

Vanguard-1 At Fifty – Bring her home!!
Astronomy magazine: March 2008 column
08mar-astron.vangaurd-1.doc

The oldest surviving artificial Earth satellite turns 50 on St. Patrick's Day, half a century from the day at the dawn of the Space Age when Vanguard-1 blasted off. Thanks to its higher than usual orbit (it was only a light-weight test payload), it entered an orbit that promised to be stable for centuries.

It was the first satellite powered by solar cells, and its small suite of instruments provided unprecedented information on the size and shape of the Earth, air density, temperature ranges, and the micrometeorite density in space. Tracking its orbit allowed geophysicists to realize that the Earth is slightly pear-shaped, not round with a slight equatorial bulge.

It had been so small in comparison with Sputnik and Sputnik-2 that Soviet premier Khrushchev scoffed at what he derided as a 'grapefruit satellite'. The jibe rebounded, Moscow jokesters reported, when most Russians responded to the metaphor by asking what a grapefruit was.

The project had been named 'Vanguard' in 1955 when scientists hoped it would be the very first element, or 'vanguard', of human expansion into space. History upset those semantic intentions when both 'Sputnik' and 'Explorer' payloads preceded it into space.

But fate offers the derelict satellite yet another chance to deserve the name. Well before it slips much lower and is threatened with atmospheric immolation, Vanguard-1 may pioneer another 'space first' by becoming the first satellite brought home, for museum display, by a new generation of robot space vehicles.

Initially launched into an orbit ranging from 650 km to about 4000 km, the satellite has slowly lost energy due to air drag at perigee, the apogee has been slipping lower by about 3 km per year while the perigee has dropped at a tenth of that rate. Unless acted on by some outside force, it's stable for many thousands of years.

Consideration is now being given – by private, commercial space planners – to offering a prize for the safe retrieval of the payload. Nominally, it would demonstrate technologies for scouring the spacelanes for dangerous 'space derelicts', removing them before they are reduced to dangerous clouds of debris by some random space-to-space collision. Emotionally, the idea of grabbing a classic satellite out of the sky is just neat.

Legally, Vanguard-1 isn't 'space junk'. It remains the property of the United States government, and quite probably, of NASA, which wasn't even formed when it was launched, but which took over the project (and the satellite's operations) later in 1958. Through analogy with maritime law, government property is not subject to automatic salvage rights when abandoned, as private property (at sea, and presumably in space) is.

One proposal calls for a low-thrust robot to hitch-hike into orbit as the ballast section of a communications satellite launch, then take a year or two to match orbits with Vanguard, grab it, and wrap it in an inflatable hollow shell that increases its air drag a thousand times, dropping it out of orbit in a few years. Just before final decay another small robot could chase it down and install an inflatable thermal shield and a recovery beacon, and nudge it strongly enough to hit a target continent such as Australia. It might just work.