

April 30, 2014

Joint Statement of the Scientific Priority of Identifying a Kuiper Belt Object for the New Horizons Mission

NASA Small Bodies Assessment Group (SBAG)

NASA Outer Planets Assessment Group (OPAG)

Kuiper belt exploration is a fundamental science goal of the Kuiper Belt-Pluto mission that was recommended as the number one medium-sized (now “New Frontiers”) mission priority in the 2003 Planetary Decadal Survey. New Horizons was launched in 2006 to explore the Pluto system and one or more Kuiper belt objects (KBOs). With its atmosphere, seasonal volatile transport cycles, and dynamically complex satellite system, Pluto is a planetary outlier in the Kuiper belt. It is entirely unlike the far more numerous, small, primitive planetesimals (KBOs) left over from the era of planet formation that populate the classical Kuiper belt, and especially its dynamically “cold” core that New Horizons will soon pass through. This population is also the most accessible example of a debris disk, like those detected around numerous other stars. SBAG and OPAG are united in affirmation of the tremendous scientific value of exploring a primitive KBO *in situ*, where it remains essentially unaltered since the time of planetesimal formation.

The scientific bounty of a spacecraft encounter with a primitive KBO is realizable in our lifetimes, but only with New Horizons and only if a suitable target can be found while there is still time to reach it. No other mission currently in flight, in build, or in design will reach the Kuiper belt. Time is of the essence for New Horizons. A suitable target must be discovered during the 2014 apparition to allow enough time to determine the object's orbit prior to execution of a targeting burn immediately after the Pluto encounter. Delay of the discovery (and subsequent targeting burn) shrinks the volume of space within the Kuiper belt that can be reached. The probability of finding a reachable KBO shrinks dramatically as time passes.

Despite an extensive and continuing ground-based search making use of the world's best deep, wide-field imaging facilities, and discovering over 50 new KBOs, a target has not yet been found that can be reached with the available fuel. The ground-based search effort will continue in 2014. But even under optimistic assumptions for weather and seeing, a ground-based search would have a less than 50% chance of finding at least one viable target during the 2014 apparition, based on current best estimates. In contrast, a dedicated search (<200 orbits during the 2014 apparition) using the Hubble Space Telescope is very likely to find one or more reachable KBOs. The probability of a successful search substantially declines if postponed to 2015. Therefore, we strongly support the New Horizons KBO search team's proposal to bring the unique capabilities of HST to bear on this problem as soon as possible.

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