PHYSICAL PROPERTIES AND SURFACE COMPOSITION OF MAIN-BELT ASTEROIDS. M. Birlan, Institut de Mécanique Céleste et de Calculs des Ephémérides, Observatoire de Paris, CNRSUMR8028, 77 av Denfert-Rochereau 75014 Paris cedex, France (Mirel.Birlan@imcce.fr)

Introduction: New remote-sensing capabilities have opened the early history of individual asteroids and their parent bodies to sophisticated investigation. Based on the small size of the planetesimals and on meteorite chronologies, it is known that all significant chemical processes that affected these minor planets were essentially complete within the first 0.5% of solar system history. Asteroids represent the sole surviving in situ population of early inner solar-system planetesimals, bodies from which the terrestrial planets subsequently accreted. Thus, one of the central questions of current asteroid studies concerns the geologic issues related to the original compositions of asteroidal parent bodies and the chemical and thermal processes that altered the original planetesimals [1].

Method: The remote observing was used in order to obtains spectral data in the near infrared spectral region (NIR). NIR spectra covering 0.8-4 µm spectral range were obtained with SpeX/IRTF in remote observing mode from CODAM - Paris Observatory. In the case of some space missions (Rosetta, Marco Polo), these runs are parts of the wide program of groundbased investigations of the space mission targets before the spacecraft encounter or to be used a source of calibration for the embarqued instruments.

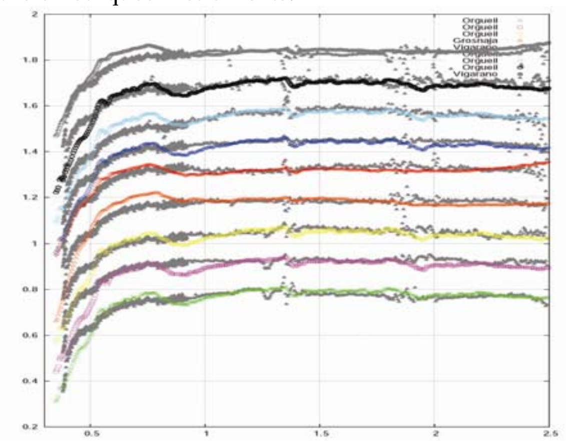

Figure 1. V+NIR spectra of 21 Lutetia and some of the best fit meteorite spectra.

Results: 2867 Steins and 21 Lutetia , the Rosetta flyby targets. 2867 Steins was observed for a long periof . The best-fit model for the constructed visible-plus-NIR spectrum is represented by a very rich-oldhamite mixture (57% enstatite, 42% oldhamite, and 1% orthopyroxene) [2]. These results place Steins in a subdivision of the E-type class with objects like 64 Angelina, 3103 Eger, and 4660 Nereus. Recently, numerical integrations found the existence of a dynamical pathway linking the current positions of Steins and Eger [3]. 21 Lutetia was observed in the visible and NIR regions. Spectra in the 0.8-2.5 µm spectral region were obtained [4,5,6]. Statistical tests and models classify the asteroid as C-type and the carbonaceous chondrites yielded the best fit. These results are consistent with a primitive composition for 21 Lutetia. The best correlation coefficients for the best fit spectrum similar to the spectra of Lutetia span the range 91-95% (Figure 1).

Karin family. The spectroscopic campaign of a young cluster of asteroids (the age of the Karin family is estimated to 5.7 My) was proposed in order to characterize the mineralogy of the family and to constrains the timescale of space weathering processes. The V spectra of members show behaviors which could be associated to surfaces younger than that of Koronis family (origin of Karin parent body) [7]. 832 Karin show no spectral variation during its rotational phase [8].

M-type asteroids. This taxonomic category is interesting case because it is mainly associated to a igneous/metamorphic, metal-rich asteroids. Our observations concern the NIR spectral region for a better coverage of this region. 7 asteroids were observed. With one exception, the asteroids exhibit red slopes. Analysis of best correspondence with the RELAB meteoritic database show a clear affinity with metallic meteorites [9].

References: [1] Gaffey, M. et al. in *ASTEROIDS III* (2002). [2] Nedelcu D.A. et al. (2007) *A&A*, *473*, L33. [3] Fornasier S. et al. (2007) *A&A*, *474*, L29. [4] Birlan M. et al. (2004) *New Ast*, *9*, 343. [5] Nedelcu D.A. et al. (2007) *A&A*, [6] Birlan M. et al. (2006) *A&A*, 454, [7] Vernazza et al. (2006), *A&A*, 460, [8] Vernazza et al (2007), *Icarus*, *191*, [9] Birlan et al, (2007), *A&A*, 475