



T1M – Pic du Midi

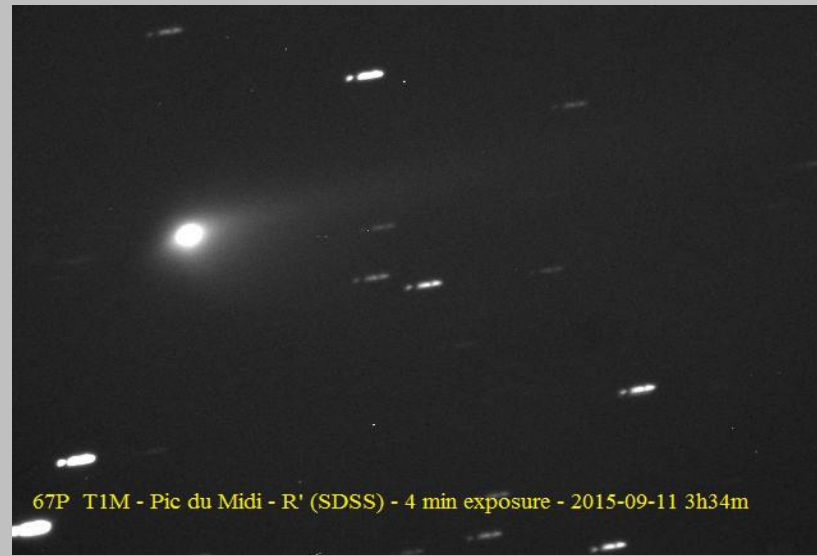
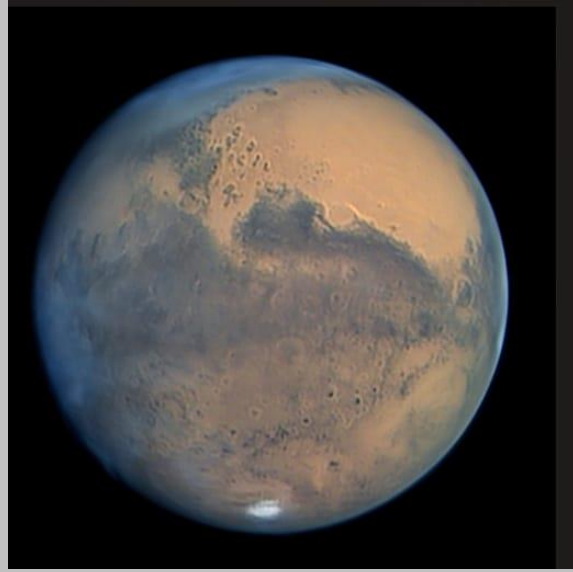
the swiss knife for astronomy !
Flexible telescope used on alerts



