



## Thrill of space exploration is a universal constant

In the film *Gravity*, Sandra Bullock plays *Everywoman*, and reminds Colin Macilwain how inspiring science and discovery still can be.

For a small boy growing up near Glasgow in 1969, the appearance on a flickering television of a man with a Scottish Borders name taking one small step for man was, to put it mildly, a seminal moment.

Yet ever since NASA's Apollo programme ended in 1972, discussion of space travel in the United States (and Europe) has been dominated by arcane arguments about whether human space flight is really cutting-edge 'science'.

For this child in 1969, space travel, discovery and science were all much the same thing. Odd that it should take a film, the glorious *Gravity*, to remind me that they still are. And that the United States and Europe have — partly at the insistence of their scientific communities — dropped ambitions for human space flight and surrendered the field to China and India. I do not lament the surrender:

I merely point out that, despite protestations to the contrary, it can lead only to the eclipsing of US leadership in global science and technology.

*Gravity's* plot carries a simple metaphor for the passing of the space-travel torch from US grasp. (Warning: some mild spoilers ahead.)

In a career-defining performance, Sandra Bullock plays *Everyman* and *Everywoman*, a fusion of determination and uncertainty, carrying all of our doubts and fears into orbit. Early on, the International Space Station is struck by debris and we see torn and bedraggled stars-and-stripes parachutes as the station disintegrates. Later, salvation is delivered by a Chinese re-entry pod, which returns to Earth beneath billowing parachutes adorned in a strangely neutral, red-white-and-blue livery. The studio clearly felt that a climatic scene featuring the deep-red flag of the People's Republic of China would be more than a US audience could bear. But the point is clear — wherever the movie is viewed. (Filmed and painstakingly computer-simulated over many months by director Alfonso Cuarón, *Gravity* seems almost as though it was shot on location.)

It was touching to see the old space station starring in a film: I know it so well. Back in 1984, at the commencement of the space-station project, an editorial in this journal called for its cancellation (see *Nature* 307, 1–2; 1984). Five years later, I crawled through a full-scale plywood model of it in Huntsville, Alabama. I was on Capitol Hill in Washington DC when the US House of Representatives came within a single vote of pulling the plug in 1993.

At that time, the House Committee on Science had a slogan on the wall: 'Where there is no vision, the people perish.' But the space station was not visionary enough: it was a form of retreat. The United States and its partners built a space station on their way down from space; China will do so on the way up. The

political logic is inexorable. A crewed space programme will unite and galvanize the country's people. If you have the public money — as China clearly does — there is no more obvious priority.

And the effort will bring rewards. Space flight is not like gene-sequencing or wafer fabrication, which almost anyone can do if they buy the machinery. Rocket science is, after all, rocket science — it is hard, demanding and can elude even the most technologically savvy nations, as Japan's persistent inability to master it demonstrates.

It is said that Apollo yielded only the non-stick frying pan, but that misses the point. I was in Huntsville in 1989 to visit Intergraph, a NASA spin-off computer company that developed RISC (reduced-instruction-set computing) microchips. These begat SPARC microprocessors, cheap Unix workstations and modern computer graphics. Ultimately, the

masterful, computer-generated imagery for which *Gravity* is being acclaimed was set in motion, in part, by the Apollo programme itself.

That effort was collective, yet the United States' self-narrative holds that innovation comes from individuals, including the robber barons in chinos celebrated in lame films such as 2010's *The Social Network*, which depicted the genesis of Facebook. The scientists and engineers of the Apollo programme had no public profile, earned no performance bonuses, and their crucial role in driving innovation, especially in computing and materials, has not been adequately acknowledged.

Successful as it was, NASA, in its prime, was seriously flawed. Its astronaut corps was all male and almost all white, as musician Gil Scott-Heron ruefully observed in his superb 1970 number, *Whitey on the Moon*. NASA sent up its

first African American astronaut, Guion Bluford, and its first female one, Sally Ride, only in 1983. Russia put a woman in space in 1963; China did so last year, nine years after its first man.

Many scientific missions can inspire true believers. Out once with the *Nature* staff in San Francisco, California, I met a couple of under-employed stoners, deeply in love, who earnestly informed us of the human-genome posters on the ceiling of their bedroom. The quest for the Higgs boson appeals to nerds the world over. But a scientific mission that captures the imagination of everyone is a rare and precious thing.

Just last week, I heard a three-year-old boy on an Edinburgh bus announce to his mum: "Ah want tae go tae the Moon." She lied: "You could be an astronaut!" The next person on the Moon won't have a Scottish name like Neil Armstrong's, and may not even be a man. They will, however, inspire the sort of awe whose encapsulation in *Gravity* will surely win Bullock and Cuarón their 2014 Oscars. ■

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