NEAR-EARTH ASTEROID 1999 RQ36.

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Near-Earth asteroid 101955 (1999 RQ36) made a close approach to Earth in 1999 and 2005, and was well observed optically and with the Arecibo and Goldstone planetary radar systems. The Arecibo radar observations in 2005 were designed to measure its oblateness, and thus have unusually good aspect coverage, allowing for a good pole determination. Radar images at 19- and 15-m resolution in 1999 and 7.5-m resolution in 2005 show that RQ36 is well approximated as a triaxial ellipsoid about 700m in diameter with axis ratios 1:1.03:1.06, and shows evidence of small impact craters. There is no evidence in the radar images for a satellite larger than 5m, which would have been detected at a SNR of 30 under pessimistic assumptions about albedo and spin rate. The nearly spheroidal shape suggests that it is a strengthless rubble pile, and may have formed by mechanisms similar to near-Earth binary systems, and may even have been in a binary system in its past. Its spin rate of 4.288 hours [Hergenrother pers. comm. 2007] (the 2.1 hour harmonic is ruled out by the radar data) suggests that it is not currently being spun up by tidal or radiation forces.

1999 RQ36 may be one of the older near-Earth spheroidal asteroids, in contrast with 2006 VV2, which is likely a very young one (see presentation by Benner et al.). Older in this context means time since the most recent spinup event.

References

Hudson, R. S. et al., 2000; Bulletin of the American Astronomical Society, 32, 1001 (DPS Abstract).