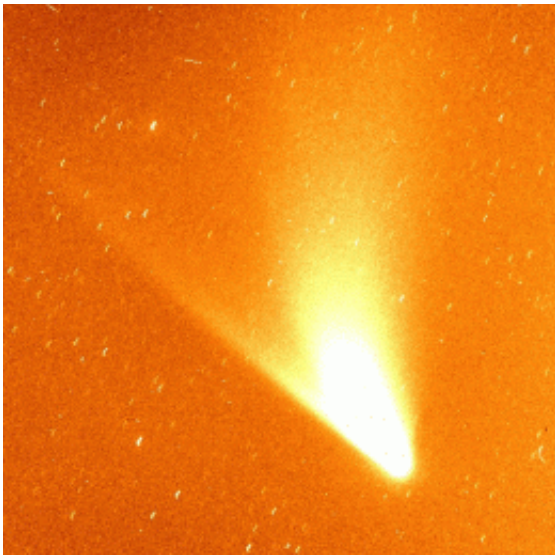


Comet Hale-Bopp finally goes dormant as it passes Neptune

May 4 2011, by Bob Yirka



Comet Hale-Bopp's sodium tail. Credit: European Hale-Bopp team.

(PhysOrg.com) -- In a joint mission to find out how Hale-Bopp, the comet that inspired news all over the world back in 1996/97, when it was at its closest to Earth, has been doing since it headed away from us, astronomer's from Hungary and Australia working together at the European observatory in Chile found that nearly fifteen years, later, Hale-Bopp, the messy, sometimes spectacular comet, has finally gone quiet.

The [comet](#) Hale-Bopp, likely the most studied and/or observed comet in human history, was visible to casual observers for nearly 18 months as it

swooped past, coming as close as 1.315 AU (1AU = one Sun-Earth distance) to us, before once again heading off into the far reaches of our solar system. First seen by amateur astronomer's Alan Hale, and Thomas Bopp, the comet drew international attention as it was the brightest that had been seen in the sky in several decades, and because it endured for so long in the night sky.

In a paper published in *arXiv*, Gyula Szabó of Konkoly Observatory in Hungary, and his two colleagues Krisztián Sárneczky, an amateur astronomer from Hungary and László Kiss of the University of Sydney in Australia, note that after 15 years, Hale-Bopp appears to have finally moved far enough from the sun (30.7 AU) that it's coma (envelope or cocoon that is formed by ice sublimating in space) has finally diminished to the point where it's almost nonexistent. After reaching its perihelion (closest point to the sun) on April 1, 1997, the comet has ever since been rushing the other way with very little fanfare, though it was noted briefly in 2007, also by Szabó, that it still had a very visible coma at 25.7 AU.

Szabó and his team in 2007 also took note of the temperature of the surface of Hale-Bopp at the time and found it to be 53.1 K (-220 Celsius or -364 Fahrenheit) and because the comet is now seen to be freezing to death, they believe that it can be inferred that comets like Hale-Bopp, seem to die at about 50-53 K.

This marks the farthest distance that a comet has ever been studied from, and gives scientists new insights into how far a comet must travel from the sun before it goes dormant, something that might work to our advantage as scientists in the future try to discern the behavior of comets that might pose a threat to us by passing too close; though we won't have to worry about Hale-Bopp any time soon, since it won't be heading our way again for another 2500 years.

More information: Frozen to death? -- Detection of comet Hale-Bopp

at 30.7 AU, Gy. M. Szabó, K. Sárneczky, L. L. Kiss, arXiv:1104.4351v1 [astro-ph.EP] arxiv.org/abs/1104.4351

Abstract

Comet Hale--Bopp (C/1995 O1) has been the single most significant comet encountered by modern astronomy, still having displayed significant activity at 25.7 AU solar distance in late 2007. It is a puzzling question when and where this activity will finally cease. Here we present new observations with the ESO 2.2m telescope at La Silla to check the activity of Hale--Bopp at 30.7 AU solar distance. On 2010-12-04, 26 CCD images were taken with 180 s exposure times for photometry and morphology. The comet was detected in R and had a total brightness of 23.3 ± 0.2 mag, referring to an absolute brightness of $R(1,1,0) = 8.3$. The profile of the coma was star-like at a seeing of 1.9", without any evidence of a coma or tail extending farther than 2.5" (=55,000 km in projection) and exceeding 26.5 mag/arcs² surface brightness. The measured total brightness corresponds to a relative total reflecting surface, a_{RC} , of 485 km², nine times less than three years before. The calculated a_{RC} value would imply a nucleus with 60--65 km radius assuming 4% albedo. This size estimate is in significant contradiction with the previous results scattering around 35 km. Therefore we suggest that the comet may still be in a low-level activity, despite the lack of a prominent coma. Alternatively, if the nucleus is already dormant, the albedo should be as high as 13%, assuming a radius of 35 km. With this observation, Hale--Bopp has been the most distant comet ever observed, far beyond the orbit of Neptune.

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