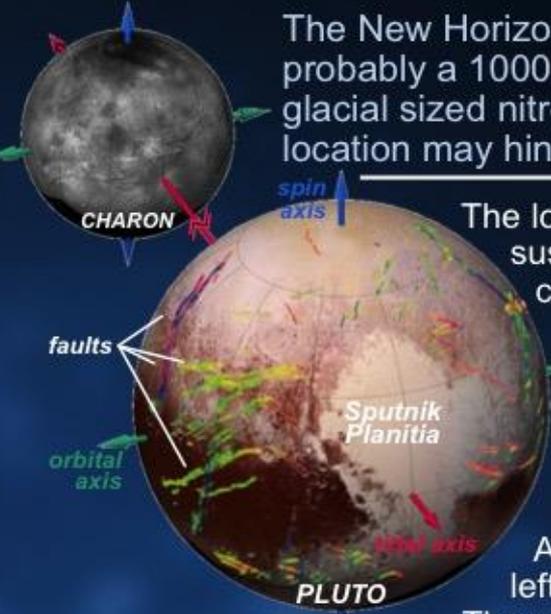


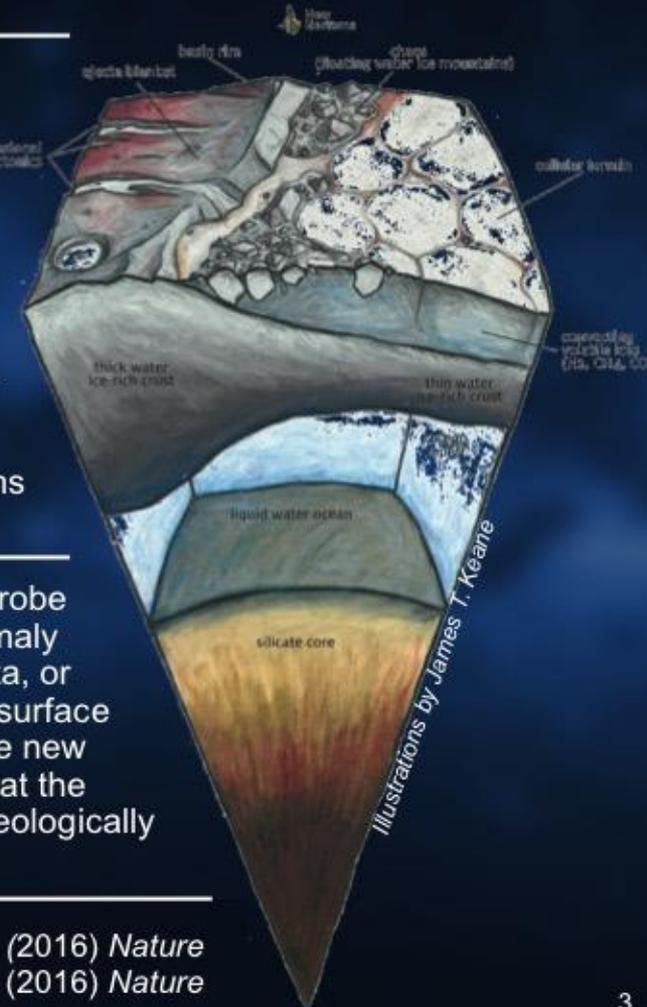
Reorientation, Faulting, and an Ocean on Pluto

The New Horizons mission has revealed that Sputnik Planitia (left side of Pluto's heart), is probably a 1000 km diameter impact basin that is filled by a thick layer of actively convecting glacial sized nitrogen ice. This unique structure controls the orientation of Pluto, and its location may hint at a subsurface ocean.



The location of Sputnik Planitia is not random: it is suspiciously close to Pluto's tidal axis (the axis connecting Pluto and Charon; figure upper left). This suggests that this basin is a mascon - a location with excess mass. When this denser than average spot was created, it unbalanced Pluto and caused Pluto to roll on its side, putting Sputnik Planitia as close to the tidal axis as possible. As the dwarf planet reoriented (figure lower left) tidal/rotational stresses fractured the crust. The pattern of faults on the surface of Pluto confirms this reorientation hypothesis.

If Sputnik Planitia does have excess mass, this can be used to probe the geologic structure of the basin. This positive mass anomaly may come from volatiles in the basin, the impact ejecta, or possibly the presence of a present-day subsurface ocean (figure at right). In any case, these new findings from New Horizons suggest that the outer solar system may be far more geologically active than expected.



Keane et al. (2016) *Nature*
 Nimmo et al. (2016) *Nature*