

For forecasters, it's no GOES for a while

Mirrors, mirrors, for the sky: Are there any not awry?

That's the question haunting NASA as the agency finds itself beset with yet another major mirror flaw—this time in a \$1 billion series of five weather satellites, the first scheduled for launch in February 1992.

Unlike the imperfection recently detected in the Hubble Space Telescope's primary mirror, this one was spotted on the ground. But mirror replacement could delay the launch of the first of the new weather satellites for a year, potentially hampering efforts to monitor hurricanes and other severe storms, says James Greaves, NASA's program manager for meteorological satellites.

These satellites constitute the third generation of Geostationary Operational Environmental Satellites (GOES), which provide visual and infrared snapshots of North America's weather every half-hour—enabling the instrument to monitor huge weather patterns that cannot be tracked by radar, polar-orbiting satellites or airplanes. Only a single GOES now orbits Earth, and controllers expect it to run out of fuel sometime in 1993, says Elbert W. Friday, director of the National Weather Service in Silver Spring, Md. If that satellite fails before the launch of its successor, known as GOES-NEXT, it could force U.S. meteorologists to rely on less sophisticated tools that cannot reliably track hurricane development and progression, he adds.



Computer-enhanced image shows what Hubble can do when it eyes relatively bright (25th-magnitude) stars. Released Aug. 13, this image of a young star cloud called 30 Doradus, in the Large Magellanic Cloud, reveals about twice as many stars as Earth-based telescopes.

The impaired optics of the weather satellites have no relation to Hubble's mirror flaw. Scientists found problems while testing a GOES prototype late last year, but attributed them to instrument misalignment rather than to defects in the pair of flat, oval mirrors that relay light to those instruments. However, a new computer simulation reveals that exposure to partial sunlight would cause

the flat mirrors to arch "like a potato chip," says Joseph Dezio, GOES deputy program manager at NASA's Goddard Space Flight Center in Greenbelt, Md.

The temperature gradient created when sunlight strikes one edge of the mirror while the other edge remains in darkness—a scenario occurring daily and lasting several hours—temporarily causes the mirrors to deviate from flatness by about 300 millionths of an inch, an error large enough to significantly dim the images of clouds, oceans and storms, Dezio says. If new optical coatings can reduce the distortions, GOES-NEXT might be delayed by only two to four months, he says. If the remedy requires replacing mirrors, it could take a full year and several million dollars.

On the Hubble front, a NASA investiga-

tive team announced last week it had identified the likely cause of the "spherical aberration" that has crippled the telescope's ability to image faint objects. The panel reported finding an error in the "null corrector," a testing device used by mirror manufacturer Perkin-Elmer Corp. of Danbury, Conn. (now called Hughes-Danbury Optical Systems, Inc.) to check the shape of the primary mirror. An extra millimeter of space between a focusing lens and a small mirror in the null corrector apparently led the company's scientists to grind the primary mirror incorrectly, says Sarah Keegan, spokeswoman for the investigative panel.

Panel member Roger Angel, of the University of Arizona at Tucson, says Perkin-Elmer scientists discounted measurements taken with a second type of null corrector, which indicated the primary mirror might be misshapen, because that device had less precision. — R. Cowen

Anxiety weighs down pregnancies and births

Though physicians routinely monitor the medical condition of pregnant women, a new study suggests they should pay equal attention to social and psychological influences during pregnancy.

"Chronic emotional distress and anxiety during pregnancy importantly contribute to premature births and low-birthweight babies, independently of the mother's medical risks," reports psychologist Marci Lobel of the State University of New York at Stony Brook. She presented her findings in Boston last week at the annual meeting of the American Psychological Association.

Babies weighing less than 5½ pounds stand a much greater chance of dying in the first few months after birth than normal-weight infants. About 7 percent of all U.S. newborns, or about 250,000 births each year, fall into the low-birthweight category.

Lobel, working with Christine Dunkel-Schetter and Susan Scrimshaw of the University of California, Los Angeles, studied 130 women aged 18 to 42 receiving prenatal care at the UCLA Medical Center. Most were Hispanic and had low incomes. The researchers monitored the women for several indicators of emotional stress, including daily feelings of anxiety, chronic sources of anxiety, and distressing events such as financial setbacks or the death of a loved one. They also checked each woman's medical records for 66 medical risk factors, such as diabetes or complications during previous pregnancies. Roughly two-thirds of the women had been pregnant before.

The team found that premature births occurred most frequently among the women who faced a combination of medical risks and emotional stress. Moreover, Lobel says, the newborn's gestational age and the mother's emotional stress pre-

dicted the low birthweights, whereas medical risks alone did not.

Emotional stress did not affect the difficulty of labor, the baby's physical condition immediately after birth, or subsequent neonatal complications, she notes. The ease of labor and the baby's health at birth did correlate, however, with the amount of social support the mother received during pregnancy, such as financial assistance and help with chores and child care.

Women who suffered most from daily anxiety proved the most likely to deliver premature and low-birthweight babies, Lobel says. "What's important seems to be how one interprets negative life events, not how many of these events occur," she asserts.

Though several previous reports have linked upsetting life events to premature birth, Lobel says none of these studies thoroughly documented anxiety during pregnancy.

"We don't want to alarm women," she adds. "Every pregnant mother experiences some emotional stress, often without effects on the baby." No evidence yet shows that reducing emotional stress during pregnancy improves birth outcomes, she points out.

Nevertheless, researchers should begin formulating and studying programs to ease the emotional burdens of particularly distressed women during pregnancy, says psychologist Elaine Blechman of the University of Colorado in Boulder.

Meanwhile, Dunkel-Schetter says, "we hope the findings will encourage physicians to weigh emotional stress, as well as medical history, when considering the possibility that a mother will deliver prematurely or have a low-birthweight infant." — B. Bower