September 2025 - Issue 152

ORBIT

Astro Space Stamp Society

Apollo-Soyuz Test Project (ASTP) 50 years on

Voyager 1 space probe breaks record of 5 billion km travelled from Earth

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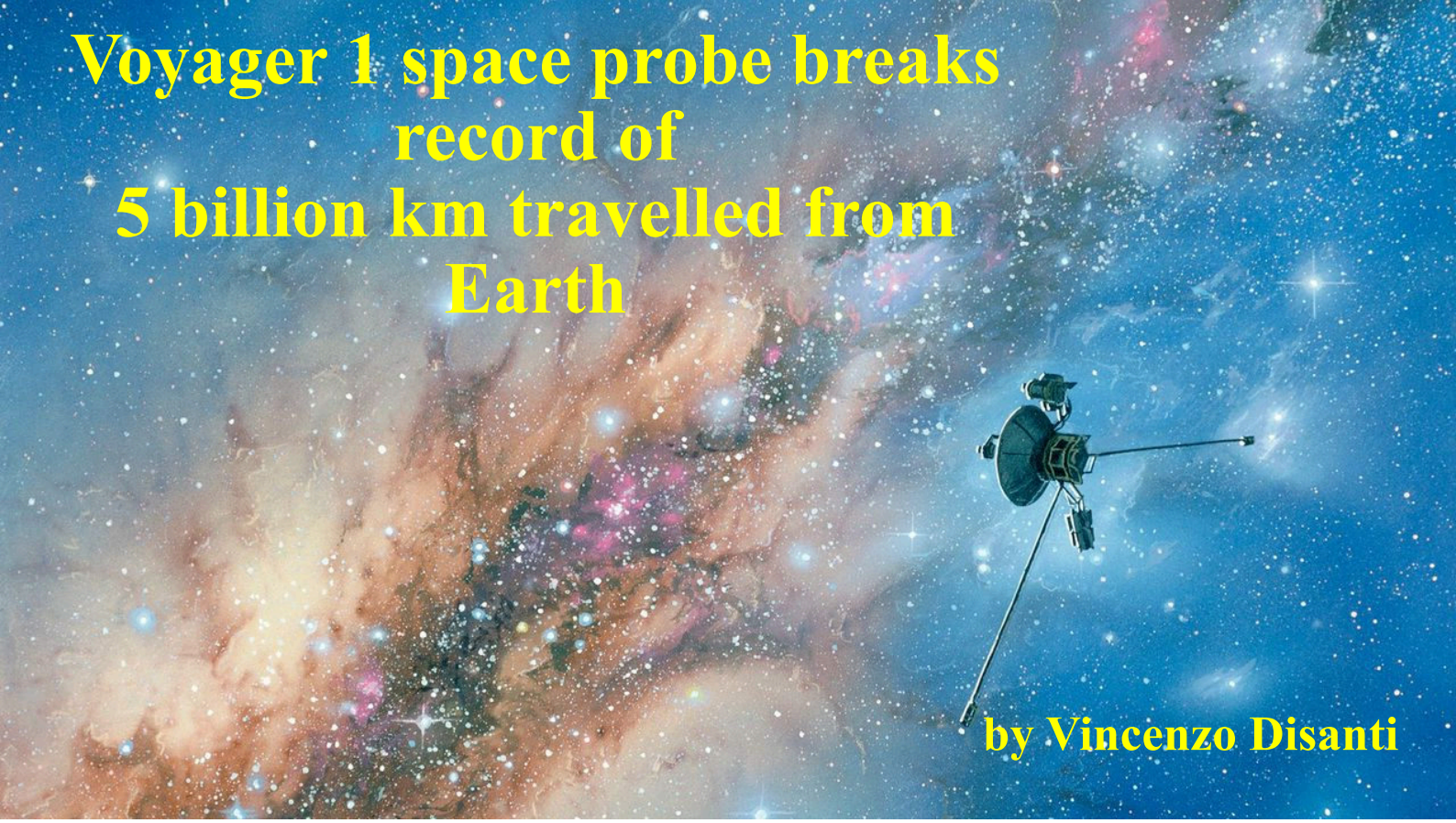


by Vincenzo Disanti

Mission patch for Voyager

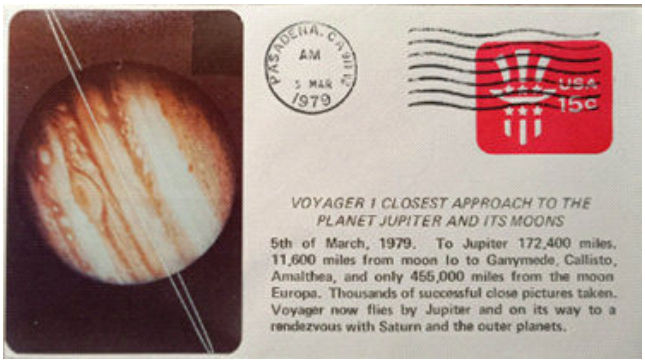
Voyager 1 is undoubtedly the space probe of records!

