Next Stop Outer Space

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The earth might soon exhaust its supply of certain essential resources. Researchers are therefore searching for new sources on the Moon, on Mars, and in the depths of outer space.

ESA

Which laws govern the universe? How do planets form, and how does life emerge? To learn more about these questions, the European Space Agency is sending observers into space: the Cheops space telescope, used to study exoplanets, will be launched at the end of 2019 and, amongst others, the LISA gravitational wave detector will be launched in 2034. Whether the ISS space station, orbiting 400 kilometers above the Earth, will continue to operate beyond 2024 is something that ESA, together with its partners, has yet to decide. Johann-Dietrich Wörner, who directs ESA, has brought up the alternative idea of successively establishing a "moon village."

Cheops

The Cheops telescope weighs 280 kilograms, has a diameter of thirty-two centimeters, and draws the energy it needs to operate from its 2.5-square-meter solar panels. Eleven of ESA's member states are participating in this mission, which will extend to a period of 3.5 years, in collaboration with Switzerland.

Earth

There are currently 7.7 billion people living on planet Earth. The United Nations predicts that this figure will rise to 9.7 billion in 2050, and more than 11 billion by 2100.

NASA

The United States actually had little interest in returning to the Moon—it was considered too costly, with too few insights to be gained. President Donald Trump is now putting the pressure on and urging for a new attempt to be made. The Artemis program aims to put astronauts on the Earth's lunar satellite by 2024. Private aerospace companies have already been asked to provide support by contributing the landing technology, while NASA is, at the same time, planning to use the Moon as a base for advancing further into the far reaches of outer space: it spends almost a quarter of its annual budget of US$21 billion on deep space research.

Exoplanets

Exoplanets are planets found outside our own solar system. They do not orbit our sun, but rather another star. Several thousand exoplanets have been discovered to date.

BLUE ORIGIN

One day, "millions of people" will be living and working in space, according to the founder of Amazon, Jeff Bezos. This is why he and his company Blue Origin are working on building the New Glenn rocket, having unveiled the spider-shaped Blue Moon lunar lander, which is powered by hydrogen, in spring 2019. This will be able to transport vehicles, scientific equipment, and—potentially—astronauts to the Moon as well, as is a stated objective. Bezos is hoping to prevent future energy crises by conducting further research into the solar system. And he has another goal as well: space travel should become as inexpensive as commercial aviation is today.

The Moon

The Earth's moon is the fifth-largest in our solar system. It orbits the Earth at a mean distance of 384,400 kilometers, and to date, twenty-four people have stepped foot on its surface. Scientists continue to study the rock samples brought back from it.

ROSCOSMOS

To date, Soviet and Russian cosmonauts have spent more time in space than their astronaut colleagues in other countries. The splendor of days past has faded into distant memory, however. In an effort to restore that former glory, Roscosmos, the state aerospace agency founded in 2015, has constructed the new spaceport Vostochny and is examining plans to send tourists to the ISS space station in the future. Russia also intends to set up stations in the orbits of the Moon and of Mars.

ISS

The International Space Station—operated by Europe, the United States, Russia, Japan, and Canada—soars 400 kilometers above the Earth, traveling at 28,800 km/h. The ISS has room for six researchers, and needs ninety minutes to complete one orbit of the Earth. Its construction, which had to be done in space, required forty missions, and the station has been inhabited since 2000. The costs of development, construction, and ten years of operation amount to €100 billion.

Falcon Heavy

Falcon Heavy (right) is currently the largest rocket of all, and designed for missions to Mars. Its payload would total 16.8 tons on a flight like this. When its missions are closer to Earth, it needs less fuel and can transport a maximum of 63.8 tons. Its propulsive force is eighteen times that of a Boeing 747, with each launch costing US$90 million.

CNSA

China has only made a few manned flights into space so far; however, it spends US$8.4 billion annually for its civil and military aerospace activities, and is quickly catching up. The government's plan: to become the leading aerospace nation by mid-century. China's strategy: a space station of its own to rival the ISS will be completed in 2023, and will focus on the Moon from 2030 on, along with plans to deploy probes to Mars and Jupiter. The National Space Administration caused a furor in early 2019 when the Chang'e 4 space probe touched down on the far side of the Moon—a spectacular feat that no one else had achieved before. In 2018, China was already launching more rockets into space than any other nation.

Jupiter

Jupiter orbits the sun at a distance of around 778 million kilometer, taking 4,333 Earth days to do so, and is by far the largest planet in our solar system. If the Earth were the size of a grape, Jupiter's size would equal that of a basketball.

SPACE X

Bigger, further, cheaper: these are the criteria that entrepreneur Elon Musk, together with 6,000 employees, is using as a basis to build rockets, some of which can be used several times and—as is the case with the Falcon Heavy—can deliver heavy loads to the ISS space station. NASA contracts account for the majority of the company's turnover. It launches weather and intelligence satellites into space for the state-owned agency. Two of Musk's objectives: to fly tourists to the Moon by 2023, and to set up colonies on Mars. Should this not succeed, then the technology used for propulsion can be utilized on Earth, with Musk speculating that it will be possible to reach any given location in no more than thirty minutes.

Mars

Billions of years ago, the Red Planet, which is half the size of Earth, was warmer and wetter—nowadays, its surface resembles a cold and dusty desert with only a thin atmospheric layer covering it. Mars orbits the sun at a distance of 228 million kilometers, with light taking 13.6 minutes to reach its surface. A series of probes and spacecraft have been sent to Mars by the US, Europe, and India to conduct research into the planet.