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FROM SPUTNIK TO VOYAGER

The Soviets launched *Sputnik 1* on 4-10-1957, a big shock for the US. Within a year President Eisenhower created NASA. Russians had a long list of impressive 'firsts' until 1971:
1957: *Sputnik 1* - First satellite around the Earth; 1959: First spacecraft that flew by the Moon (first pictures of the far side); 1961: idem – Venus (first images of heavily clouded planet); 1961: First man in space (Yuri Gagarin; 1 orbit, 108 min.); 1963: First woman in space (Valentina Tereshkova; 48 orbits); 1965: First space walk (10 minutes); 1966: First spacecraft that landed on the Moon (*Luna 9*); 1970: Idem – Venus (despite temperatures of 460 º C and pressure of 90 atm.); 1968: First spacecraft that flew in orbit around the Moon and back to Earth; 1971: First space station (*'Salyut 1*'); 1971: First spacecraft making a soft landing on Mars.
All of this under a military umbrella, in great secrecy – and with many failures and disasters. but for almost a decade they remained ahead of the US.

It is amazing how spaceflight developed in the 50 years since *Sputnik.*

1. Around the Earth
   Instruments – Enormous numbers (thousands). Some 800 of them are active, with a variety of tasks: communication (= most of them), positioning (GPS), military reconnaissance (spying!), weather and environmental observations, search for minerals and archaeological objects and, of course, astronomical research!
   Special cases: *Hubble Telescope* (1990), *Spitzer Telescope* (launched in 2003 to study infrared wavelengths) and the *International Space Station.*
   Astronauts - Since 1961/1962 (Gagarin/John Glenn → just to prove that it was possible). Nowadays astronauts orbit the Earth to build/extend/repair instruments and to work for long periods in 'space stations'.
2. To the Moon
   It started with unmanned spacecraft, flying by or orbiting the Moon (taking pictures of the far side), putting instruments on the Moon's surface, bringing Moon-dust back to Earth etc.
   Then, in 1968 the first astronauts orbited the Moon, followed between 1969 and 1972 by twelve American astronauts who visited the Moon during six *Apollo* missions.
3. To the Planets of the SS and the Sun
   It started with fly-by's (Russian and American) to collect information. First to the inner planets (M-V-M,1960's), then also to the outer planets (1970's). In a next stage it also became possible to put spacecraft in orbit around planets and the Sun (except Uranus and Neptune), and in a number of cases to land instruments on the planets (Venus, Mars, Saturn's moon Titan).
4. Out of the Solar System
   The *Voyagers 1 + 2* were launched by NASA in 1977 to visit the four outer planets. They went further away – even into interstellar space – than anything else. Both reached Jupiter in 1979 and Saturn in 1981. *Voyager 1* studied Saturn's rings and then left the ecliptic. *Voyager 2* continued in the ecliptic in order to visit the two most distant planets: Uranus in 1986 and Neptune in 1989. They provided new information about the surface and the atmosphere of the outer planets and their moons, discovered Jupiter's rings and 26 new moons: Jup.3, Sat.8, Ur.10, Nep.5.
   After the fly-by's of the planets they continued towards the outer edge of the Solar System. They are now, after 30 years, some 15 billion km away, but still sending messages. They can continue to do so for another 15 years (nuclear power). After that they will continue to travel for ever, passing the first stars after at least 40,000 years.

FUTURE

After the *Voyagers* it does not make sense to go any further, as we will not be able to receive the data any more. So we will continue to fly to objects within the Solar System and try to discover ever more detail about its planets, moons, meteorites, comets etc. Special field of interest: Water and Life, in past or present.
Big steps: Men on the Moon (again), eventually leading to a permanent moon base, and, in a later stage, astronauts on Mars (and not further, journeys taking too long). Important developments in the field of international cooperation / competition (cooperation between USA, Russia and Europe since decades, new participants: Japan, China, India and others).

News in brief

- The Peruvian meteorite (see last month's summary) did *not* cause illness in the villages around the impact site. Some 30 people (not 'over 200') probably became ill because the groundwater in the region is contaminated with arsenic, which got into the air as a consequence of the impact.
- The Mars Rover *Opportunity* has descended into the Victoria Crater and started to study the crater's walls.
- NASA has again extended (financially) the life of the Mars Rovers *Spirit* and *Opportunity,* this time until 2009. The rovers were launched in January 2004.
- On 23/10 the shuttle *Discovery* was launched. It brings a big new module – *Harmony* – to the International Space Station. This module will enable the attachment of European and Japanese laboratories, to be launched in the coming six minths.