F. Colas, A. Klotz, J. Dubouil - GRANDMA Nice 2022

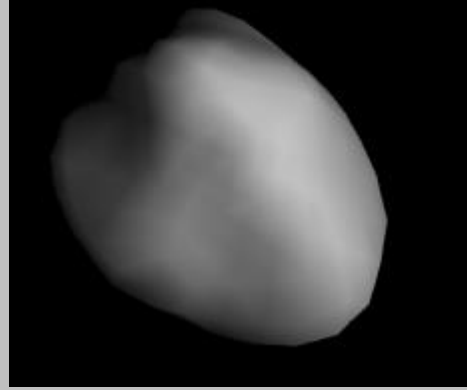


52.5 km

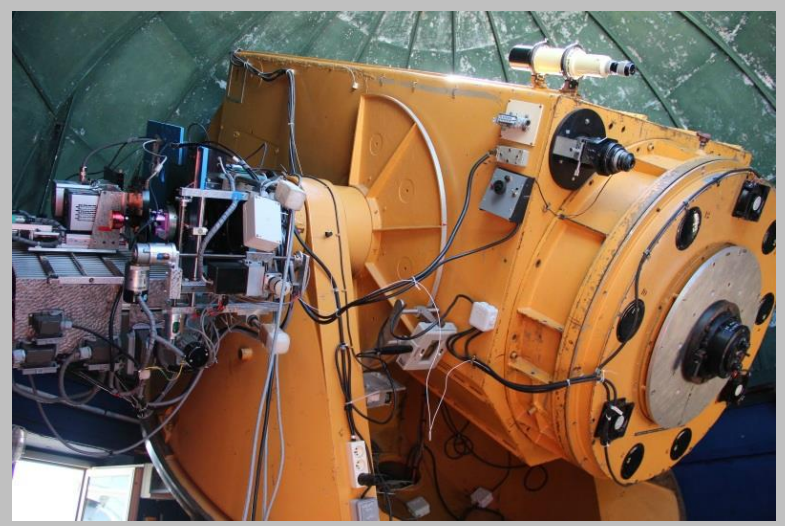


67P T1M - Pic du Midi - R' (SDSS) - 4 min exposure - 2015-09-11 3h34m

67P/Tchouriumov-Guérassimenko



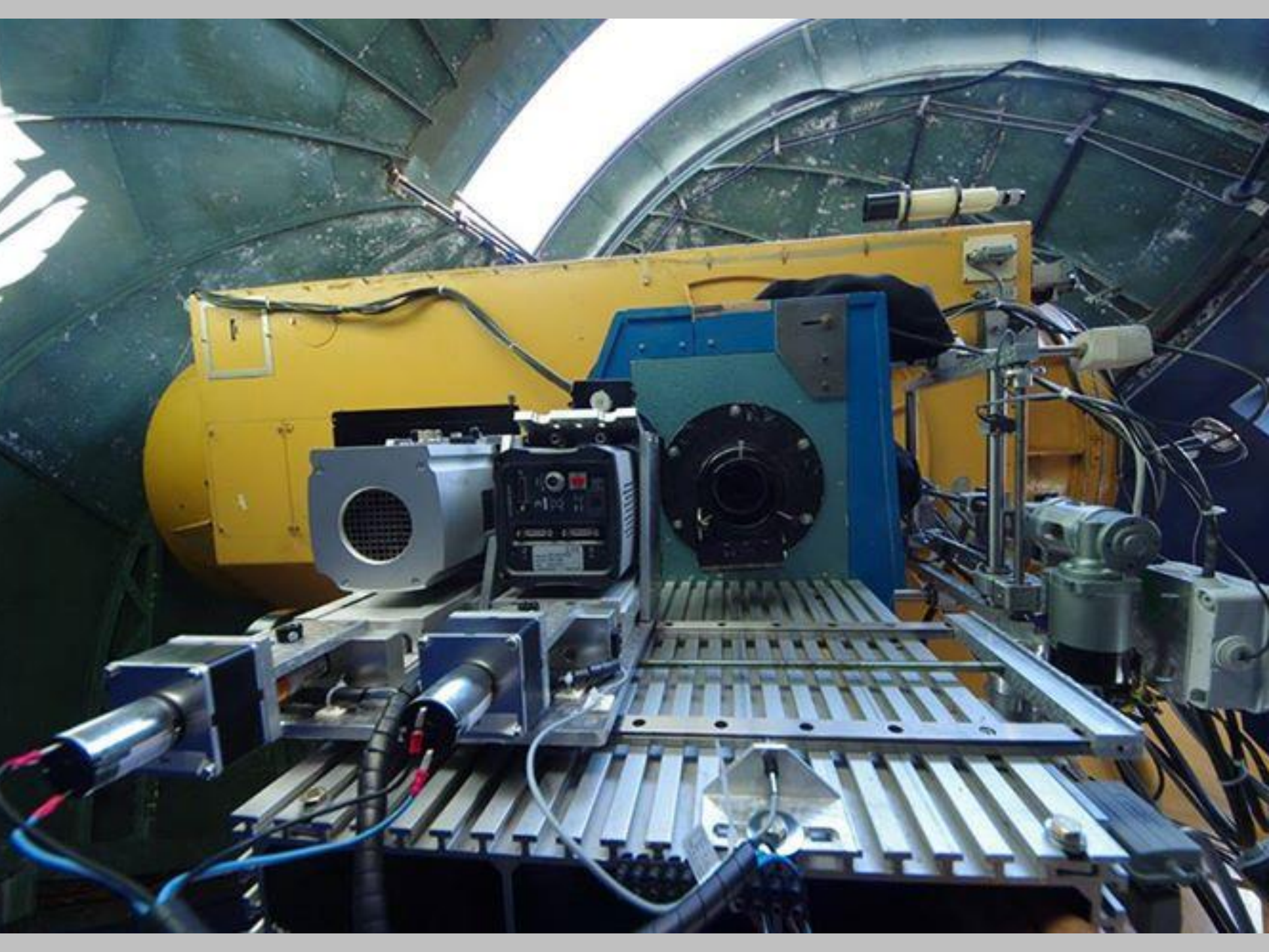
Lutetia



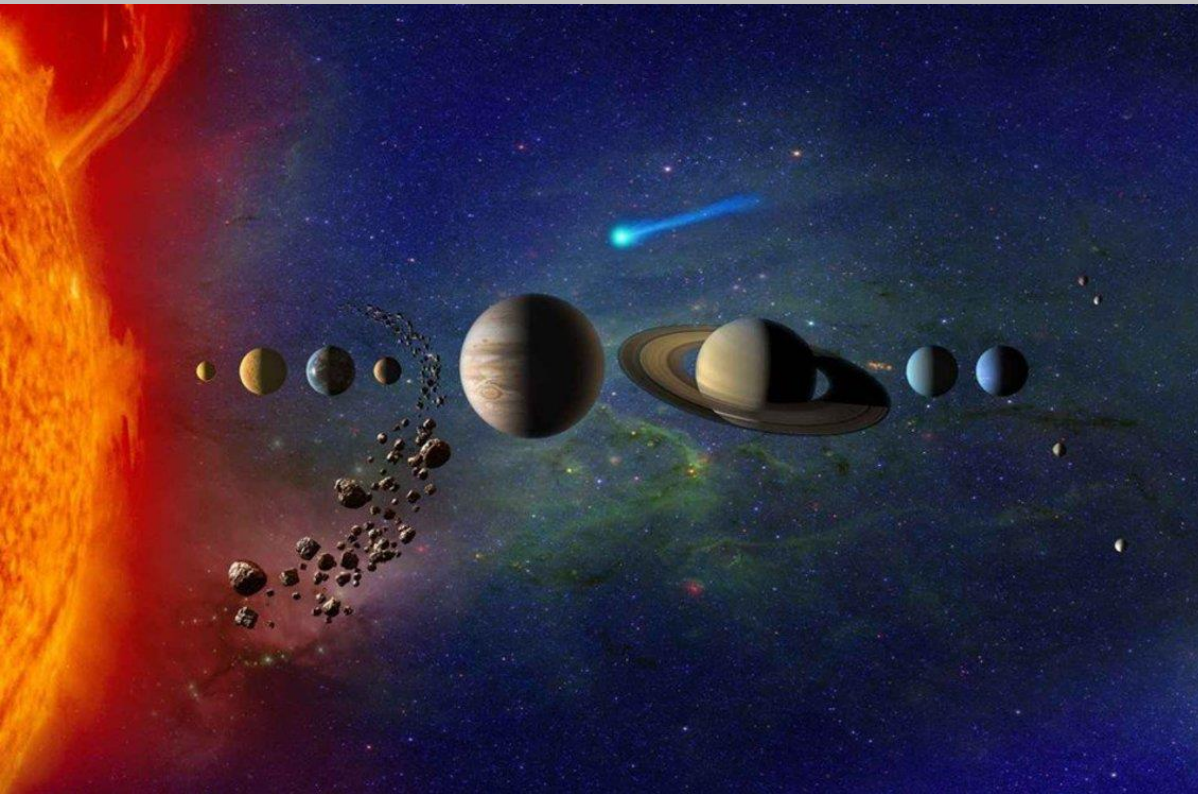
The “Station de Planétologie des Pyrénées” (S2P), Pic du Midi observatory







Characterize Interplanetary matter



The study of interplanetary matter is fundamental for our understanding of the Solar System

Solar System:

Formation (meteorites)

