



The Hubble Space Telescope cruises above Earth in May 2009.

SPACE EXPLORATION

Probing the Universe

A celebration of uncrewed space missions is less than international in scope, finds **John Zarnecki**.

The space age has revolutionized our knowledge and understanding of the Universe, near and far. The past 60 years have seen a profusion of methods for space exploration — from Earth-orbiting satellites that, freed from the absorbing atmosphere, have opened up almost the entire electromagnetic spectrum to our view, to mostly robotic probes that have allowed us to study most types of object in our Solar System close up.

In *Dreams of Other Worlds*, Chris Impey and Holly Henry submit 12 of these space missions to close scrutiny. They describe how the missions were achieved and place them in a historical and even cultural context — this is, after all, a collaboration between an astronomer and a literary scholar. For those with a scientific background, this provides a generally refreshing perspective compared with many texts. For example, the chapter on the Mars Exploration Rovers invokes the work of H. G. Wells and Orson Welles, and, more surprisingly, that of T. S. Eliot, Virginia Woolf and Vita Sackville-West. And, to help to explain the Spitzer infrared space telescope and some of its discoveries, the authors make use of Jules Verne's 1870 science-fiction classic *Twenty*

Thousand Leagues Under the Sea and James Cameron's films *Avatar* (2009) and *Aliens of the Deep* (2005).

Selecting just 12 missions is a bit like picking your all-time best football team or top ten artists. It is impossible. Impey and Henry's list includes examples that are well known beyond the scientific community, such as the Hubble Space Telescope and the Voyager spacecraft, as well as the less widely known Hipparcos star-mapping mission and the Chandra X-ray Observatory. Whatever your view of their choices, they are all well-analysed and presented in a scholarly yet engaging way. The authors remind us — if we need reminding — that in addition to these missions being wonderful technological achievements, science is at their core. Whether that is the high-energy Universe represented by X-ray astronomy, or the cold Universe revealed through infrared observations — from the interior of the Sun to the outer reaches of our Solar System — Impey and Henry are able guides. They explain the scientific

Dreams of Other Worlds: The Amazing Story of Unmanned Space Exploration
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imperative of these missions in a way that is accessible and interesting to specialists and generalists.

I do take issue with the book's subtly US-centric world view. There is no doubt that scientifically, the US space programme has been the dominant force. The Soviet Union achieved many great firsts — such as the first successful lunar soft lander, the 1966 Luna 9, as well as the first image of the far side of the Moon, and Venera 7, the first Venus lander. But, with some notable exceptions, the scientific output of the Soviet, and subsequently Russian, programme has been relatively poor. More recently, the European Space Agency, Japan, India and China have had significant successes, including the first close fly-by of a cometary nucleus — that of Halley's comet — by Europe's Giotto spacecraft in 1986 and the return to Earth of particles from the asteroid 25143 Itokawa by the Japanese Hayabusa spacecraft in 2010.

Not to include a single mission from the Soviet Union, Russia or Japan seems to me myopic. One could easily make a case for the Venus landers Venera 13 and 14, which survived for up to two hours on the surface of the planet; or the Franco-Soviet Vega balloons, which drifted for up to two days in the atmosphere of Venus; or the Hayabusa mission.

Impey and Henry do include two European-led missions in their round dozen. These are Hipparcos, which between 1989 and 1993 measured the positions of more than 100,000 stars and other objects to unprecedented accuracy, and the Solar and Heliospheric Observatory (SOHO), launched in 1995 and still operating, observing both below and far beyond the Sun's visible surface. But, oddly, the authors first refer to SOHO as NASA's, later writing that "SOHO was conceived by the European Space Agency; fourteen countries and more than three hundred engineers were involved in its design and construction," with NASA handling launch and ground operations. Europe has also contributed hardware and finance to the Hubble Space Telescope from the very start — but there is barely a mention of this.

The authors do point out that space science is a truly international activity and has generally been carried out in an open, generous and embracing spirit, despite the occasional blip. However, the subtle but pervasive 'space nationalism' of *Dreams of Other Worlds* tarnishes what is otherwise an informative and engaging read. ■

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