

The Leading Side of Enceladus: New Views from Cassini ISS

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High-resolution mosaics of the leading-hemisphere of Enceladus were acquired for the first time by Cassini's ISS Narrow Angle Camera (NAC) during two close flybys, one on November 21, 2009 and another on May 18, 2010, respectively. Additional imaging of the leading-hemisphere is planned for a close (2800 km) flyby on August 13, 2010 (orbit 136). Low resolution imaging obtained earlier in the Cassini mission showed that the leading hemisphere is heavily modified by tectonism, but the extent to which the tectonic styles on the leading hemisphere might be similar to those elsewhere on Enceladus was unclear. The new mosaics show that the leading side is subdivided into distinct geological provinces that exhibit different cratering histories and diverse tectonic styles. The highly tectonised terrains are bounded by a prominent broad annulus of grooved and striated terrains that ranges from about 60 km to over 140 km in width. It surrounds a complex arrangement of tectonic structures, including a conspicuous province near 30°N, 90°W of curvilinear ridges and approximately orthogonal-trending ridged-troughs. Among the most significant new findings is a region near 10°S, 60°W of terrain that is covered by a distinct pattern of rounded, rope-like sub-parallel ridges. These ridges, in appearance and scale, are remarkably similar to ropy (funiscular) plains materials that previously have been found only in the South Polar Terrain region adjacent to active tiger stripes. We suggest that the pattern of ropy ridges on the leading hemisphere arose from a similar style of tectonic deformation that produced the South Polar funiscular plains – a terrain that is closely related to possible folding and tectonic spreading associated with the tiger stripes. These features may thus record an ancient episode of South Polar style tectonism and volcanism near the equator.