

Double and multiple craters indicating the break-up of projectiles in the Saturnian system

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Double and multiple craters (clusters and linear chains) occur on the terrestrial planets and were formed by impacts of broken-up projectiles. On the icy satellites of Jupiter, similar features, e.g. long chains of craters, could be observed [2]. One cause of break-up of a single impactor is the tidal force of the target body [1][2]. As a second cause for crater clusters, spatially close impacts of mutually orbiting small bodies were discussed [3][4].

In the densely cratered plains on the icy satellites of Saturn, double and multiple craters (including chains) can also be distinguished in the Cassini ISS camera data. Craters in these groups, as shown in *Fig. 1*, are characterized by (a) similar morphology, (b) similar degradational state, in a number of cases (c) similar sizes and/or (d) common crater rims, and (d) similar orientation of linear chains. Crater groups occur over a range of sizes of the craters within the group and incorporate kilometer-sized craters (or less) (*Fig. 1*, middle) as well as groups with comparably large craters several tens of kilometers across (e.g., group of Prytanis crater on Dione (*Fig. 1*, right)). Similarities in morphology, degradation or size are a strong indication that these closely spaced craters were formed at the same time by multiple impacts. In this work we will discuss preliminary results about (1) identification and mapping of double and multiple craters on Saturn's satellites, (2) their stratigraphy and ages, (3) occurrence within the context of geologic units on which these groups are superimposed, and (4) possible hemispherical asymmetries. References: [1] Sekiguchi, N. (1970), *The Moon*, V. 1, No. 4, 429 – 439. [2] Schenk P. M. et al. (2004), in *Jupiter* (J. Bagenal et al., eds.), p. 427 – 456, Cambridge Univ. Press, Cambridge, UK. [3] Baldwin, R. B. (1963), *The measure of the Moon*, Univ. of Chikago Press, 88p. [4] Binzel, R. P. and van Flandern, T. C. (1979), *Science*, 203, 903 – 905.

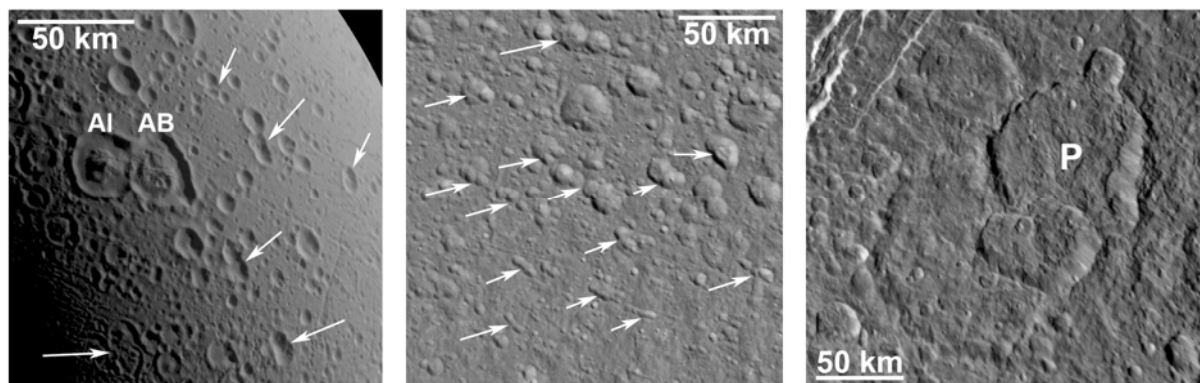


Figure 1: Double and multiple impact craters on Enceladus and Dione (indicated by arrows). **(left)** Enceladus, ISS frame N1597179417 (flyby 080EN), largest craters indicated are Aladdin (AI) and Ali-Baba (AB); **(middle)** parallel chains of craters on Dione (Pantagias Catena), detail of a mosaic taken in flyby 015DI; **(right)** group of large, degraded craters on Dione (P: Prytanis), detail of a mosaic taken in flyby 050DI.