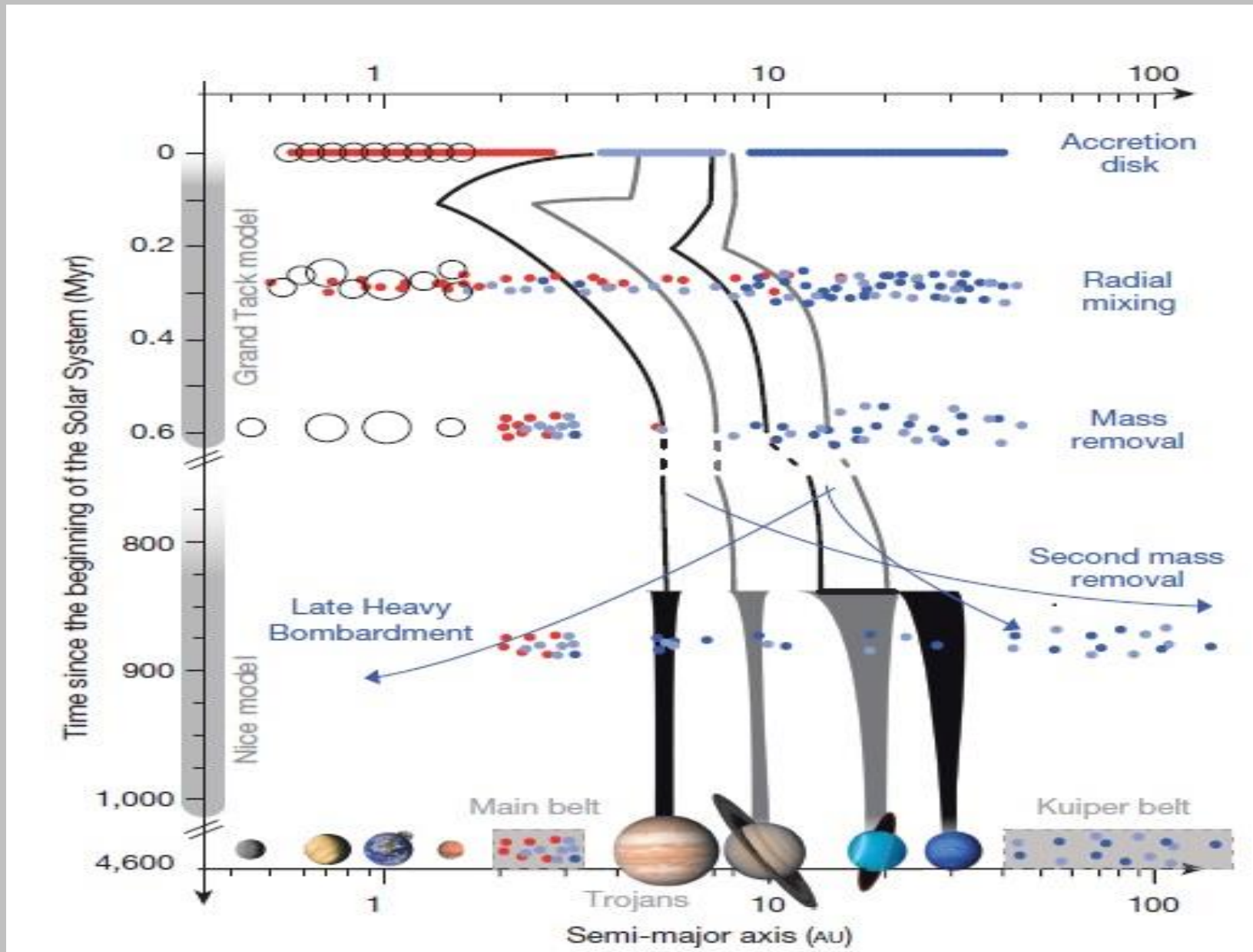
Evolution (impact flows on Earth and other planets)

Impact risks

...

Interplanetary matter covers a large number of objects from micron dust to 1000 km asteroids

Evolution du système solaire

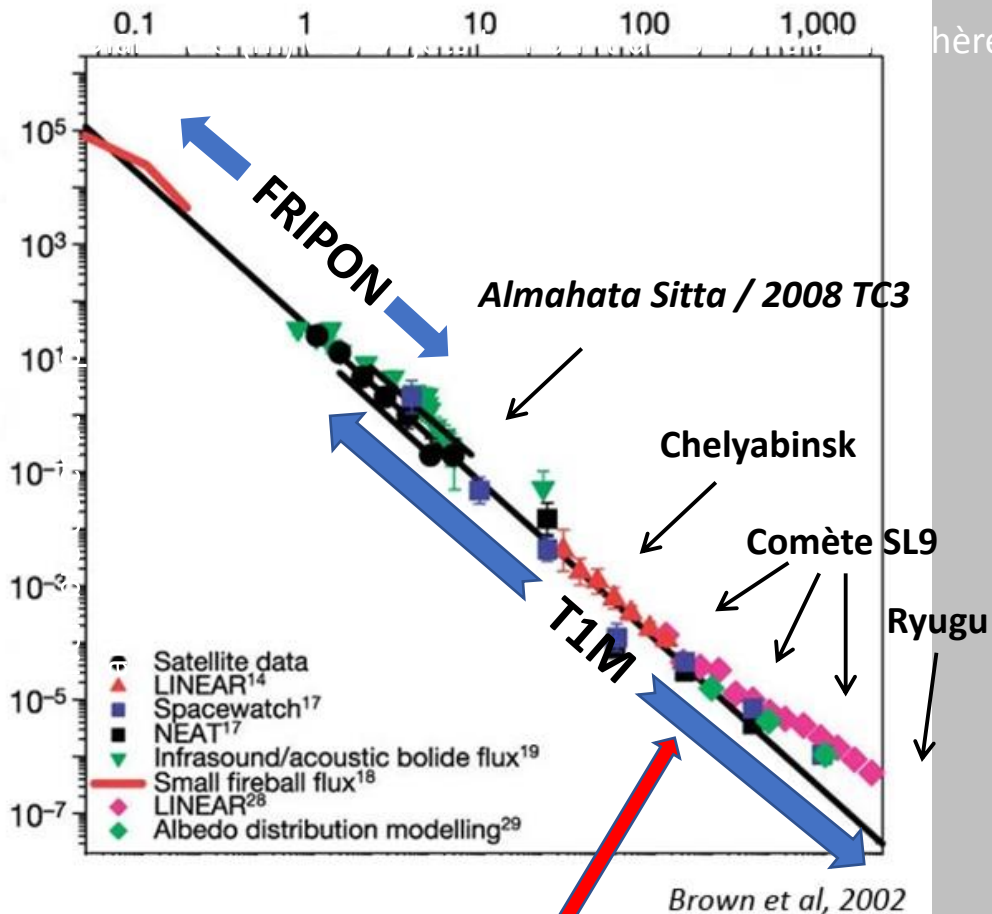


Migration of planets = mixing of matter

(Nice model !)

