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Impact-induced N₂ generation on Titan and Triton in the Late Heavy Bombardment

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Titan is a very unique satellite because it is the only satellite that has a thick atmosphere composed mainly of N₂. In contrast, Triton and Pluto have only very thin atmospheres composed mainly of N₂. Puzzling questions on planetary and satellite atmospheres is how and when the huge amount of N₂ was formed on Titan and how its origin is different from those of Triton and Pluto. In this study, we evaluate the role of impact-induced N₂ production during the Late Heavy Bombardment from NH₃ ice in Titan's crust using a laser gun method. Based on the measured efficiency of N₂ production, we quantitatively discuss the N₂ productions on Titan, Triton, and Pluto during the Late Heavy Bombardment and compare their origins.

Keywords: Titan, impact, Triton, nitrogen, atmosphere