# Lutetia's lineaments

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The European Space Agency's Rosetta spacecraft flew by asteroid (21) Lutetia on July 10th, 2010. Observations through the OSIRIS camera [1] have revealed many geological features [2]. Lineaments are identified on the entire observed surface of the asteroid. Many of these features are concentric around the North Pole Crater Cluster (NPCC) [3].

As observed on (433) Eros and (4) Vesta [4,5], this analysis assesses whether or not some of the lineaments could be created orthogonally to observed impact craters. The results indicate that the orientation of lineaments on Lutetia's surface could be explained by three impact craters: the Massilia and the NPCC craters observed in the northern hemisphere, and the candidate crater Suspicio inferred to be in the southern hemisphere. The latter has not been observed during the Rosetta flyby.

Of note is that the inferred location of the Suspicio impact crater derived from the lineaments matches the location, where hydrated minerals have been detected from Earth-based observations in the southern hemisphere of Lutetia [6]. Although the presence of these minerals has to be confirmed, this analysis shows that the topography may also have a significant contribution in the modification of the spectral shape and its interpretation.

The cross-cutting relationships of craters with lineaments, or between lineaments themselves, show that Massilia is the older impact feature, the NPCC the younger, and that the Suspicio impact crater is significantly older than the NPCC impact crater but younger than Massilia.

This analysis presents an alternative interpretation of the origin of the lineaments on asteroid Lutetia that differs from previous numerical modeling [7], depending on the assumption used for the creation of the lineaments. It also does not associate the orientations of the lineaments to pre-existing orientations related to a hypothetical parent body as recently suggested [Giacomini et al., 2014]. In this respect, this analysis agrees with Lutetia being a planetesimal [8,2].

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