

# We're left behind in the space race

By

Ian Crawford

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THE launch of the space shuttle Discovery yesterday afternoon, came against the backdrop of proposed manned missions by NASA and the European Space Agency (ESA). Both these programmes aim ultimately to land people on Mars, although it seems certain the Moon will be an earlier target. It is true that human space exploration is expensive, and the tragic loss of the space shuttle Columbia in February 2003 reminds us it is sometimes costly in human, as well as in merely monetary, terms. However there are also many scientific, economic and cultural benefits of human spaceflight which, in my view, amply justify both the risks and the costs.

Research in space, where the gravity is a tiny fraction of that on Earth, can cover areas as diverse as materials science and life sciences, including human physiology and medicine. Moreover, a human spaceflight infrastructure is of value for maintaining space telescopes such as Hubble. Hubble is a robotic telescope, but still needs servicing by humans. In addition to installing optical equipment to correct its initially faulty mirror, the astronauts who serviced Hubble also replaced its solar panels and a number of gyroscopes -- the truth is, even if Hubble had been built with a perfect mirror it would still have failed over a decade ago without human intervention, and all its tremendous scientific discoveries since then would have been lost.

Astronauts also have an advantage over robots when it comes to exploring planetary surfaces, whether on the Moon or on Mars. The Apollo programme, when NASA landed men on the Moon between 1969 and 1972, clearly demonstrated the scientific value of astronauts as field geologists. Their principle advantages are their versatility in problem solving, their ability to make discoveries off the beaten track, and their efficiency in covering the ground. For example, after spending a year on Mars, NASA's Spirit rover only covered a distance of 4 kilometres, while the astronauts on the Apollo 17 mission covered a cumulative distance of 39 kilometres in just three *days*, in addition to returning with 110 kg of rock samples and deploying a wide range of geophysical equipment.

Of course, space travel is risky, but society asks many people to volunteer to do dangerous jobs: policemen, coal miners and soldiers for example. Astronaut Gus Grissom, who died in a fire during the testing of Apollo 1 in 1967, mulled over the risk in the months before the accident. He said: "We are in a risky business ... and we hope that if anything happens to us it will not delay the program. The conquest of space is worth the risk of life." Certainly, from a scientific point of view, it would have been a disaster if the Apollo programme had been cancelled in 1967; all scientists can be hugely grateful that those astronauts were prepared to take the risks.

There are also cultural reasons why manned spaceflight is important. Economically and industrially, human spaceflight is technically very demanding and as such helps to stimulate technical developments in hi-tech industries. It also employs a lot of people; a study published in the science journal *Nature* in 1987 analysed where NASA's procurement budget was spent. The budget then was \$8.6 billion, which generated \$17.8bn in industrial turnover and created 209,000 new jobs. This activity led to an extra \$5.6bn in local, state and federal taxes, but also led to technical and skill development. Human spaceflight is expensive, but it's important to remember the money never goes into space: the money is spent in economies on the ground, circulating and stimulating industry.

There are also other benefits. Large space-based projects have the potential to stimulate co-operation between nations. For example, the International Space Station involves 16 nations. I think this sends a very positive message: if we move on to explore the Moon and Mars then countries will be working together in a very high-profile kind of way, creating positive links between nations. Space exploration is also very exciting for young people and, in an environment where we find it difficult to get young people to go into science and engineering, this inspiration could be of great value educationally. And there are perhaps more intangible, psychological, benefits – with fewer and fewer challenges in exploring our increasingly constricted and finite world, an exciting, forward-looking, and *open-ended*, activity like space exploration may give a much-needed sense of purpose and achievement to human civilisation.

Of all the major industrial nations, the UK is the only one to have consistently refused to take part in human spaceflight. British scientists are missing out on access to space and, in the future, will miss out on even more opportunities. I think we are shooting ourselves in the foot with current UK space policy, and really should be participating more in this exciting, and scientifically and culturally uplifting, activity.

**Dr Ian Crawford is a lecturer in planetary geology at Birkbeck College, London**