Research in Graubünden

Measuring instruments from Davos on their way to the sun

The spacecraft “Solar orbiter” seeks to uncover the secrets of the sun

In February 2020 the spacecraft “Solar Orbiter” started from Kennedy Space Center/USA in the direction of the sun. On board this mission of the European Space Agency (ESA) are ten instruments - two of them with involvement of the PMOD/WRC in Davos. The spacecraft will fly so close to the sun that telescopes will be able to observe its north and south poles for the first time. In June 2020, the probe was already almost halfway to the sun - telescopes have never been so close to this star before. “Solar Orbiter” will fly by Venus (and once by Earth) many times on its journey to the sun. In the process, the probe will use the planets' gravity to change its own orbit so that it comes closer to the sun and can observe it from an increasingly higher angle of inclination. By the end of 2021, “Solar Orbiter” will be in its operational orbit.

There are two types of measurement methods on board: “seeing” the Sun through telescopes and “touching” the Sun-derived material that passes by the spacecraft. Already, from the first data received, the researchers noticed new phenomena that will help them better understand the complex and very dynamic changes of the Sun. Since no one has ever seen the poles of the Sun before, the Solar Orbiter mission will yield new insights into this star. If all goes according to plan, the mission will last until 2029, with the poles most visible toward the end of that time span.

Space missions like this take decades to plan, design, build and test. A wide range of skills is required: those interested in a career in space exploration can train in physics, electronics, mechanical engineering, software or navigation, to name just a few specialties. The teams are international and have successfully continued the operation of the spacecraft and all instruments even during the difficult times of the pandemic. In addition to the “Solar Orbiter”, there are numerous other space probes and ground-based telescopes studying the Sun. The operators of these facilities, which are scattered around the world, are banding together as a large international community to obtain the best data. One of these other space probes is called “SOHO”. It was launched 25 years ago and is equipped with an instrument built by the PMOD/WRC, which is still in operation today. With this instrument a number of solar storms could already be observed. These storms follow an 11-year cycle and have occurred more frequently in recent months - an exciting time for this spacecraft and not least for the PMOD/WRC!

Ultimately, researchers in Davos want to understand why the Sun is so dynamic, why it produces such high-energy explosions (much more energetic than nuclear bombs), and how it affects the technology we rely on here on Earth. To further unravel these mysteries, another spacecraft is currently being constructed with the cooperation of PMOD/WRC: A space weather monitor that will orbit the Sun far from Earth. The goal of this mission will be to detect when solar storms are moving toward Earth. Ultimately, this should improve warning of severe storms of this type. This mission is scheduled to launch in 2027.

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For more information: https://sci.esa.int/web/solar-orbiter, www.pmodwrc.ch.

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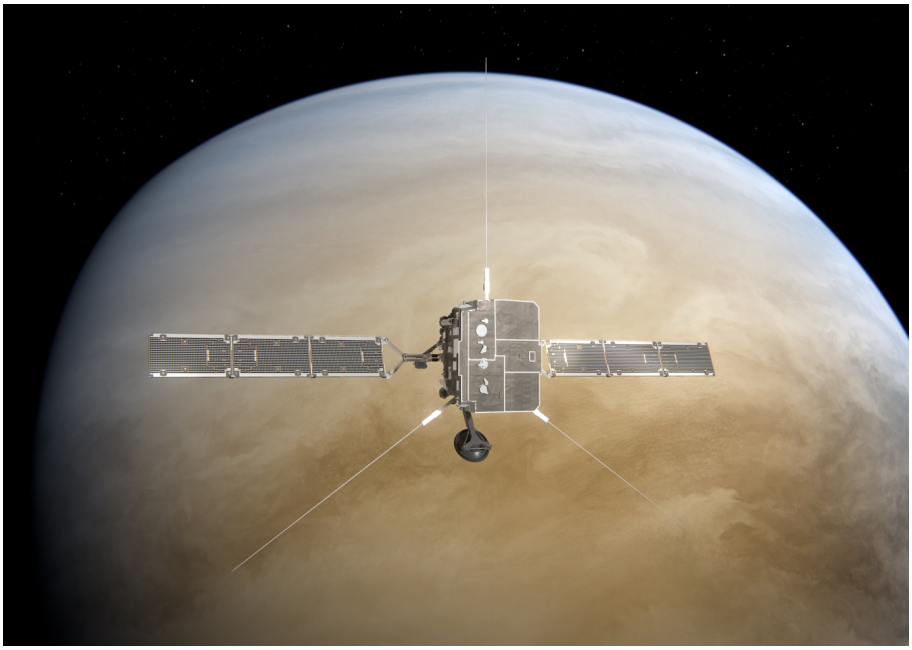

Figure 1: Artist's impression of Solar Orbiter during its flyby of Venus. Image credit: Courtesy of ESA.

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