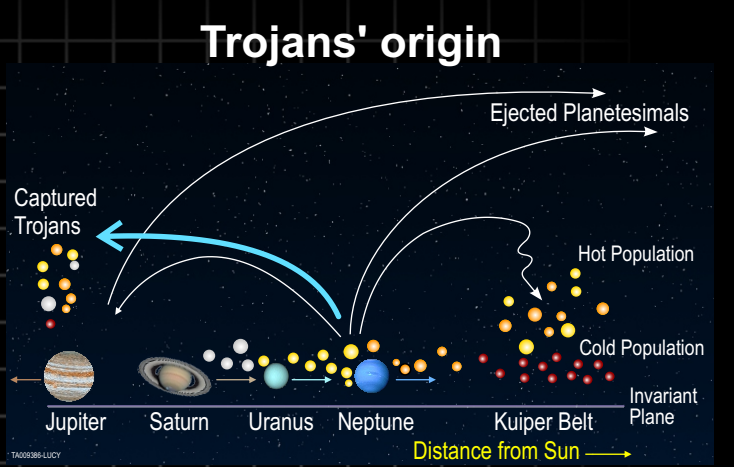
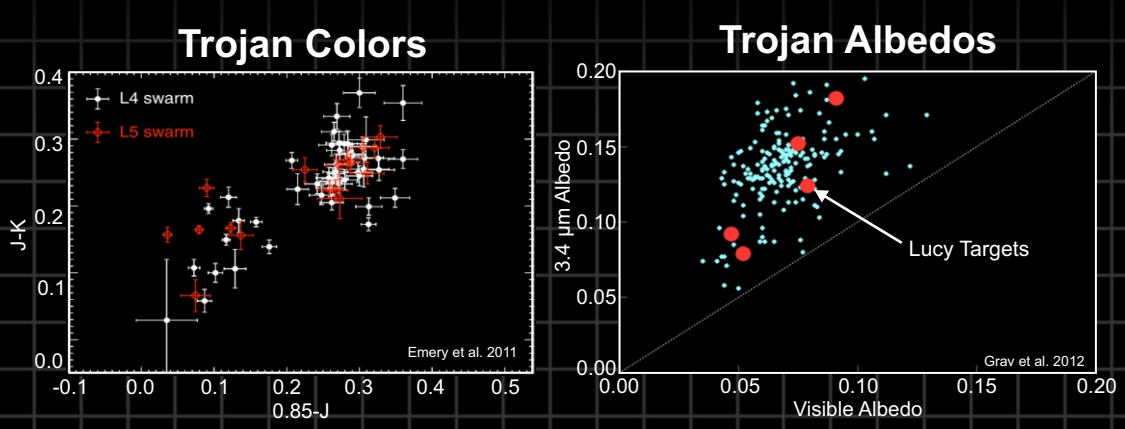




LUCY

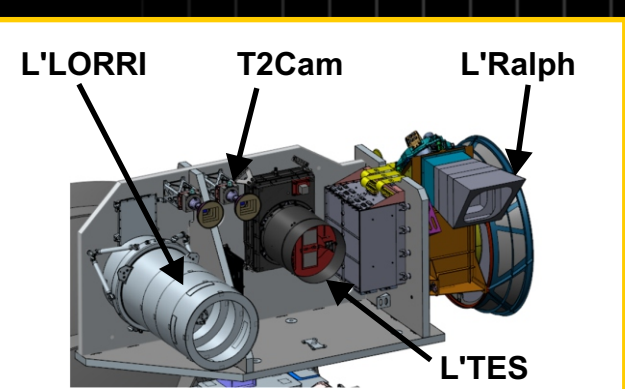
A Mission of Discovery

- Lucy is a Trojan Tour:**
- It will perform flybys of 6 Jupiter Trojans
 - 2021 launch, encounters from 2025-2033
 - High science return from never before encountered population
- Science Motivation:**
- Trojans are thought to be remnants of giant planet formation
 - Trojans are not a homogeneous population:
 1. Contain C, D, and P spectral types (i.e. gray, red, and very red)
 2. Have albedos from 4% to 15%
 3. Wide range of colors



Trojans present us with a **unique** opportunity to constrain planet formation:

1. They likely formed at different locations (Ds/Ps more primitive than Cs)
2. Were mixed together by planet formation and migration

