

Astronauts lift our spirits. But can we afford to send humans into space?

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America's first step in its attempt to reconquer worlds beyond our planet ended in spectacular success on Friday. An unmanned version of its Orion spacecraft soared more than 3,000 miles into space before splashing down on target in the Pacific ocean. The flight was hailed by Nasa, which says that the spaceship is destined to be the first of a fleet that will carry humans to the Moon, [Mars](#) and beyond.

In many laboratories and research centres, this delight was shared by scientists. A return to sending men and women to other parts of the solar system – years after the US scrapped its last manned space vehicle, the shuttle – cannot come soon enough for them.

But for others, the test flight was viewed as a distinctly unhappy event. Putting humans into space is futile, expensive and ultimately harmful to real science, argue researchers who believe that robot craft represent the future of space exploration and are dismayed by the US's commitment to return to expensive manned missions.

Scientists like Weinberg point to missions such as Europe's Rosetta and Philae probes which have successfully begun an exploration of Comet 67P. They argue that these missions represent the real future of the solar system's exploration. Men and women will remain expensive nuisances when it comes to discovering other worlds, they say. Relatively cheap robot probes are the future.

The existence of these two camps – manned versus unmanned – reveal a deep division in attitude to space exploration.

[Some] envisage setting up a handful of lunar colonies that would mirror the establishment of research bases in the Antarctic. From these, small numbers of astronauts would survey the lunar landscape, make observations and collect samples.

This vision is not shared by all scientists. Martin Rees, the Astronomer Royal, believes the cost of putting humans in space is harder to justify because of the rising sophistication of robots. "If you look at the great discoveries that have already been made in the solar system's exploration, the vast majority have been carried out by robot probes: the discovery of the great hydrocarbon lakes on Saturn's moon, Titan, and the discovery of the underground ocean on another of its moons, Enceladus, are good examples," he said.

Indeed, he adds, the whole manned spaceflight programme, which is so enormously expensive, has produced very little of scientific value.

So are science and manned spaceflight virtually incompatible? No, some argue. For a start, the idea of robot efficiency is a myth, as there is no substitute for putting a person into space to get things done.

The contrast between the scientific returns of the two approaches is revealed by examining the number of scientific papers based on the Apollo missions. These vastly outnumber the papers produced from all the robot missions that have been carried out on the Moon and Mars.

[But] the Apollo missions in the 1960s and 1970s cost \$25bn – more than \$100bn today. From this perspective, manned missions are more than 100 times more expensive than robot missions, it is calculated. In the early days of spaceflight, there was little alternative to putting humans in spacecraft. But now robotics has achieved an advanced status and is constantly becoming more sophisticated. Martian rovers can navigate rocky terrains, drill holes and analyse soil samples – using 20th-century technology.

Supporters of manned spaceflight, such as Professor Martin Barstow, of Leicester University, accept human flights are much more expensive but say they are justifiable because they are much, much more effective than robot missions: "Consider Mars. You could get robots to scrape its surface and send back material to Earth, but

if you want to hunt down the few places that might still support primitive life you will need to send humans. Only they possess the necessary intuition for that kind of task.”

Others point to the inspirational effects of putting men in space. In the 1960s astronauts such as Yuri Gagarin and Neil Armstrong stimulated youngsters into careers in science because manned flights create heroes who spark an interest in technology. But again this claim is disputed. If a classroom today displays space photographs, these are more likely to be glorious images of stars and galaxies taken by the Hubble space telescope than pictures of astronauts. “It’s the robot probe that captures interest today,” said Rees. “The only time an astronaut makes news is when a space station toilet gets blocked.”

In short, the jury is still out over the future of humans in space. However, one thing is clear: we may one day return to other worlds, like the Moon and maybe Mars, but current global economic problems suggest these trips will happen later rather than sooner.

Yuri Gagarin became the first human to fly in space when he orbited the Earth in his Vostok spacecraft on 12 April 1961. His mission was followed by a series of flights - by the US and the Soviet Union - of larger and larger capsules. These culminated in the lunar landings of the US Apollo programme in the late 60s and early 70s.

The 12 men who landed on the Moon on Apollo spacecraft are the only humans to have walked on another world.

After the Apollo programme was brought to a premature close, largely due to lack of public interest in the US, America concentrated its efforts on constructing a fleet of reusable space shuttles. These were intended to become the nation’s primary means of launching payloads into orbit and were to be launched once a week when fully operational according to Nasa’s ambitious timetable. The first shuttle, Columbia, was launched on 12 April 1981.

Thirty years later the fleet was retired after a total of only 135 flights - including two catastrophic accidents which destroyed the shuttles Challenger and Columbia and killed each of their seven-person crews. Since then, the only craft capable of carrying astronauts to the International Space Station has been Russia’s Soyuz space capsule.

At the same time the Chinese have pursued their own manned spaceflight programme, which began in 2003, when Yang Liwei became the first person sent into space by the Chinese space programme after orbiting the Earth 14 times in his Shenzhou 5 capsule, making China the third country to independently send humans into space.