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Vesta Collisional History Revealed by DAWN

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Vesta is a 530 km diameter differentiated rocky body in the main asteroid belt that accreted within the first few million years after the formation of the earliest solar system solids [1,2,3]. These circumstances, along with the fact that Vesta's surface is probably sampled in meteorite collections (the so-called howardite, eucrite and diogenite (HED) meteorites), make Vesta one of the best targets for studying the early evolution of the main belt. According to current dynamical models [4,5,6], Vesta early evolution took place in an environment where collisions with other asteroids were much more frequent than today. These considerations lead us to deal with fundamental questions, such as: How much of Vesta history can be inferred from remote sensing, and in particular from cratering studies? Can this history inform us about the past evolution of the main asteroid belt and the solar system? Can radiometric ages of HEDs be used to establish a Vesta crater chronology to be compared and, possibly extend, the Apollo-based lunar crater chronology?

Dawn observations of Vesta confirm and extend the range of geologic and impact processes seen on smaller asteroids. One of the obvious features emerging from these observations is that the surface of Vesta is dominated at all scales by impact craters. The lack of many of the obliteration processes that may occur on larger bodies (e.g., erosion on Mars, Venus; lava emplacement on the Moon and Mercury) allows for greater preservation of craters on Vesta. Observed crater sizes range from the resolution limit (10s of meters for the low-altitude mapping orbit) to the largest $\sim$500-km impact basin at the south pole, called Rheasilvia.

The Framing Camera on the Dawn spacecraft extensively imaged Vesta during its Survey phase, at an altitude of about 2700 km. These data have been used to build a global mosaic with a scale of 260 m/px, covering about 85% of Vesta's surface [7]. At the moment of writing, we have identified and catalogued 3457 craters $\geq$2 km, of which 1872 are $\geq$ 4 km, and 12 are $\geq$50 km (several large and degraded craters have been identified thanks to digital terrain models). The work is in progress as more and more data become available.

Here we present an overview of Vesta global crater catalogue and we discuss how this precious database can inform us about the above mentioned major questions and solar system processes.

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