ASTEROIDS 4 VESTA AND 21 LUTETIA: A COMPARATIVE STUDY. H. U. Keller[1], S. Mottola[2], L. Jorda[3], S. E. Schröder[4], F. Preusker[2], F. Scholten[2], R. Jaumann[2], J.-B. Vincent[4], S. F. Hviid[4], C. Raymond[5], and C. T. Russel[6], [1]IGEP TU Braunschweig (keller@linmpi.mpg.de), [2]DLR IfP Berlin, [3]LAM Marseilles. [4]MPS Lindau-Katlenburg, [5]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, [6]Institute of Geophysics and Planetary Physics UCLA.

Abstract: When 21 Lutetia was observed during the Rosetta flyby in July 2010 it was then with an equivalent radius of 49 km the biggest asteroid encountered by a spacecraft. Its shape is highly irregular, characterized by huge impact craters, and is not well represented by a triaxial ellipsoid. Its spectral classification is ambiguous and still under discussion. Surprisingly, a relatively high density of 3400 kg m-3 was determined, suggestive of a possible (at least partial) differentiation of the body. In contrast to the limited results of the Lutetia flyby, the rendezvous of the Dawn spacecraft with the third biggest asteroid 4 Vesta reveals a wealth of detail. Its shape is well approximated by an oblate spheroid, which indicates that it was formed in hydrostaic equilibrium. Its effective radius is 268 km. Vesta is the parent body of the HED meteorites, achondrites that experienced extensive igneous processing, and therefore it is expected that Vesta is differentiated. 4 Vesta may well represent a miniature planet. The densities of the Moon, Vesta, and Lutetia are similar within the error bars and hence surface gravity and escape velocity scale with the radii of these bodies. Geomorphologic features and processes on Vesta's surface are commonly interpreted based on the extended knowledge of the Moon that, however, is 286 times more massive than Vesta. Vesta's topography is considerably rougher when related to its size and resembles in many respects that of Luteria's battered surface typical for asteroids. Geomorphologic features on Vesta and Lutetia can be directly compared because the scales of images taken during the Dawn high altitude mapping orbit (HAMO) and those of Rosetta are both about 60 m/pixel. In contrast to the geomorphological similarities Lutetia's surface spectrum is featureless and displays only a few subdued color variegations (Fig. 1) whereas Vesta's surface displays divers lithologies in craters and ejecta in addition to a hemispherical dichotomy. The direct comparison with Lutetia's properties (shape, geomorphology, crater size distribution, and variegation) will help to constrain parameters of processes on Vesta and be useful to separate exogenic from endogenic effects. It will also help to disclose more information on the nature of Lutetia.

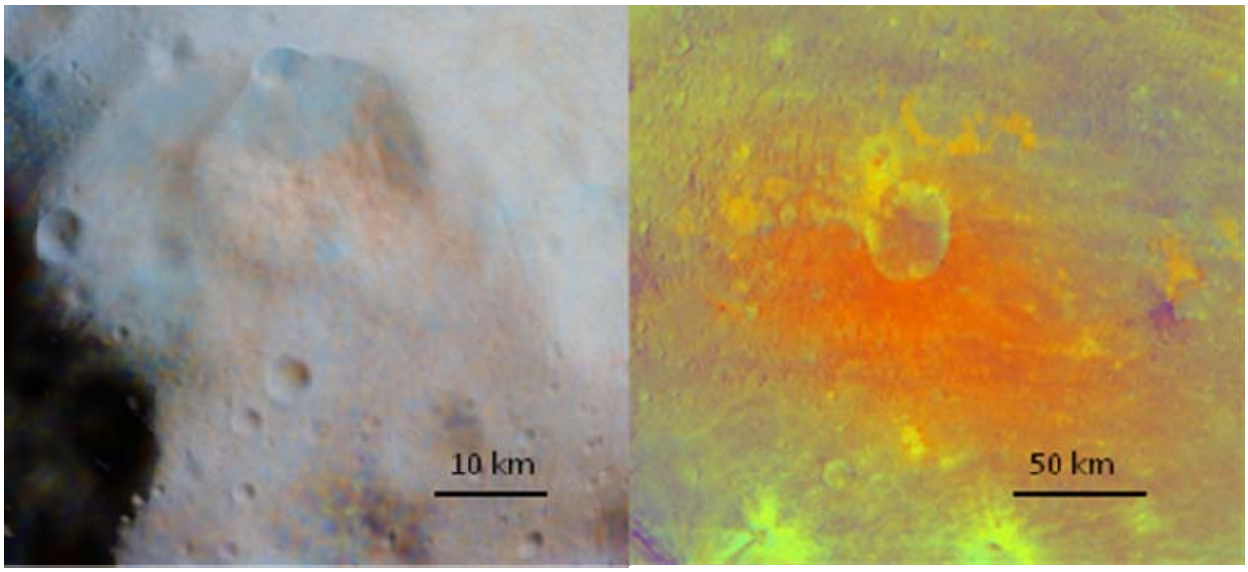

Figure 1 Left: the central crater complex shows the strongest color variegation of Lutetia. Right: Vesta's Oppia crater and ejecta display highly variable lithologies. The Lutetia image is underlaid by a high resolution ortho image. Similar filter ratios and stretches are applied for both false color representations.