The Edges of the Solar System

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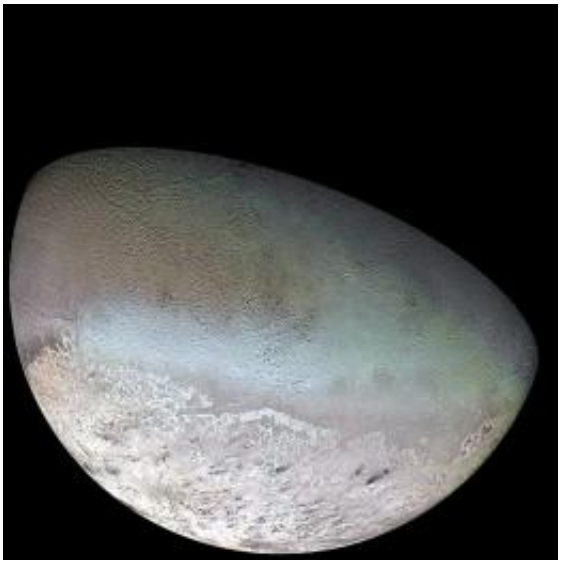

An image of Triton, the largest moon of Neptune. Triton is thought to be a Kuiper Belt Object captured by Neptune. Credit: NASA; Voyager 2

(PhysOrg.com) -- The solar system does not end abruptly past the planets. Beyond the orbit of Neptune, the outermost planet (it orbits the sun at a distance of 30 AU, where one AU is the average distance of the earth from the sun), lies the Kuiper Belt, a region of many, small icy bodies that extends out well beyond 130 AU.

Although it resembles the asteroid belt between Mars and Jupiter in that it consists mainly of many small objects, unlike the asteroid belt its bodies are icy, rather than rocky. Gerard Kuiper was one of the astronomers who hypothesized this region in the 1950's to explain a

particular class of comets, and he argued that the objects were remnants of the very primitive solar system.

About 1000 Kuiper Belt Objects (KBOs) are known, and models suggest there could be many tens of thousands of them, with sizes ranging from meters to hundreds of kilometers. In addition, at least four dwarf planets orbit in this region: Pluto, Eris, Haumea and Makemake. Detecting KBOs is extremely difficult because they are so small and do not reflect much light.

The TAOS project (Taiwanese American Occultation Survey) is designed to detect new KBOs indirectly, by monitoring large fields of stars and searching for occultations -- when a KBO happens to pass between a star and earth, blocking the starlight. CfA astronomers Frederica Bianco, Matt Lehner, Matt Holman, Charles Alcock, and Pavlos Protopapas, together with a team of twenty-one colleagues, have just published the results of 3.75 years of TAOS observations, making this the first detailed study of occultation data.

Although they have not detected any KBOs so far, even the null result allows them to refine the current models. They also conclude that KBOs are probably structurally fragile, and that the orbital motions of Neptune played a key role in the formation of the Kuiper Belt as a whole.

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