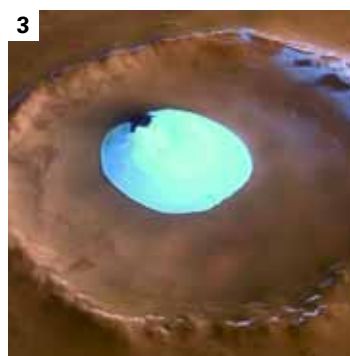
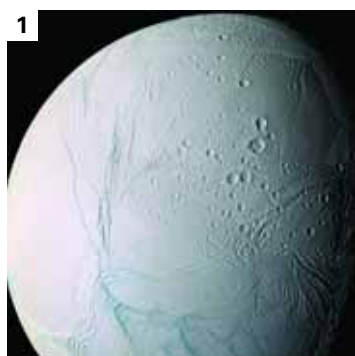


Space Exploration

Voyages of discovery

Space Exploration

The UK has taken a leading role in many of the most exciting space science missions of recent years. Teams are currently working on spacecraft exploring the Solar System and looking to the Galaxy and Universe beyond. Future missions are planned which will continue to put Britain at the forefront of international space exploration. The UK's endeavours in space science are funded through BNSC partner the Particle Physics and Astronomy Research Council (PPARC) and are carried out in collaboration with the European Space Agency (ESA) as well as international partners.



1. Enceladus, one of Saturn's many moons.
Credit: ESA

2. Lunar craters Brianchon and Pascal taken by Smart-1.
Credit: ESA

3. Perspective view of crater with water ice on the Martian surface.
Credit: ESA

Front cover image. Our neighbouring galaxy, Andromeda.
Credit: ESA

The planets

British teams are working on missions to the Moon, Mars, Saturn and Venus. One spacecraft is even on its way to land on a comet.

One of the most successful space science missions of recent years has been Cassini-Huygens. The UK is at the forefront of the design, engineering and science of this international collaboration. As well as sending back remarkable close-up images of the Saturn system, the spacecraft has, so far, revealed four new moons, a new ring and found an atmosphere around the moon Enceladus.

Most spectacularly, after more than seven years in space, the Huygens probe successfully touched down on Titan revealing the landscape for the first time. The very first part of Huygens to hit the surface was a British-built sensor. The Cassini spacecraft will continue to orbit Saturn until at least 2008.

Much closer to home, the European Smart-1 spacecraft is orbiting our own Moon. It is providing the first global map of the composition of the lunar surface enabling scientists to draw up new three-dimensional models of the landscape.

Mars has also been receiving unprecedented attention with Mars Express sending back spectacular views of canyons, valleys and craters. The mission has produced evidence for recent glaciers, a frozen sea and signs of methane, suggesting life might have been possible in the relatively recent past.

Secrets of the Sun

Several missions are currently investigating the Sun and its effect on the Earth. The space-based Solar and Heliospheric Observatory (SOHO) is viewing the Sun from its deep core through to its outer atmosphere, the 'corona'. It is also observing the solar wind – the stream of charged particles emitted from the Sun – out to a distance ten times beyond the Earth's orbit.

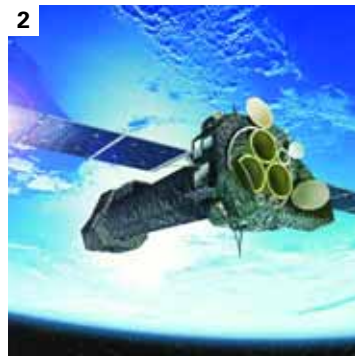
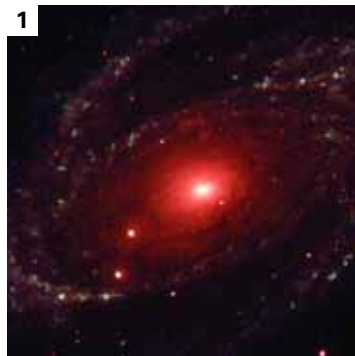
Meanwhile, the four Cluster spacecraft are examining the interaction between the solar wind and the magnetic field surrounding the Earth: the magnetosphere. The solar wind has the power to knock out orbiting satellites or even cause power cuts on the ground. Orbiting in formation, each Cluster spacecraft carries 11 identical instruments, three of which are led by UK scientists.

The STEREO (Solar Terrestrial Relations Observatory) spacecraft will complement the others by providing the first three-dimensional views of the Sun. It will also investigate the nature of the Sun's coronal mass ejections which hurl billions of tonnes of electrically charged gas towards Earth.

The depths of space

The UK has invested considerable resources in the design, construction and operation of Europe's largest scientific satellite, XMM-Newton. The X-ray observatory has, so far, discovered the most distant massive structure in the Universe. The finding suggests that the Universe's structure of stars and galaxies formed sooner after the Big Bang than astronomers previously thought.

The Swift spacecraft is investigating one of the biggest mysteries in the Universe: the brief explosions of radiation, known as gamma-ray bursts that flash across the Cosmos. Invisible to the human eye, it has been suggested that the bursts may signal the death of stars or the merger of black holes.



