# New Horizons first results: Implications for our understanding of the Solar System's early history and evolution

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The *New Horizons* spacecraft provided the first reconnaissance of the Third Zone of the Solar System, the region beyond Neptune that is populated by ice bodies that may date from the earliest epochs of planetary formation (1). The encounter with Pluto showed a world of active processes at the edge of the Solar System, including ongoing glaciation; eolian processes; features characteristic of thermal segregation of volatiles; global volatile transport; tectonic extension; and possible cryovolcanism. Pluto's surface is covered with methane, nitrogen, carbon monoxide, and water ice, some of it freshly deposited. The youngest regions are free of impact craters. Pluto's substantial atmosphere is a location of photochemical reactions that create complex organics that coat parts of Pluto's surface.

Charon also exhibits evidence for major tectonic activity, although it does not appear to be active at the present. A large impact basin is associated with a mysterious low-albedo material of unknown origin.

**Discussion**

New Horizons accurately measured the sizes of both Pluto and Charon, enabling a derivation of the bulk density of the two bodies; they differ by only ~10%. If Pluto and Charon were formed in a catastrophic collision, these similar densities imply that the two bodies were not differentiated early in their history.

[1] Stern, S. A. *et al*. (2015). *Science* **350,** 292.
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