Reaching **for the Sun…**

The Sunrise solar observatory has successfully completed its first balloon flight. It flew at an altitude of 37 kilometers to observe the Sun like no other telescope before. The researchers at the **Max Planck Institute for Solar System Research** in Katlenburg-Lindau are hoping for rich rewards.

TEXT **BIRGIT KRUMMHEUER**

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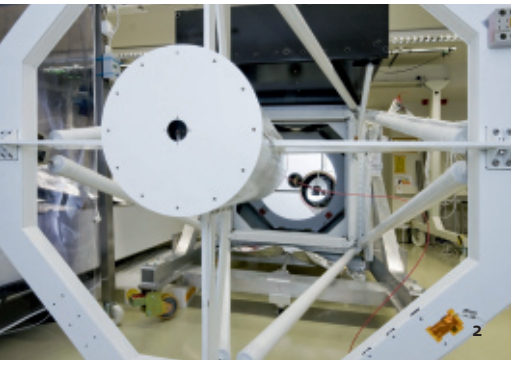

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Early in the morning, the cloud cover over the Esrange Space Center in Kiruna, northern Sweden, breaks up, just as the meteorologists had forecast. The night's preparations have not been in vain. The white gondola containing the solar observatory is already hanging from a mobile crane as the engineers roll out the 300-meter-long empty balloon tube. The countdown has begun.

The *Sunrise* mission, which successfully launched on June 8, sounds like a contradiction in terms: a precise solar telescope suspended from a swaying helium balloon. Nevertheless, the scientists from the Max Planck Institute for Solar System Research, which led the project, chose the location between heaven and earth with due consideration. At its cruising altitude of 37 kilometers, the observatory has left behind more than 99 percent of the Earth's atmosphere – and the detrimental effect it has on image definition. At the same time, the project is more cost effective than a flight into space.

A balloon flight like this is nevertheless immensely complex: researchers and engineers spent six years preparing for the project. The main mirror is one meter in diameter, making the observatory the largest solar telescope ever to have left Earth. The instruments that measure the Sun's magnetic field and the image stabilization system are also unique – as is the mission objective: the scientists want to make the magnetic field of the Sun visible with a precision never before achieved. The researchers expect this finely woven blanket to provide them with the key to understanding many solar processes, such as how the solar corona heats up to several million degrees.

But first there has to be a successful launch. Very slowly, the balloon straightens up. Only its top portion is filled with helium. In the stratosphere, the gas bubble will expand to a volume of one million cubic meters. The moorings are released as soon as the balloon stands vertically above the mobile crane. The balloon gently lifts its three-ton load into the sky.

In the stratosphere, polar winds seize the observatory and carry it westward. At these latitudes, it doesn't get dark in summer, so the telescope has the Sun in its sights around the clock as it makes its journey. When it landed safely in northern Canada on June 13, 1.2 terabytes of data were stored on its onboard hard disks. A lot of work – but at the same time a treasure trove for the researchers. ◀

Photos: MPI for Solar System Research – Klaus Heerlein [1], Jochen Herting [2], Sami K. Solanki [3], Peter Barthol [4], Bernd Chares [5]

Final preparations for the solar observatory *Sunrise*, whose main mirror is one meter in diameter [photos 1 and 2]. Then, on June 8, things get serious: While the observatory hangs from the mobile crane, the helium balloon slowly straightens up [3]. Shortly afterwards, the balloon pulls *Sunrise* upward with a jolt [4] – the two-hour journey to the stratosphere has begun [5].