

Ground Control to Major ATom

Nuclear power is a controversial issue on earth. But it has long been an interplanetary success story.

Satellites and space probes require huge amounts of energy and suffer extreme low temperatures. Nuclear power solves that problem – even far from the sun or on a planet's dark side.

Decay heat

Most space probes use the decay of radioactive isotopes (mostly plutonium 238) to generate heat and prevent on-board systems from freezing. That heat is then transformed into electricity.

Nuclear reactors

Others have small on-board power plants with a nuclear chain reaction running for years on end. Most Soviet space missions used this technology until 1988.

EARTH

EARTH ORBIT MISSIONS

47 nuclear powered satellites were launched into orbit between 1961 and 1988.

FAILED MISSIONS

8 missions fell back on to the earth's surface or burned up on the way through the atmosphere, some due to launch failures, others after the mission ended.

EARTH ORBIT

Altitude: 720 to 36,000 km

36 Soviet missions

11 US missions

LUNA 15a, 1969

APOLLO 13, 1970

MARS 8, 1996

MOON MISSIONS

Distance from earth surface: 363,000 km

LUNA 17 & 21

Lander & Rover

Launches: 1970, 73

APOLLO 11 to 17

Orbiter & Lander

Launches: 1969 – 72

Apollo 13 failed, the crew safely returned to earth. The Lander fell into the Pacific Ocean along with its nuclear battery.

VIKING 1 & 2

Orbiter/Lander

Launch: 1975

Arrived: 1976

PATHFINDER

Rover

Launch: 1996

Arrived: 1997

SPIRIT & OPPORTUNITY

Rover

Launch: 2003

Arrived: 2004

MARS

MISSIONS TO MARS

Distance from earth orbit: 56 million km

The **Spirit & Opportunity** remote-controlled rovers shot spectacular pictures of the red planet and sent them back to earth. Spirit stopped responding in 2010. Opportunity is still going.

The launch of the **Curiosity Mission** (a reactor-heated rover) was delayed several times and is now scheduled to launch in winter 2011.

ULYSSES

Orbiter

Launch: 1990

Active until: 2009

EXPLORING THE SUN

Distance to earth: 150 million km

JUPITER

GALILEO

Orbiter

Launch: 1989

Arrived: 1995

Burned up in Jupiters atmosphere in 2003.

JUPITER

Distance to earth orbit: 600 million km

CASSINI-HUYGENS

Orbiter/Lander

Launch: 1997

Arrived: 2004

The **Cassini** probe carried the lander **Huygens** that landed on Saturns moon Titan in 2005. Cassini is still active transmitting pictures and data to earth.

SATURN

Distance to earth orbit: 1,3 billion km

NEW HORIZONS

Space probe

Launch: 2006

Currently passing Uranus

Distance to earth:

3 billion km

PIONEER 10 & 11

Space probes

Launches: 1972 & 73

Last contact: 2003/1995

15 billion km

12 billion km

VOYAGER 1 & 2

Space probes

Launches: 1977

Both are still active

17 billion km

14 billion km

BEYOND THE PLANETS

Space probes about to leave our solar system

No man made object has ever been further away from home than **Voyager 1**. As a friendly gesture, it carries a golden plate with messages for alien races. Then aliens can finally learn something about our standard of nuclear power from the 1970s.

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Sources: nasa.gov, space.skyrocket.de, wikipedia.org

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