

Trying to avoid Hubble trouble

Hoping to replace failing gyroscopes on the Hubble Space Telescope before the orbiting observatory develops a bad case of the jitters, NASA is planning to launch an emergency repair mission this October.

Two of Hubble's gyros no longer work, and a third has recently proved unreliable. That leaves three of the devices operating—the minimum required to keep the telescope focused on a celestial target. If another gyro fails, the telescope will automatically shut down.

"We are one failure away from losing science," said NASA scientist Edward J. Weiler, based in Washington, D.C., during a March 12 briefing.

A shuttle mission to replace the gyros, originally scheduled for June 2000, has been advanced 8 months to try to avert what Weiler calls a "science emergency."

NASA estimates that there's a 20 percent chance another gyro will give out before the October mission. Four of the devices were last replaced during a 1993 repair mission and were expected to last an average of 4 to 5 years.

Weiler notes that the craft is not in danger of wobbling out of its orbit even if all of the gyros fail before repairs succeed. Hubble can still rely on other instruments—a sun sensor, star trackers, and a device that senses the craft's position relative to Earth's magnetic field—to stabilize its path. None of these devices, however, can keep the telescope steady enough to do observations, Weiler adds.

In addition to replacing the gyros, astronauts will patch insulation damaged by radiation, install a faster main computer, and replace Hubble's aging reel-to-reel tape recorder with a solid-state device. In late 2000 or early 2001, another shuttle crew is scheduled to install a high-resolution, wide-field camera and attempt to revive Hubble's near-infrared camera, which recently ran out of coolant, with a new cooling system. —R.C.

Hubble captures a burst's afterglow

The Hubble Space Telescope has imaged the fading fireball from the most energetic gamma-ray burst ever detected (SN: 1/30/99, p. 70). The image, taken Feb. 8 and released March 11, clearly distinguishes the dying ember from the burst's home galaxy, which lies some two-thirds of the way to the edge of the observable universe.

The image reveals a galaxy of highly irregular shape, with finger-like filaments extending above the bright white blob of the fireball. The galaxy might have been distorted by a collision with another galaxy, says Andrew S. Fruchter of the Space Telescope Science Institute in Baltimore. A collision could have heated and compressed gas within the galaxy, precipitating a massive wave of starbirth. Indeed, the galaxy's very blue appearance—also noted by the Keck I Telescope atop Hawaii's Mauna Kea—is an indication of recent star formation.

An increase in star formation would lead to a high frequency of stellar explosions and collisions of stars, including neutron stars and black holes. The observations dovetail with the theory that massive exploding stars and colliding dense objects produce gamma-ray bursts. —R.C.



Image, taken Feb. 8, of the fading visible-light ember (arrow) of a gamma-ray burst that was observed on Jan. 23. Finger-like projections characterize the burst's home galaxy.

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Friendly peril for disaster workers

Tragedy struck the USS *Iowa* naval ship on April 19, 1989, as it sailed north of Puerto Rico. A gun turret exploded, killing all 47 men working within its steel-encased walls. At Dover Air Force Base in Delaware, 71 members of the local community—mostly enlisted men in the U.S. Air Force—volunteered to help mortuary officials in grueling duties that included identifying the dead sailors, conducting autopsies, and sorting personal belongings.

Over the next 13 months, volunteers who had felt that one or more victims reminded them of a friend were particularly likely to exhibit a severe trauma reaction known as post-traumatic stress disorder (PTSD) or other signs of mental turmoil, according to a study in the March *AMERICAN JOURNAL OF PSYCHIATRY*. PTSD symptoms include re-experiencing a traumatic event, avoiding reminders of it, emotional detachment, and heightened physiological arousal.

Disaster workers who had personally identified with the dead (noting, "It could have been me") or who had thought of them in regard to a family member ("It could have been my son") experienced fewer subsequent trauma-related problems, about the same number as their counterparts who had not identified in any way with victims, reports a team led by psychiatrist Robert J. Ursano of the Uniformed Services University of the Health Sciences in Bethesda, Md.

The researchers assessed 54 volunteers a month after the disaster. Of that group, 41 were contacted 4 months later and 44 were questioned about 13 months after the fatal explosion.

Nearly three-quarters of the original 54 volunteers said that they had identified with victims as friends, family, self, or in more than one of those ways. Aside from their elevated PTSD rate, workers who had identified with victims as friends also cited higher levels of anger, anxiety, depression, and physical complaints of undetermined cause.

Those who had identified with the dead as friends—and later encountered more trauma-related problems—averaged 25 years of age, about 5 years younger than the volunteers who did not associate friends with victims.

Reasons for the link between identification with the deceased as a friend and ensuing psychiatric symptoms are unclear. Further work needs to examine whether this type of identification by itself triggers trauma-related problems or instead reflects deeper concerns, such as unresolved grief for friends' deaths or the loss of past friendships. —B.B.

Criminal links to prenatal smoking

Violent crime rates rise sharply among men whose mothers smoked cigarettes during pregnancy and also experienced delivery complications, a new analysis finds.

The link appeared most striking for men into their mid-30s who repeatedly committed violent crimes, report psychologist Patricia A. Brennan of Emory University in Atlanta and her coworkers. No such association emerged between mothers' cigarette smoking and teenage criminal activity.

Brennan's group examined extensive data through 1994 on 4,169 Danish men born from September 1959 to December 1961 in Copenhagen. During the third trimester of pregnancy, their mothers had reported the number of cigarettes smoked daily. The researchers statistically accounted for social, familial, and maternal factors thought to increase criminal behavior.

Maternal cigarette smoking may damage the fetal brain in ways that later promote criminality, the researchers theorize in the March *ARCHIVES OF GENERAL PSYCHIATRY*. However, it's still unclear whether a mother's smoking during pregnancy directly affects her child's propensity for lawbreaking, cautions psychologist David M. Fergusson of Christchurch (New Zealand) School of Medicine in an accompanying comment. —B.B.

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