On 25 August 2012, Voyager 1[1] reached and passed the heliopause, the boundary of the Solar System, at a distance of about 121 AU from the Sun, thus becoming the first object built by man to leave our solar system.

Currently, Voyager 1, despite its almost 48 years, continues its solo journey at a speed of about 61,500 km per hour.

On 28 January 2025, Voyager 1 reached and beat the record of 25 billion kilometers travelled, so much so that, as explained in the commemorative cover, the radio signals sent from Earth take 23 hours and 9 minutes to be received by the probe.

When Voyager 1 was built, it was designed to be launched towards the external solar system and its primary objective was mainly the close flyby of Jupiter and Saturn.



Cover for Voyager 1 closest approach to the planet Jupiter and its moons.

Stamps from Liberia for the 45th anniversary of the launch of Voyager 1.

The probe launched from Cape Canaveral on 5 September 1977 (some of us hadn't even been born yet!), and was equipped with on-board instruments suitable not only for taking pictures of the target planets and of their Moons but, above all, for studying their magnetism.

The first target assigned to Voyager 1 was Jupiter, which was reached, in its closest approach, on 5 March 1979.

The observation of Jupiter and its satellites continued until April 1979 and allowed the

Cover for Voyager 1 closest approach to the planet Saturn.

surprising discovery of sulfur volcanoes on Jupiter's moon, Io.

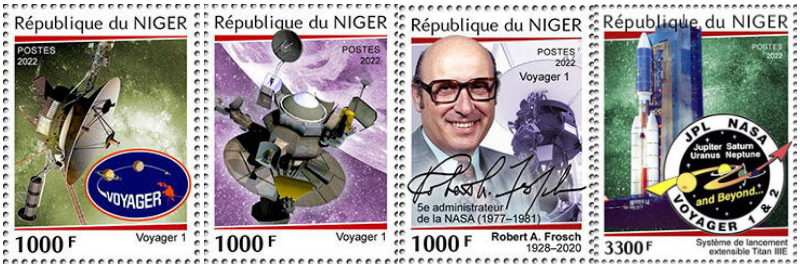
In particular, Voyager 1 sent the images of the red spot of Jupiter that were taken every 10 hours for 28 consecutive days at the same local Jovian time. After rounding Jupiter, Voyager 1 continued its journey towards Saturn, and reached its closest point, just 120,000 km away on 12 November 1980.

The probe thus photographed the particularly complex structures of Saturn's rings, and studied its atmosphere. Before leaving Saturn, Voyager 1 was directed towards the Titan satellite so as to enter its orbit and study it as closely as possible.

At this point, but only seemingly, the Voyager 1 mission was almost over because after having passed Saturn and its moons, the probe moved further and further away from the Sun, heading towards the edges of the Solar System.

Voyager 1, however, continued its long journey carrying on board, among other things, the Voyager Golden Record, a gold-plated recorded disc containing images and sounds of the Earth with, even, instructions in case "someone found it".

Pale Blue Dot *(centre of photo) is the iconic picture of the Earth taken on 14 February 1990 by Voyager 1, when it was 6 billion km far.(© NASA/JPL–Caltech)*



Stamps from Niger for the 45th anniversary of the launch of Voyager 1.

In 1990, the probe also took several photographs of the planets of the solar system when it was more than 6 billion kilometers from Earth.

The most famous of these images is the Pale Blue Dot, which shows the Earth so small that it is less than a pixel in size.

Voyager-1 had now achieved all of its main objectives for interplanetary observation within our solar system but it would soon be the first to cross new boundaries.

In December 2004, it was announced that, according to the analysis of the recorded data, Voyager 1 had observed and passed the so-called "termination shock" (the boundary where solar wind particles are slowed to subsonic speeds).

Reaching the heliopause in August 2012, in December 2012 the data sent by the probe showed new and sensational discoveries on what are defined as the boundaries of the solar system.

The probe had in fact entered a so-called "magnetic highway" that effectively connects the solar system to interstellar space.

The instrumentation useful for studying the magnetism of Jupiter and Saturn was thus used to study this "highway" which would appear to be a means of connection between the sun's magnetic field and the interstellar magnetic field.