B.Carry F DeMeo

The small bodies of the System at Pic du Midi



rière

Statistics on falling objects in the Earth's atmosphere

FRIPON : from one centimeter to one meter :
missing link between dust (zodiacal light
and shooting stars) and asteroids (telescopes and
impacts on giant planets)

- FRIPON 1 cm => 1 m
- Almahata Sitta (3 m, asteroid discovered before its fall)
- Chelyabinsk (17 m, every 200 years?)
- Comet SL9 (50-300 m, falls every 100 years?)
- Benou (500 m, space mission Osiris-Rex)

LSST exhaustive detection limit ~ 150 m

Observation of interplanetary matter

Interplanetary "rocks" :
Impacts on Jupiter

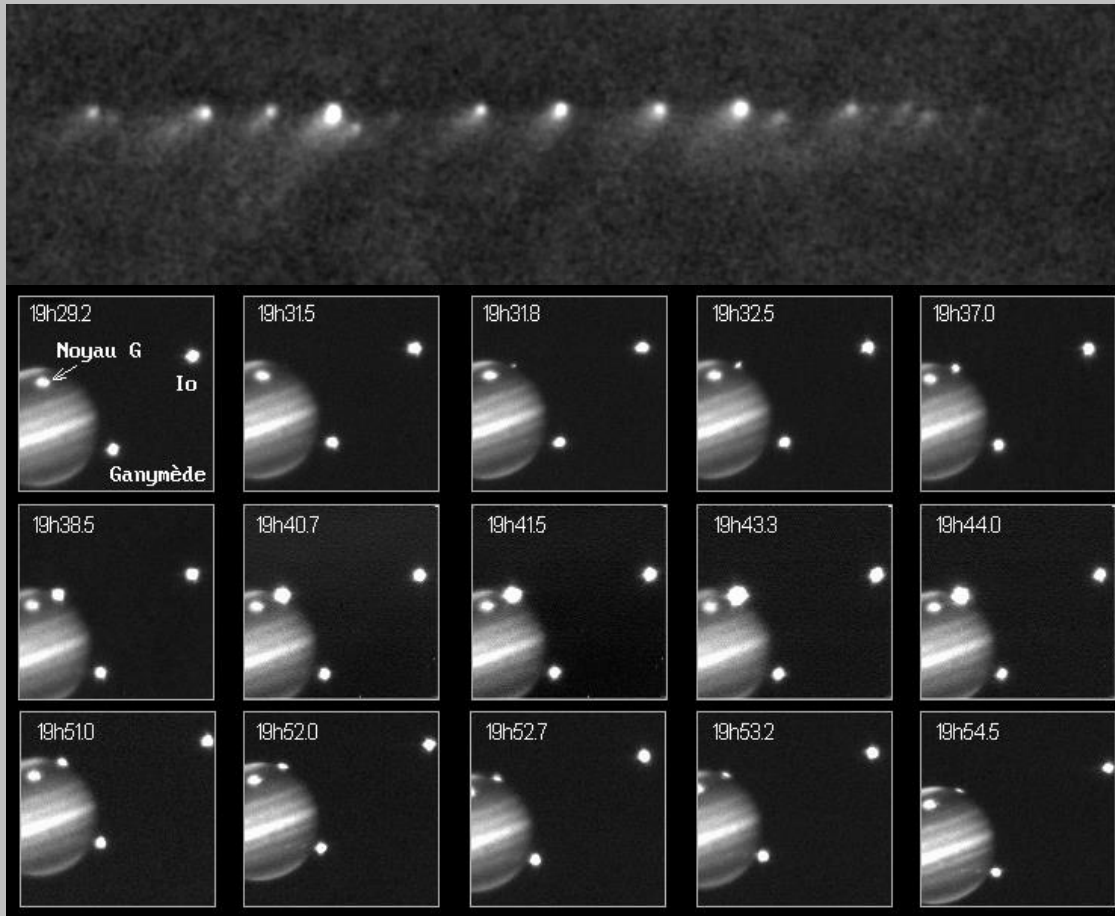
After the fall of the comet Shoemaker Levy 9 in 1994, 6 collisions with Jupiter were observed

1 event per year ?

