

Return to Comet Tempel 1: Results from Stardust-NExT

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Abstract

On February 14, 2011 Stardust-NExT flew by Comet Tempel 1, the target of the Deep Impact mission in 2005, obtaining dust measurements and high-resolution images of areas surrounding the 2005 impact site, and extending coverage to almost two thirds of the nucleus surface. No large-scale morphologic or photometric changes have occurred in the region of common coverage during the past six years. The most significant changes took place along the edges of a prominent smooth, flow-like feature, the margins of which receded in places by up to 50 meters. The amount of material removed is sufficient to account for about a percent of the estimated mass loss of the comet per perihelion passage. The DI impact site shows a subdued impact scar some 50 meters in diameter implying surface properties similar to those of dry, loose snow. Smooth areas cover about half of the newly imaged face of the comet. On the nucleus smooth regions are restricted to gravitational lows, consistent with the view that they originated from eruptions onto the surface and date from a time after the nucleus had achieved its present shape. Much of the surface of the comet displays evidence of pervasive layering. Two types of layers may be involved: some related to the smooth flows and others possibly dating back to the accretion of the nucleus. Coma and jet activity were lower in 2011 than in 2005. As was the case at the Wild 2 flyby in 2004, the dust instruments detected bursts of impacts consistent with a process by which larger aggregates of material emitted from the nucleus fragment into smaller particles within the coma.

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