

Director's Perspective: "Good Luck"  
Steven Beckwith, August 18, 2002

A colleague of mine once advised me, "When you're good, you're also lucky." By that metric, the teams maintaining the Hubble Space Telescope are unusually good, having had a string of good luck since the first servicing mission and continuing today. The recent luck started with the serendipitous discovery of SN2002dd in the Hubble Deep Field by the ACS Team during orbital verification. This type Ia supernova at a redshift of 1.06 will be one of the very few high redshift objects that help confirm or deny the acceleration of the universe. We are especially lucky to have Hubble as a tool during the time when it became apparent that supernova of type Ia can be used to measure the expansion history of the universe, showing that the universe is accelerating.

An added piece of luck was the availability of NICMOS to get the infrared magnitudes (rest frame B) essential to the calibration of high redshift supernovae, a task that is currently impossible with ground-based telescopes. Restored to operation by the NICMOS Cryocooler System (NCS), it is more sensitive now than it was when first installed thanks to the happy coincidence that the detector can now be run at a higher temperature to boost the overall quantum efficiency. That luck resulted from a very good team at Goddard Space Flight Center and in industry.

Good luck gave us the unusual nova, V838 Mon, which erupted in January of this year and was first observed with ACS at the end of April. V838 Mon is surrounded by circumstellar material that reflects the light from the outburst after the travel-time delay, creating a light echo that can be used to reconstruct the full three-dimensional distribution of material by watching it light up at different times. STScI astronomer, Bill Sparks, is unusually lucky – and, therefore, unusually good – for having published a detailed analysis of this very phenomenon in 1994, even though the most recent other example of a nova with such a light echo erupted in 1901. Good foresight, Bill.

Luck was on our side when astronomers finally localized gamma-ray burst sources well enough to study them with optical telescopes during the HST era. HST became particularly important for revealing their locations within the distant galaxies that give rise to them in the first place.

Extrasolar planets were unknown at the time of HST's launch and only just discovered when STIS was installed during the second servicing mission. Nevertheless, STIS observations of HD 209458b, an exo-planet that eclipses its parent star, revealed sodium in its atmosphere. It was a big surprise that we could study exo-planet atmospheres without a dedicated mission; we are probably 20 years ahead of our time because of HST and STIS, very lucky, indeed.

We are lucky to be living in a time when we have a cornucopia of astronomical discoveries and the tools to study them well. Although only designed to study a few of these phenomena, HST has been an important part of the analysis in almost every subfield of astronomy. We astronomers are especially lucky to be living in this era.

Imagine now what it would be like to be without Hubble's capabilities. We would consider ourselves extremely unlucky if Hubble were not around to follow up the next equivalent of the SN Ia or GRB phenomena or to study the atmospheres of new exoplanets. Thus far we have been saved by the miracle of servicing. Visiting HST every 2 or 3 years has kept it in good operating condition, albeit with a gap of a month or so when the gyros failed in 1999. But we will need even better luck after the next servicing mission in 2004 for Hubble to maintain its superlative output until 2010, the envisioned end-of-life.

Fortunately, the Hubble team is exceptionally good, and so we can hope for exceptional luck to remain with us to the end of Hubble's life. My hope is that if we are especially good, we can extend our use of Hubble right on up to the launch of NGST, when many of Hubble's capabilities will be superceded with superior ones. That will be good luck, indeed.