Comets and asteroids

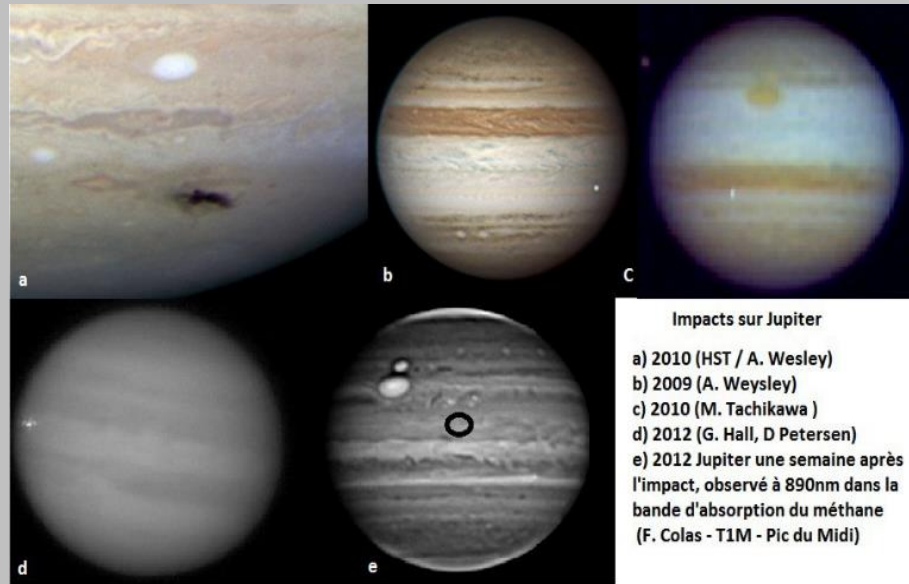
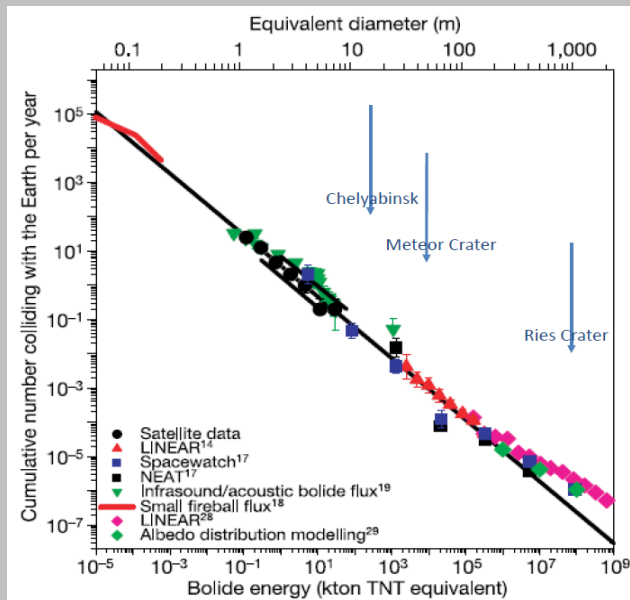
Fall of the comet Shoemaker Levy - 9
Pre-impact images
Impact of the H nucleus on July 18, 1994

(Pic du Midi Observatory, F. Colas et al)



From 5 m to 500 m

Observation of interplanetary matter program "Lucky Planet"

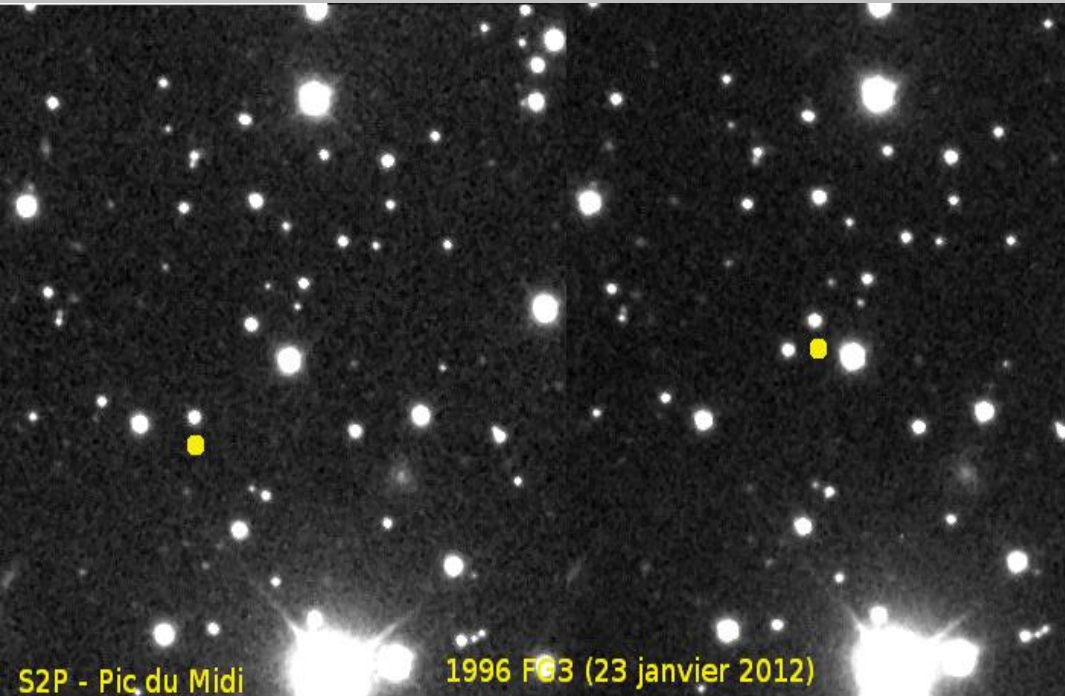


“Flux d'impacts dans le système solaire et datation des surfaces”

