

# Planetology

## PHYSICS OF THE MINOR BODIES OF OUR SOLAR SYSTEM & LINK WITH METEORITES



Revolving around the Sun between the orbits of Mars and Jupiter, asteroids are small airless bodies considered to be leftovers from the processes of planetary formation. Some of them are thought to be as old as the Solar System itself, whereas others are the debris of ongoing collisional evolution. Understanding their chronological origin, diverse physical nature, varied compositions and orbital distribution is hence essential to constrain models of Solar System formation and evolution. In addition to orbit computation, most of our knowledge is hitherto based on the determination of their albedos and reflectance spectra as tools to investigate their compositions and mineralogy. In this METEOR, we will explore the techniques used understand what are minor bodies made of.

### Fundamental knowledge

by B. CARRY, M. DELBO,  
G. LIBOUREL & P. TANGA

**I) Our solar system:** What do we see in the solar system nowadays?

- Populations of minor bodies.
- Orbital characteristics.
- Population interlinks.
- Evidences for a dynamic past.

**II) Solar system early stage:** How the solar system begun?

- Formation of first solids.
- Meteorite formation & classes.
- Accretion processes.
- Planet formation.

**III) Solar system history:** What were the main events that shaped our solar system?

- Planetary migrations.
- Dynamical instabilities.
- The Nice model.

**IV) Surface properties:** How do we use the light to determine the composition and properties of a surface?

- Theory of reflectance & emittance from a granular medium.
- Laboratory experiments.

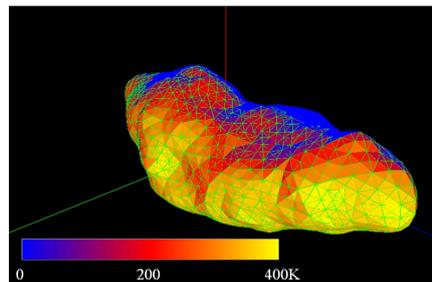
### Astronomy

by M. DELBO

The students will learn how to study asteroids from astronomical data obtained from the ground, airplanes, and space.

**Infrared Data** – Theory of heat transfer in a granular medium.

- Thermal models of air-less bodies.
- Astronomical observations in the thermal infrared.
- Data interpretation in term of physical properties. Size, albedo, and thermal inertia.



### Cosmochemistry

by G. LIBOUREL

The students will learn how to study meteorites, pieces of asteroids that fall on the Earth, containing the first solids formed from the condensation of the protoplanetary nebula :



**Laboratory Data** – Formation and composition of meteorites.

- Chronology of the solar system from meteorites.
- The problem of linking meteorites with asteroid parent bodies.
- Thermal properties of meteorites vs. asteroids.

See also

Reviews on asteroid physical properties in the *Asteroids IV* book

- (a) [Book chapter by Delbo et al.](#)
- (b) [Book chapter by Durech et al.](#)

### Contacts

☎ +33-492-00-19-74 (G. Libourel)

✉ [libou@oca.eu](mailto:libou@oca.eu)

☎ +33-492-00-19-44 (M. Delbo)

✉ [delbo@oca.eu](mailto:delbo@oca.eu)