Cover for Voyager 1 as it sets a new distance record.

This allows charged particles inside the heliosphere to escape, and charged particles from outside to pour in. On 8 February 2012, Voyager 1's position was such that no planet was visible from that distance, and the Sun had a magnitude of -16.4.

Shortly thereafter, Voyager 1's instrumentation was particularly affected by the long journey, so that on 14 November 2023, the probe suddenly stopped sending telemetry data, instead sending a pattern of repeated but indecipherable binary sequences.

After checking and analysing the data and after a few months of hard work, it was discovered that the problem was due to a malfunctioning memory module in the Flight Data Subsystem (FDS).

Finally, on 23 April 2024, NASA engineers at JPL (Jet Propulsion Laboratory) managed to reprogram the FDS and exclude the corrupted memory bank, and the probe started again to send to Earth the correct telemetry.

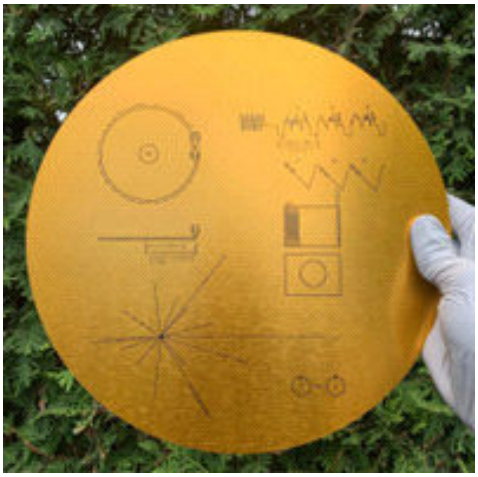
Voyager 1, however, is powered by a battery that will allow it to communicate with Earth for a short time. It has been calculated that in about 30,000 years, Voyager 1 will completely exit the Oort Cloud and enter the gravitational pull of another star.

The probe is heading towards the constellation of Ophiuchus and in about 38,000 years it will pass at a distance of about 1.7 light years from the star Gliese 445 located in the constellation of Giraffe.

Therefore, all that remains is to look at the sky and imagine what other records will be achieved by the Voyager 1 probe and ask ourselves if one day someone will be able to receive and understand the message of the gold-plated disc, the Voyager Golden Record.

This article first appeared in AD-ASTRA - N° 64 – June 2025 and is reprinted with permission. You can check out the ASITAF website Here

*[1]AD*ASTRA has already dealt with this historical mission in the article "40 years of Voyager, Man's Farthest Travelled Spacecraft" (AD*ASTRA n. 35. pages 4-6).*



Voyager's Golden Record.

Guizhou Radio Telescope

The FAST telescope stamp issued by China.

In 2017, China's State Post Bureau (SPB), issued a commemorative stamp in honour of the world's largest radio telescope, located in the southwestern province of Guizhou. The set of five stamps, entitled 'Science and Technology Innovation', was issued on 17 September 2017. The Five-hundred-metre Aperture Spherical Radio Telescope (FAST), stamp has a value of 1.2 yuan or 0.18 US dollars. The other four stamps honour China's Mozi quantum science experimental satellite, the Tansuo-1 research vessel, a national grain production project around the Bohai Sea and the Sunway TaihuLight supercomputer. They were designed by Du Yukai and printed by the Shenuang Stamp Printing House in Liaoning Province.

The Five-hundred-metre Aperture Spherical Telescope (五百米口径球面射电望远镜), has also been given the nickname of Tianyan (天眼), which translates as 'Sky's/Heaven's Eye'. It was built in the Dawodang Depression, a natural depression basin in Pingtang County in mountainous Guizhou. FAST has a 500 m diameter dish of a novel design using an active surface of 4,500 metal panels that form a moving parabola shape in real time. The cabin containing the feed antenna is suspended on cables above the dish. It can move automatically, using winches to steer the instrument to receive signals from different directions. It observes at wavelengths from 10 cm to 4.3 m.

The telescope is designed to search space for the faintest signs of life and is sensitive to any electromagnetic interference. The surrounding area is open to visitors. However, the number of visitors is strictly controlled to less than 2,000 people per day, and electronic devices, including mobile phones and cameras, are prohibited.

The FAST telescope in the mountains of Guizhou.

The complete set of science and technology innovation stamps.

The Jilin-1 Constellation Wideband No. 1 C satellite took an image of China's FAST Spherical Radio Telescope "Sky Eye" on 28 April 2024.

By Nik Steggall

The Jilin-1 satellite photographed the FAST spherical radio telescope in Guizhou on 28 April 2024.