Mission “JUNO” :
Jupiter follow-up

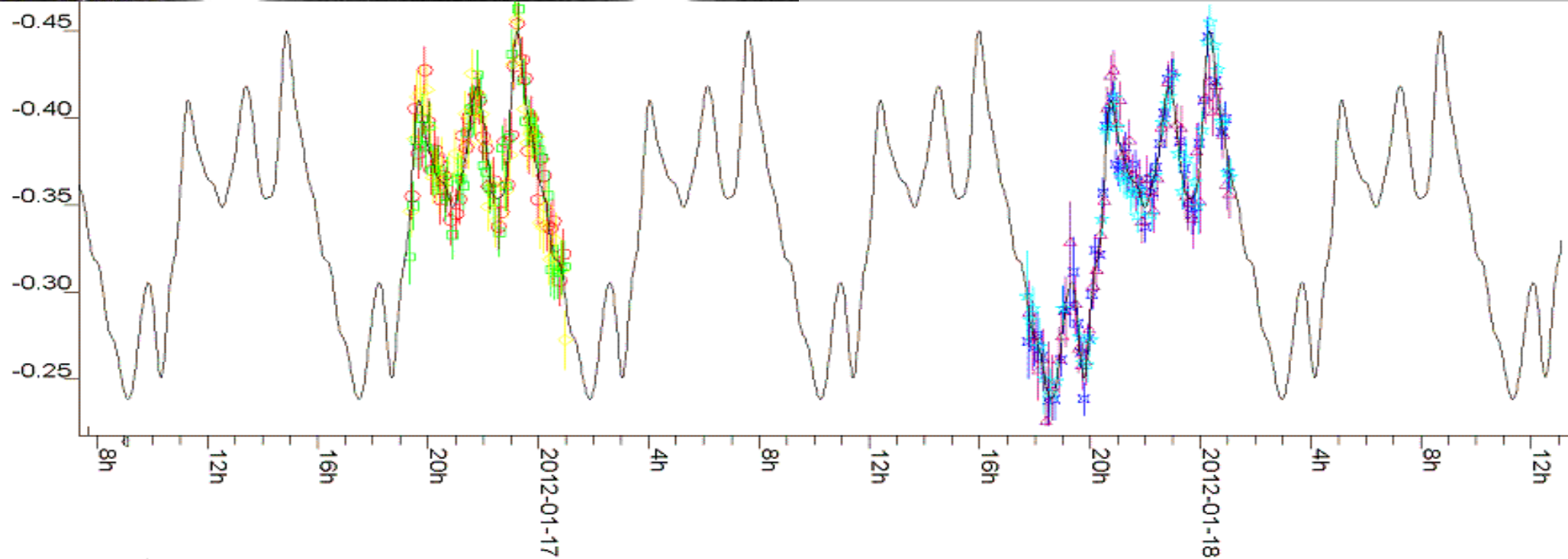


Photometric telescope



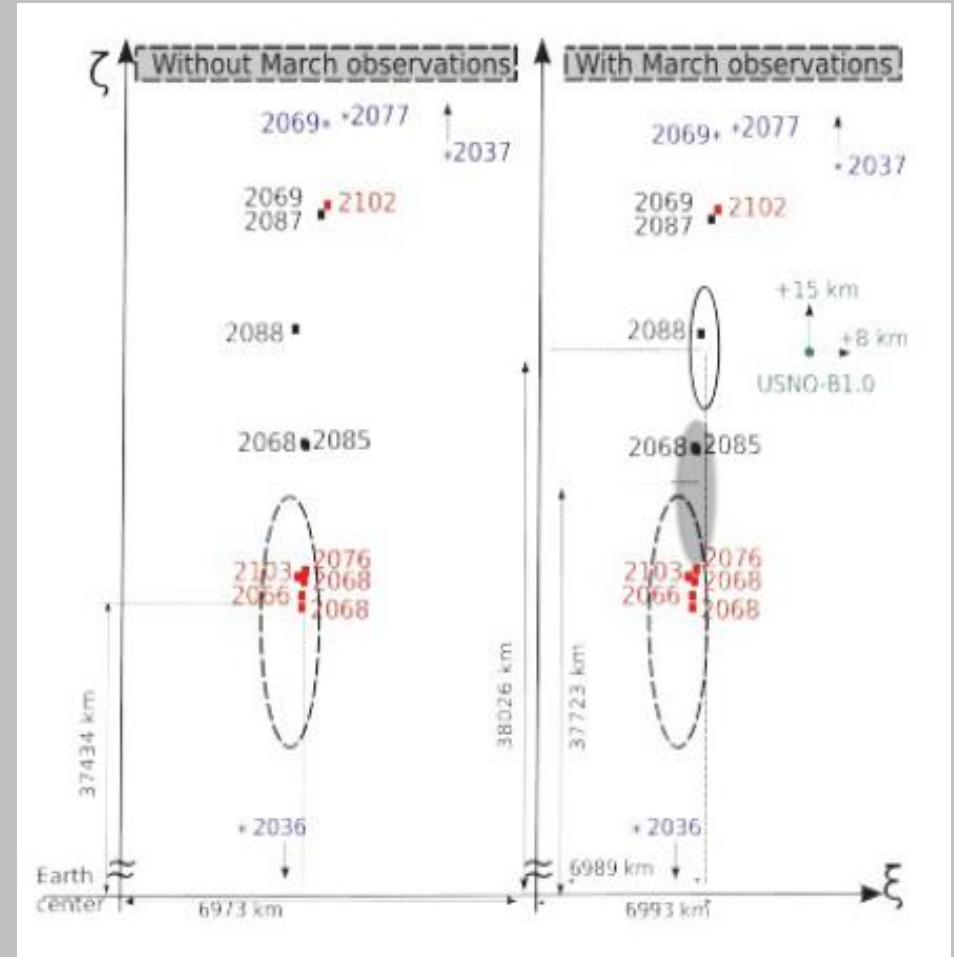
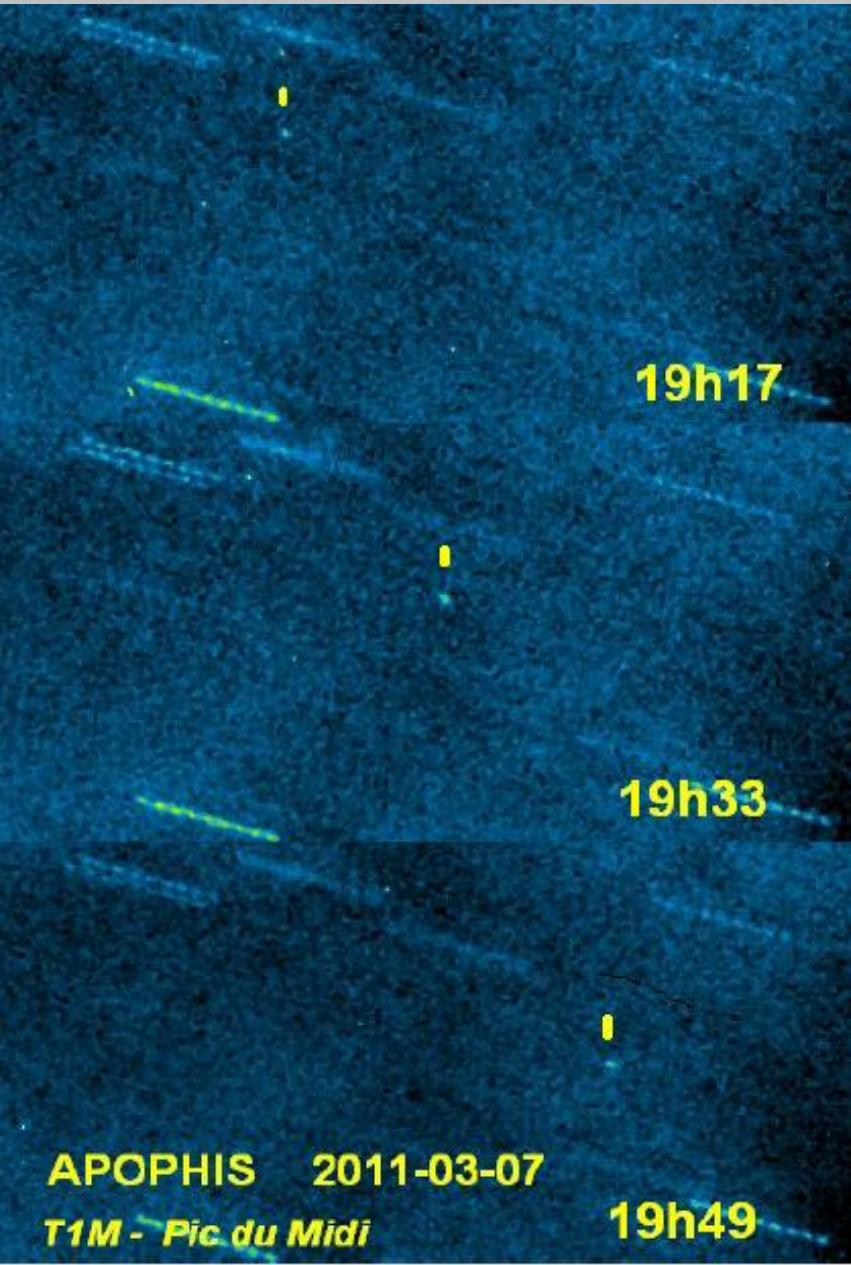
996 FG3 (Marco Polo-R target)