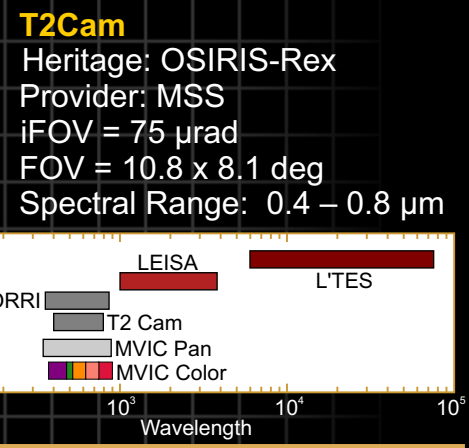


L'LORRI
Heritage: New Horizons (NH)
Provider: APL
IFOV: 5 μ rad
FOV: 0.29 x 0.29 deg
Panchromatic 0.35 – 0.85 μ m

L'Ralph (MVIC+LEISA)
Heritage NH, OSIRIS-REX
Provider: GSFC
– MVIC:
IFOV: 29 μ rad
FOV: 8.3 deg
Spectral range: 0.4-0.85 μ m
– LEISA:
IFOV: 80 μ rad
FOV: 4.6 x 3.2 deg
Spectral range: 1.0-3.8 μ m

L'TES
Heritage: OSIRIS-REX, Mars Global Surveyor
Provider: ASU
Spectral range: 6-100 μ m

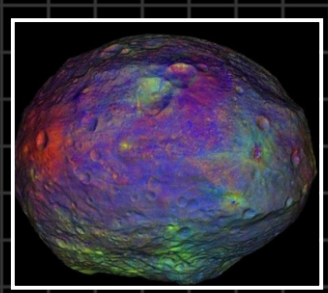
Radio Science:
2-way Doppler measurement
Uses RF system



– Lucy's Science Objectives –

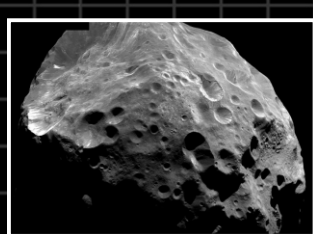
1. Surface composition

Lucy will map the color, composition and regolith properties of the surface and determine the distribution of minerals, ices and organic species.



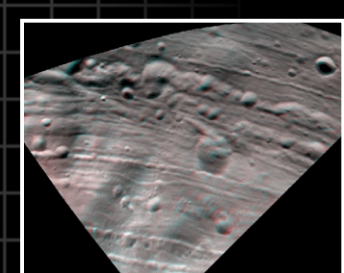
2. Surface geology

Lucy will map albedo, shape, crater spatial and size-frequency distributions, determine the nature of crustal structure and layering, and determine the relative ages of surface units.

