

# Losing their eyes in space

As NASA's prized telescopes falter, astronomers are beginning to fear, writes Sarah Kaplan.

America's Great Observatories - the Hubble, Chandra, Compton and Spitzer space telescopes - have peered into the unknown and made breakthrough discoveries about newborn stars, dark matter and the age of the universe itself. But these telescopes, whose era began in 1990, are ageing, if not already dead, and there is no budget or political will to replace them. This sobering reality was underscored this month when two were beset by technical problems, including the Hubble Space Telescope, that temporarily halted their science. Shrinking budgets and delayed projects means astronomers will lose some of their key eyes in the skies before NASA can launch new telescopes. It will make some research impossible.

"The unwillingness to invest in substantial science has begun to worry us," said astrophysicist Matt Mountain, president of the Association of Universities for Research in Astronomy, which operates the Hubble telescope on behalf of NASA. "We're facing a very daunting prospect as a community," Mountain said. "Some fields just won't have a telescope. And the science will not be possible to do in any other way."

Some of science's biggest questions - what is dark energy? Does life exist beyond the solar system? - can only be answered by large observatories working in particular parts of the light spectrum. Whether to invest in pursuing these questions "is a choice for the nation," said Paul Hertz, the astrophysics division director at NASA. "What missions



gyroscopes - which allows a telescope to rotate and point at

"People suddenly realised that Hubble is not going to live forever," said Tom Brown, the Hubble

designed. The only flagship NASA space observatory under construction is the James Webb Space Telescope, whose gold-plated

To prevent such gaps, NASA would have to start developing new missions now; most space telescopes require several decades from conception to launch. Other nation's space agencies are already working on such programs. The European Space Agency is developing the ATHENA X-ray Observatory for launch in the 2030s. China announced in 2016 it would build its own optical telescope with a field of view 300 times greater than that of Hubble.

"Their budgets are increasing," Mountain said. In the US, NASA's budget hasn't kept up with inflation, and the fraction of federal spending that goes to the agency has been cut in almost half since 1980.

The agency has been scrutinised over the Webb telescope's dramatic delays and cost overruns. "The telescope that ate astronomy," it's been bitterly nicknamed. This spring, NASA announced that it would "narrow the scope" (reduce the budget) of four proposals it is considering for launch in the 2030s.

"We need to ensure we can accomplish breakthrough science while adhering to a realistic, executable scope and budget for the next decade," Hertz, the astrophysics division director, said earlier this year. But big budgets are necessary to do to "textbook-rewriting science," Mountain said.

"It's going to be hard to replicate the capabilities of the Great Observatories without expending the equivalent kind of resources." Hubble's cumulative cost has been somewhere about \$10 billion. But look what it bought: Nobel prize-winning research on the accelerating expansion of the universe among other ground-