- Spectral and optical properties
- Astrometry



Astrometric telescope

Near Earth Object
(99942 Apophis)



Thèse D. Bancelin (2011)

“Key holes”

Program EURONEAR

Venus atmosphere

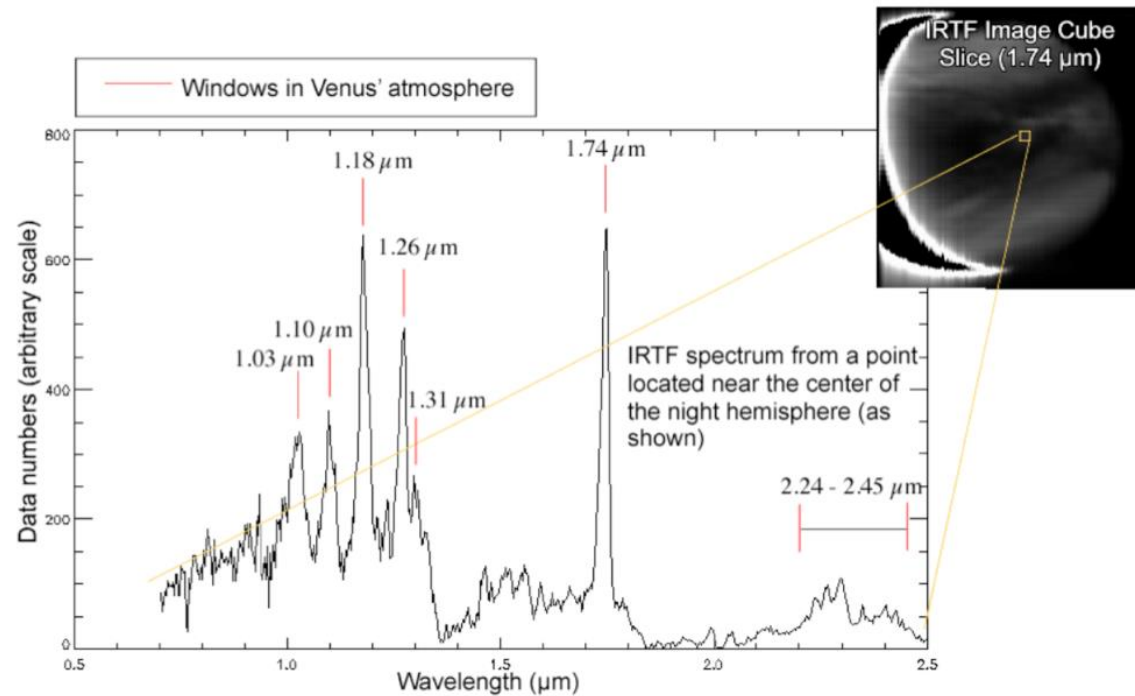
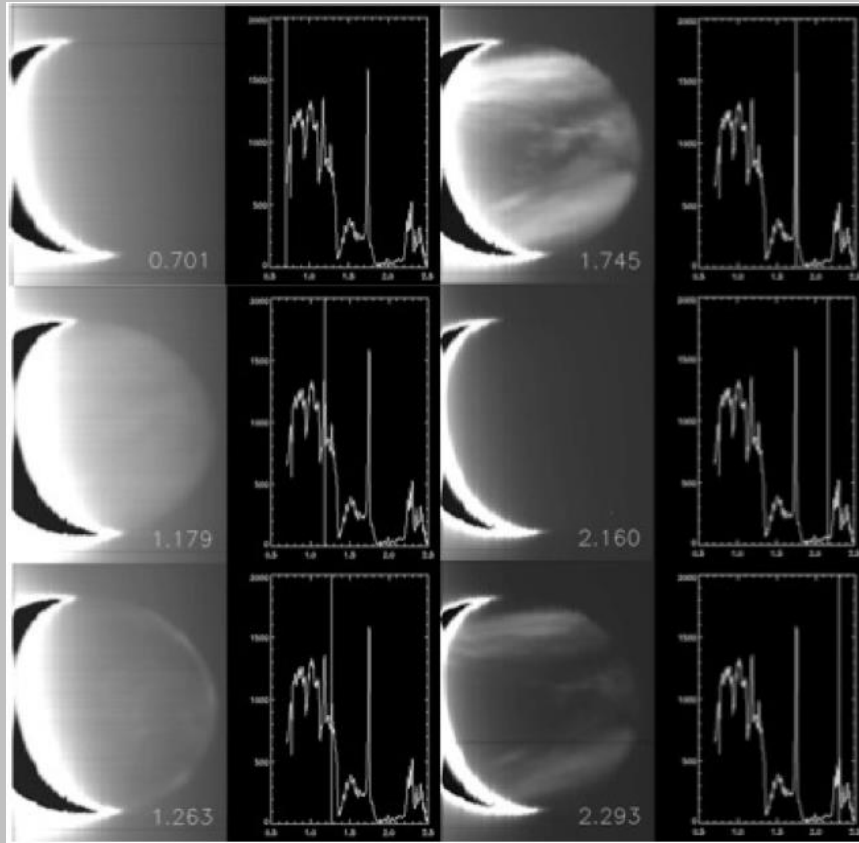
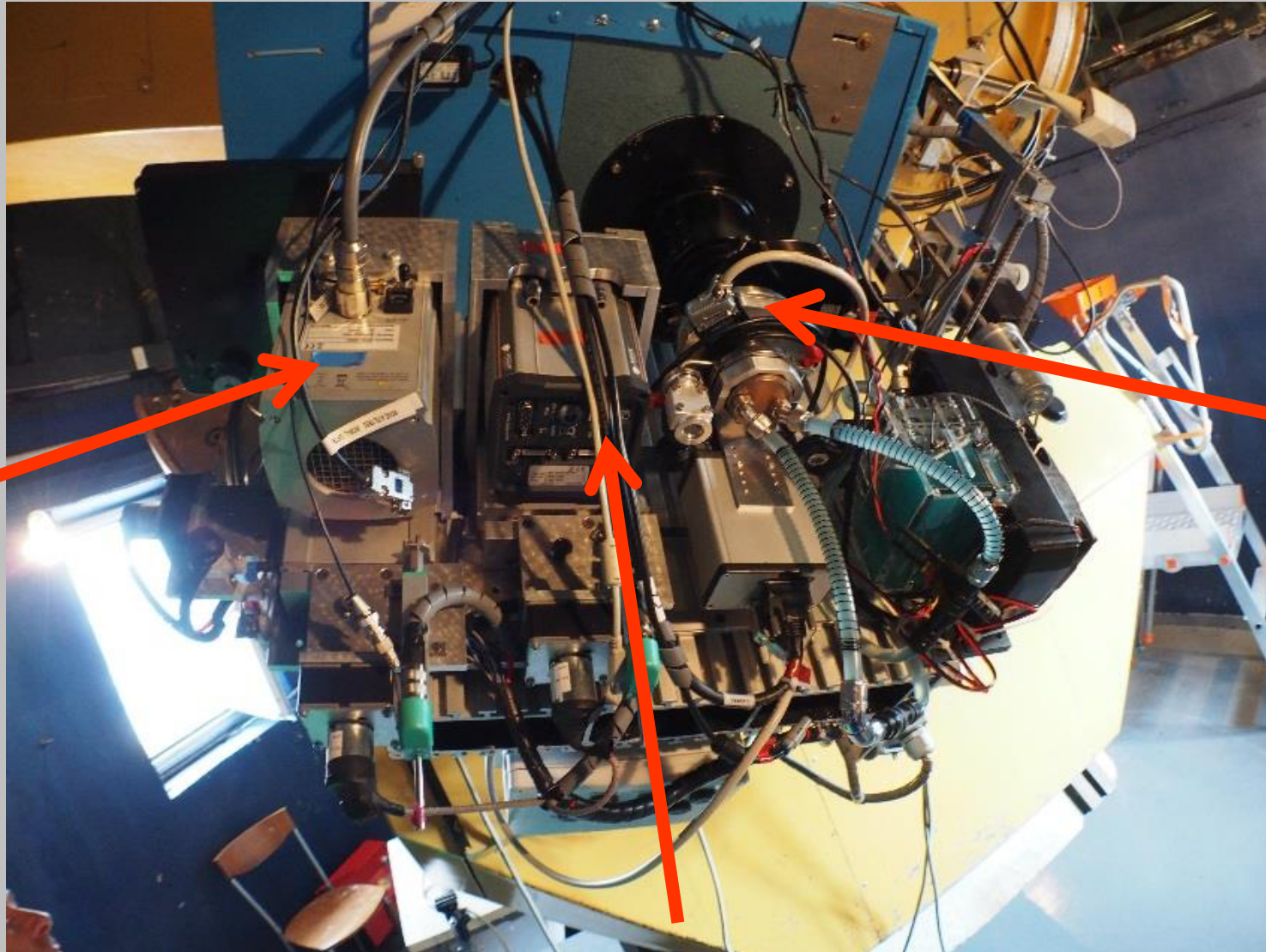


Fig. 2 A spectrum from a point on Venus' night hemisphere and a slice from the associated image cube (upper right), with the saturated daylight crescent on the left side of the disk. The major windows in Venus' CO₂ atmosphere show up as peaks in the spectrum (e.g., at 1.03, 1.11, 1.18, 1.26, 1.31, 1.74, and 2.25-2.45 μm). We obtained this spectrum using SpeX/IRTF on 16-SEP-2007.

ESA mission to Venus : EnVision

T1M – Pic du Midi
the swiss knife for astronomy !
For solar system objets and others ;-)
Flexible telescope used on alerts



Pico
Cam

ePARADISE
V 1.0
/ SIRIS

Lucky Cam

T1M – Pic du Midi

Versatile instrument (Swiss knife for solar system studies and beyond !)
Open to a large community

- Long exposure CCD camera : Astrometry and Photometry (TNO, NEO, asteroids, comets, **GRB, GW..**)
- sCMOS short exposure camera :
- Fast photometry (occultation, NEO)
- Lucky imaging (giant planets)
- SIRIS : SWIR camera: near satellites, giant planets, **GRB, GW..**
- Adaptive optics :
 - Satellites
 - Giant planets
-

Publications : 6 to 7 articles per year for the last 10 years

Mode of operation : small team, flexible use

<https://t1m.omp.eu/>