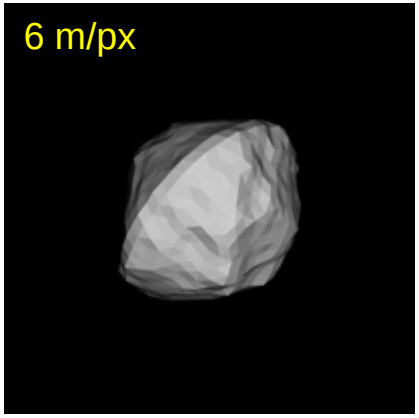
−30 sec
phase angle = 4.5 deg



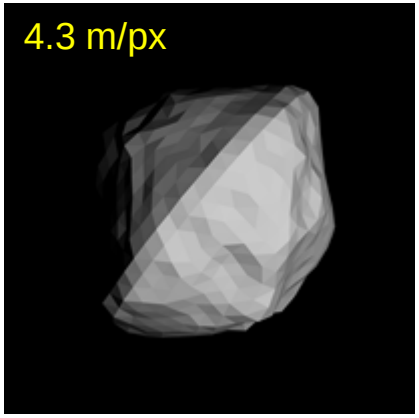
−25 sec
phase angle = 0 deg



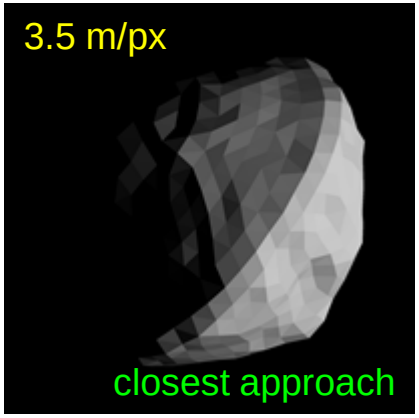
−20 sec
phase angle = 5.5 deg



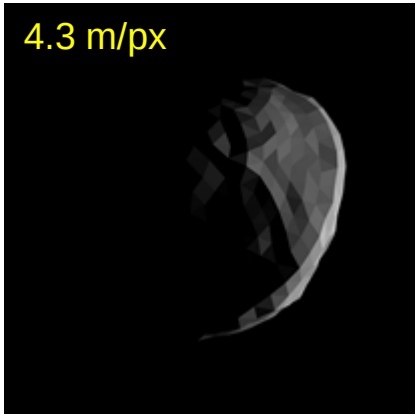
−10 sec
phase angle = 25 deg



0 sec
phase angle = 60 deg



+10 sec
phase angle = 95 deg



Expected MCAP images

Appearance of Phaethon
in the FOV of MCAP