

Director's Perspective

÷Living aAmong †The starsStars

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I was flying from Berlin to Washington, changing planes in Munich. Before boarding in Munich, there was a second layer of security, the gate agents ever vigilant for terrorists flying to America.

“Step over to the lady on your right,” said the ticket agent, “She will ask you a few questions.”

I stepped to the right and prepared to state that I had packed my own bags, they never left my side, I never take gifts from strangers, and I was not carrying large sums of money, agriculture products, or small animals. It needed to be quick. I did not yet have a boarding pass, and the passengers were beginning to board. ~~–~~The woman took my passport, noted the number of stamps, countries, and visas and asked in heavily accented English,

“Are you a scientist?” Good guess on the first try. Scientists travel a lot, a fact she knew, but something else must have given me away. Time for a ~~shave-haireut.†~~

“Yes,” I answered. Keep it short, I thought.

“What kind?”

“I am an astronomer.” My answer elicited a broad smile from my interrogator.

“Oh, how nice,” she said. “Tell me, can you see back in time?”

My colleagues and I had just released the Ultra Deep Field ~~a couple of two~~ months earlier, so I was well prepared for this question. ~~– and I~~ explained how light took time to travel over large distances, and we ~~could an~~ look far back in time by observing the light from objects far away, a kind of cosmic time machine. ~~–, the Tthe~~ sound bite popping out before I could squelch it.

“How far back can you see?” she pressed.

“About 13 billion light years,” and I said it again in German to avoid confusion with the American use of billion.

She was immediately taken with this line of thought and spent the next few minutes asking me questions about the early universe, did I believe in black holes, did I think there was life out there, and if we Americans would save the *Hubble Space Telescope*. Usually at ease with this kind of conversation, I was nervously watching the other

passengers board, convinced that these questions were not in the manual provided by United Airlines, ~~but~~. ~~Nevertheless~~, I was not going to argue with security. Finally, she capped the conversation by saying ~~;~~,

“You astronomers are so lucky. You live among the stars, not among the people.”

~~Notwithstanding my present job, I answered for my colleagues by gratefully accepted this graceful metaphor for our scientific passion, thanked her agreeing with her~~, and she let me go, having neglected to ask if I had packed my own bags (I had).~~;-)~~

In a taxi in Berlin that morning, my driver had struck up a conversation with me in broken German (~~my translation here is an approximation~~) ~~—h~~He was obviously a recent immigrant ~~as I had also been in the same country 13 years ago~~. It did not take him long to discover I was an astronomer.

“What is happening to the *Hubble Space Telescope*?” he asked. “Is it going to die?”

“Not yet,” I replied. “But ~~I am afraid~~ it will not last more than a few more years without a visit.”

“Why are the Americans so afraid,” he asked again, “that they don’t want to fly to *Hubble*?” This ~~response-question~~ has become a common theme abroad, the incredulity at the *Hubble* decision unfortunately enhanced by the unrelated but prominent ~~recent~~ events in Iraq.

All over the world, people know *Hubble* and ask me about it as soon as they learn my profession, usually before they have any hint of my deep connection to the telescope. *Hubble* has penetrated the public consciousness to an ~~almost~~ unprecedented degree for an astronomy project. There have been other times in history when a scientific idea, experiment, or practitioner became part of popular culture ~~—~~the Theory of Relativity, the explosion of the first atomic bomb, and Carl Sagan, come to mind ~~—~~but ~~they this~~ happens infrequently. We are fortunate that one of our own astronomical projects, the *Hubble Space Telescope*, has become a modern icon of the progress of civilization. Even ~~correcting for my role as correcting for my obvious bias as an ardent Hubble’s~~ ~~most ardent hugger~~, (a sort of Malmquist bias in my informal surveys), there is little doubt that my experience mirrors ~~that those~~ of most of my readers. *Hubble* connects us with the world at large.

NASA is now looking hard for ~~other~~ means of keeping *Hubble* alive without risking the lives of astronauts. The only realistic way to extend *Hubble*’s life much beyond 2007 is to visit it again, changing batteries and gyroscopes and, hopefully, installing the two new focal plane instruments. ~~They have~~ ~~NASA has~~ to visit *Hubble* again just to strap on a de-orbit module. Doing a bit more is a logical way to accomplish two goals with one mission. Without astronauts, we will have to send robots. The team at Goddard ~~Space Flight Center~~, with support from the Institute, is working out ways to do just that: send robots to add new battery packs, gyroscopes, and, yes, install the new instruments, too.

My colleagues ask often if such a mission is plausible. I have seen the laboratory demonstrations of one such system and asked a group of Institute experts to review the technical feasibility. One of our experts, David Hunter, ~~was the program manager at the~~held a series of high-level positions in the Canadian Space Agency ~~for the team that built one of the prominent contenders for a tele-robot~~building robots for the International Space Station[†], including, the Special Purpose Dexterous Manipulator arm (SPDM). David's assessment is that a servicing mission using SPDM is a challenge, but that all the tasks are doable. That's my assessment, too.

It is good news for all of us that NASA is looking favorably on a ~~comprehensive~~ robotic servicing mission, especially with installation of two new scientific instruments, ~~to which~~would keep *Hubble* scientifically productive for another ~~8~~eight years or so. It will be challenging, it will be expensive, and it will not be as tried and true as the ~~servicing~~ missions with astronauts, but it ~~may~~ achieve all of our scientific goals, and it certainly will not risk any lives in the process. This special challenge is just the kind of work that has brought NASA kudos in the past as a can-do agency.

I am optimistic that we can service *Hubble* by some method one more time in late 2007, extending its life another five or six years. The *Hubble* team has faced similar challenges in the past. Each time, the team has achieved every goal. Right now, we are living very much among people doing the hard work of putting together an entirely new kind of servicing mission so that our users can continue living among the stars.

~~[†]Robotics Engineer, Manager of Automation and Robotics, Head of Systems Engineering, Acting Project Manager of Mobile Servicing Systems, Acting Director Systems Engineering.~~