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ESA/Rosetta encounters the main belt asteroid (21) Lutetia: Analysis of Lutetia cratering history

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Abstract

On 10 July 2010 the ESA/Rosetta spacecraft will flyby the 100-km across main belt asteroid (21) Lutetia. Lutetia will be the second asteroid ever imaged by an European spacecraft (the first one being asteroid Steins imaged by Rosetta in 2008 [1]). As witnessed by past asteroid flybys, the close look at these little rocky worlds has revealed precious information on their nature, formation and evolution (e.g. [2]). Rosetta's encounter with Lutetia is expected to produce a great deal of information about its physical properties (e.g. surface composition, geology, shape, density) and more in general to provide new insights on asteroidal sciences. Indeed, Lutetia will be the largest asteroid ever imaged by a spacecraft so far, therefore it will be the best candidate for understanding the formation and evolution of asteroids, which still remain elusive for several respects.
Moreover, Lutetia belongs to a primitive class of asteroids and it is likely a primordial body, i.e. that survived intact to eons of fiery collisions within the main belt. These circumstances make of Lutetia flyby a milestone for the whole planetary community.
In this work, we will present a preliminary analysis of the surface features detected on Lutetia thanks to the imaging system OSIRIS on-board Rosetta [3]. The closest approach distance of Rosetta to Lutetia will be 3160 km, corresponding to a best resolution of 60 m/pixel. Surface features, and in particular craters, will be determined down to diameters of approximately 200 m. The flyby will provide phase angle coverage between 20 and 170 degrees.
The analysis of the acquired data will follow the successful approach we undertaken for studying the images gathered during Steins' flyby [4]. In particular, we will investigate Lutetia cratering history and give a preliminary interpretation of the observations in terms of the current collisional models.

References

[1] Keller, H. U., et al. 2010, Science, 327, 190

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