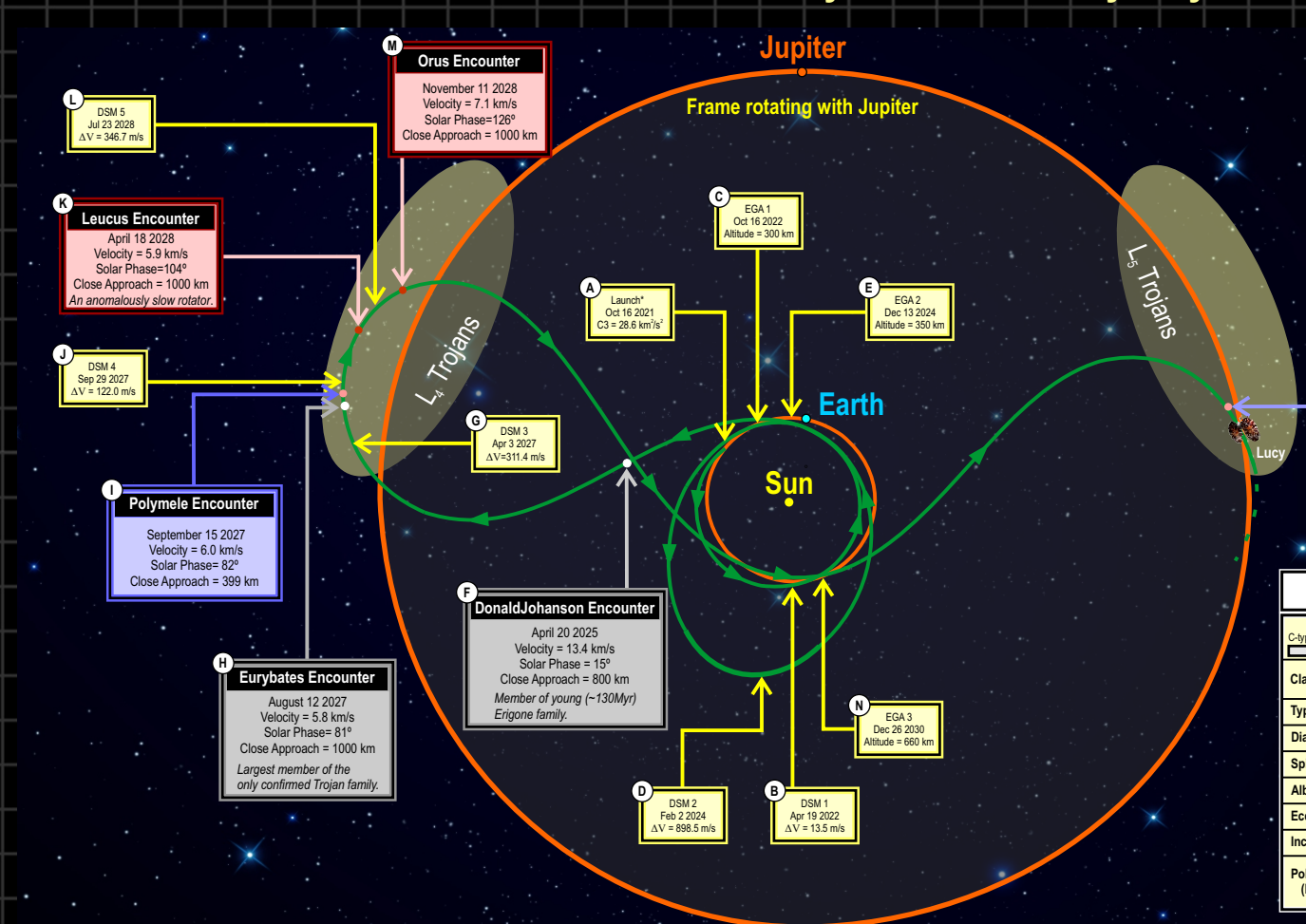


3. Interior and bulk properties

Lucy will determine the masses and densities, and study sub-surface composition via crater windows, fractures, ejecta blankets, and exposed bedding.



Lucy's twisting trajectory allows it to fly by 6 different Trojans so we can better understand where and how they formed and why they differ

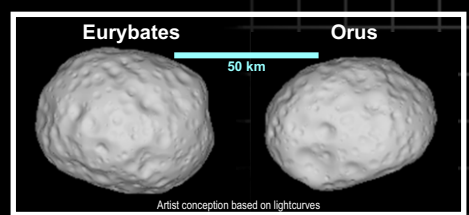


Lucy's innovative trajectory obtains flybys of all known Trojan spectral types and leverages the fortuitous alignment of Patroclus and Menoetius in the plane through the L ₄ swarm.						
Color Key	Class	Orbit	Age	Class	Orbit	Age
Gray	Main Belt	L ₄ Trojan	L ₄ Trojan	L ₄ Trojan	L ₄ Trojan	L ₄ Trojan
Blue	C	C	P	D	D	P
Diameter (km)	3.9	64	21	34	51	113/104
Spin (hrs)	Unknown	8.7	6.1	440	13.5	103
Albedo	0.1	0.05	0.09	0.08	0.08	0.047
Eccentricity	0.19	0.09	0.01	0.07	0.04	0.12
Inclination	4.4°	8.1°	13°	12°	8.5°	22°
Pole Position (long, lat)	Unknown	(143°, -45°) or (325°, -61°)	Unknown	Unknown	(28°, -58°) or (236°, -68°)	(236°, -61°)

– Lucy's Exciting Targets –

The perfect couple

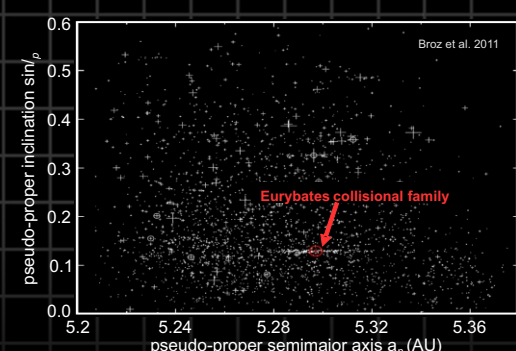
Eurybates and Orus have very similar orbits and sizes, but different physical properties!



The mystery of collisional families

Eurybates is the largest member of the only major disruptive collisional family among Trojans.

Eurybates is a C-type, rare in the Trojans. Perhaps D's become C's when hit.



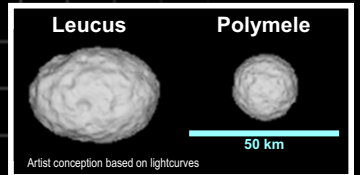
The mystery of equal mass binaries

Patroclus-Menoetius is an equal-mass binary, similar to many cold classical Kuiper Belt Objects.

Their formation challenges current ideas!



More diversity!



SURVEYING THE DIVERSITY OF TROJANS: the Fossils of Planet Formation