1. A striking ultraviolet image of the spiral galaxy M81, taken from XMM-Newton.

Credit: ESA

2. XMM-Newton spacecraft.

Credit: ESA

Rosetta

The ambitious European Rosetta spacecraft is designed to land on a comet. It comprises a large orbiter, capable of operating for a decade at large distances from the Sun, and a small lander.

After entering orbit around Comet 67P/Churyumov-Gerasimenko in 2014, the spacecraft will release the Philae lander onto the icy nucleus and spend the next two years orbiting the comet as it heads towards the Sun.

Launched in March 2004, the first system check showed the ESA spacecraft and all its instruments are working well.

Venus Express

Venus is our closest planetary neighbour but remains one of the most mysterious planets in the Solar System. Its extreme climate features intense heat and hurricane force winds whirling through a sulphuric acid and carbon dioxide atmosphere.

Venus Express will be the first space probe to perform a global investigation of the Venusian atmosphere and conduct a detailed study of the surface.

UK scientists and industry have played a key role in planning the mission and there is British involvement in the instruments on-board.

Future missions

Plans are being developed for new space observatories and a return to Mars. The UK is committed to the ambitious European Aurora space programme. Aurora is ESA's vision for robotic and, perhaps one day, even human missions to the planets. The first priority will be to concentrate on robotic missions to the Moon and Mars.

British efforts will be focused on developing scientific and robotic technologies. The projects involve designing more sophisticated rovers and a spacecraft that could land on the Red Planet, collect samples and return them to Earth for analysis.

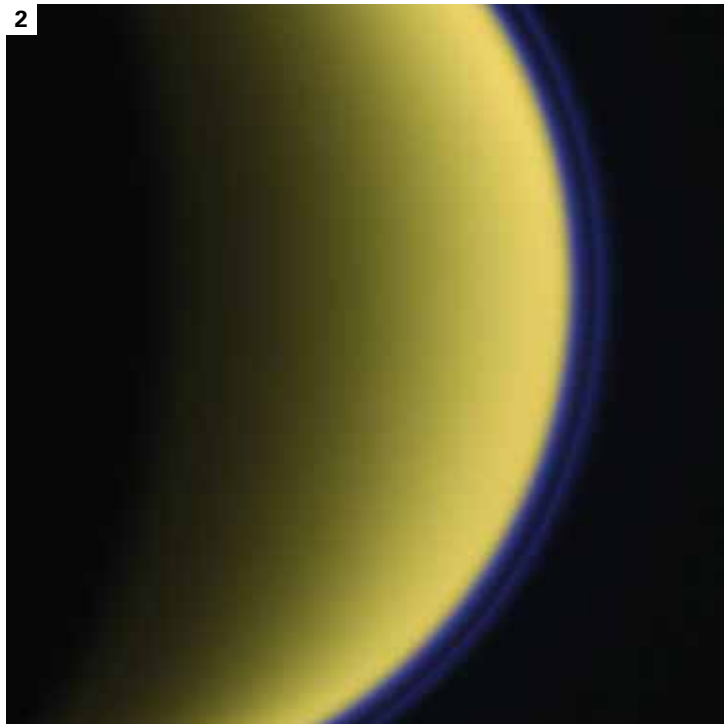
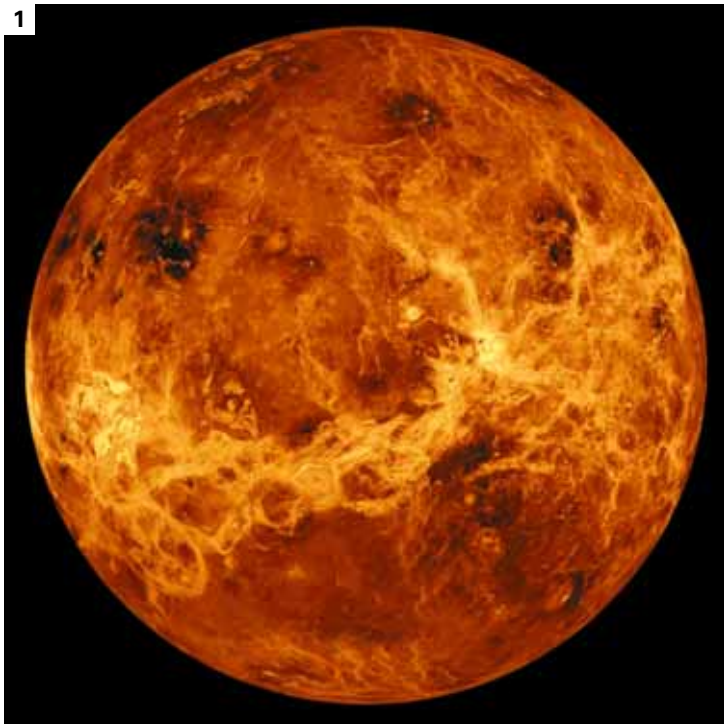
1. The Red Planet

Credit: ESA

2. Moon and stars

Credit: T.A. Rector, I.P. Dell'Antonio





1. Venus unveiled

Credit: NASA

2. Purple haze around Titan

Credit: ESA

More information

Further leaflets on the missions the UK is involved in are available from BNSC.

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