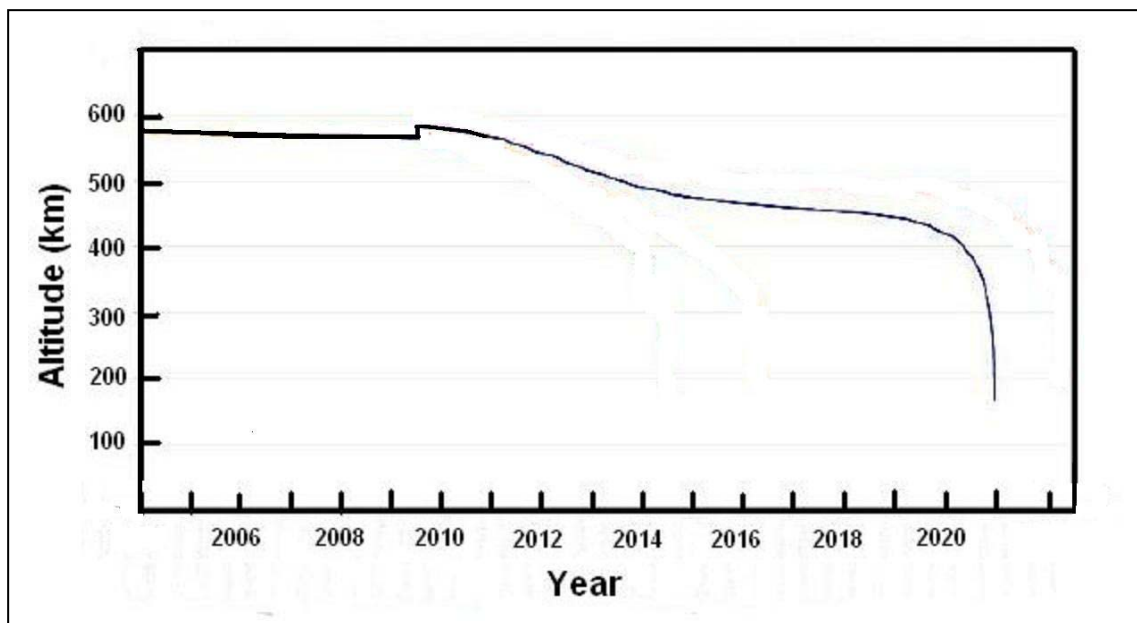


The Hubble Space Telescope was never designed to operate forever. What to do with the observatory remains a challenge for NASA once its scientific mission is completed in 2012. Originally, a Space Shuttle was proposed to safely return it to Earth, where it would be given to the National Air and Space Museum in Washington DC. Unfortunately, after the last Servicing Mission, STS-125, in May, 2009, no further Shuttle visits are planned. As solar activity increases, the upper atmosphere heats up and expands, causing greater friction for low-orbiting satellites like HST, and a more rapid re-entry.

The curve below shows the predicted altitude for that last planned re-boost in 2009 of 18-km. NASA plans to use a robotic spacecraft after ca 2015 to allow a controlled re-entry for HST, but if that were not the case, it would re-enter the atmosphere sometime after 2020.



Problem 1 – The last Servicing Mission in 2009 only extend the science operations by another 5 years. How long after that time will the HST remain in orbit?

Problem 2 – Once HST reaches an altitude of 400 km, with no re-boosts, about how many weeks will remain before the satellite burns up? (Hint: Use a millimeter ruler.)

Problem 1 – The last Servicing Mission in 2009 only extend the science operations by another 5 years. How long after that time will the HST remain in orbit?

Answer: The Servicing Mission occurred in 2009. The upgrades and gyro repairs extend the satellite's operations by 5 more years, so if it re-enters after 2020 it will have about 6 years to go before uncontrolled re-entry.

Problem 2 – Once HST reaches an altitude of 400 km, with no re-boosts, about how many weeks will remain before the satellite burns up? (Hint: Use a millimeter ruler.)

Answer: Use a millimeter ruler to determine the scale of the horizontal axis in weeks per millimeter. Mark the point on the curve that corresponds to a vertical value of 400 km. Draw a line to the horizontal axis and measure its distance from 2013 in millimeters. Convert this to weeks using the scale factor you calculated. The answer should be about 50 weeks.

“NASA's 23-year-old Hubble Space Telescope is still going strong, and agency officials said Tuesday (Jan. 8, 2013) they plan to operate it until its instruments finally give out, potentially for another six years at least.

After its final overhaul in 2009, the Hubble telescope was expected to last until at least 2015. Now, NASA officials say they are committed to keeping the iconic space observatory going as long as possible.

"Hubble will continue to operate as long as its systems are running well," Paul Hertz, director of the Astrophysics Division in NASA's Science Mission Directorate, said here at the 221st meeting of the American Astronomical Society. Hubble, like other long-running NASA missions such as the Spitzer Space Telescope, will be reviewed every two years to ensure that the mission is continuing to provide science worth the cost of operating it, Hertz added."

(Space.com, January 9, 2013.)