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The Sun in its sights – the German 'Sunrise' telescope starts on its mission

8 June 2009

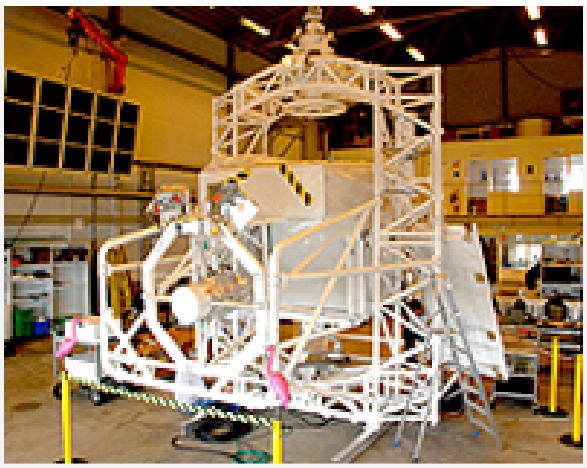
The German 'Sunrise' telescope

On Monday 8 June 2009, the German 'Sunrise' telescope lifted off at 08:27 (06:27 UTC) from the Esrange launch site near Kiruna (Northern Sweden) on its five-day mission. The solar telescope is floating over the Arctic Ocean and around the North Pole, suspended under a giant helium balloon. During this journey, Sunrise will keep its 'eye' firmly fixed on the Sun. Sunrise was promoted by the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and constructed by the Max Planck Institute for Solar System Research (Max-Planck-Institut für Sonnensystemforschung; MPS) in Katlenburg-Lindau. Sunrise is designed to observe the Sun from a great height and with a precision which neither an Earth-based telescope or a space probe has so far achieved.

The solar telescope went up under a giant American balloon. With a volume of about one million cubic metres, it is the largest balloon that has ever been launched in Europe. The midnight sun makes the Esrange rocket and balloon launch centre the optimum launch site for balloon trips to observe the Sun.

The Sun can be observed around the clock during the flight. The telescope is expected to land on 12 June in northern Canada, using a parachute.

Gigantic - a balloon as large as Dresden's Frauenkirche (Church of Our Lady)



Sunrise: preparing for the mission in Kiruna

The Sunrise payload gondola weighs more than two tonnes. In order for the balloon to be able to ascend into the stratosphere carrying such a weight, it requires 2500 cubic metres of helium. Once it has ascended, it expands to a volume of one million cubic metres, which could cover Dresden’s Frauenkirche (Church of Our Lady), at more than 91 metres high. The balloon ascends to a height of 40 kilometres, where the diameter of the balloon reaches more than 100 metres. At this height, the residual atmosphere is so thin that ultraviolet light with a wavelength of down to 200 nanometres can be detected by the telescope instruments with almost no atmospheric filtering. Such observations are not possible on the ground, since the ozone layer and the water vapour in the lower atmosphere absorb most of the ultraviolet light.

SSunrise will observe the sun at a height of more than 30 kilometres

Close to the sun

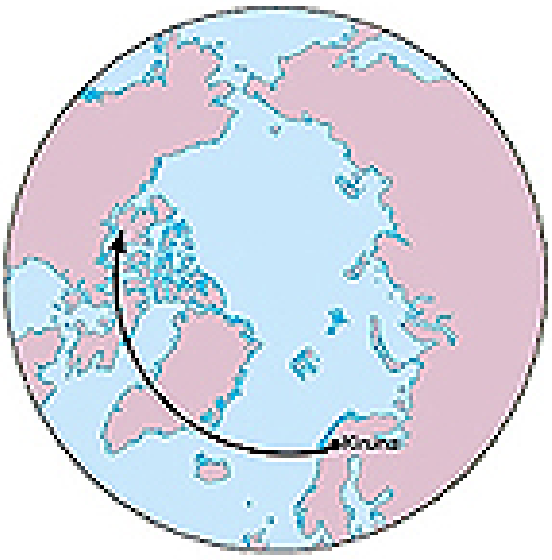
The scientists at MPS intend use the mirror on the Sunrise solar telescope, which has a diameter of one metre, to observe structures on the Sun from about 30 kilometres upwards in size. Their aim is to capture for the first time the movement and magnetic orientation of fine structures in the hot plasma; that is, the ionised gas in the Sun's atmosphere.

'Marriage': parachute and balloon are joined together

The apparently smoothly radiating Sun turns out to be highly active when observed through a solar telescope. Its surface bubbles like a pot of boiling water. This can cause gigantic eruptions, in which clouds of hot plasma are ejected millions of kilometres into space – the cause of the phenomenon known as the solar wind.

By observing these dynamic processes, scientists hope to better understand the underlying physical forces and the behaviour of the Sun as a whole. After all, even minor fluctuations in the Sun's radiation influence the sensitive equilibrium of weather and climate on Earth. In addition, Sunrise is also being used to prepare for the 'Solar Orbiter' space mission of the European Space Agency (ESA), with a launch planned for 2017.

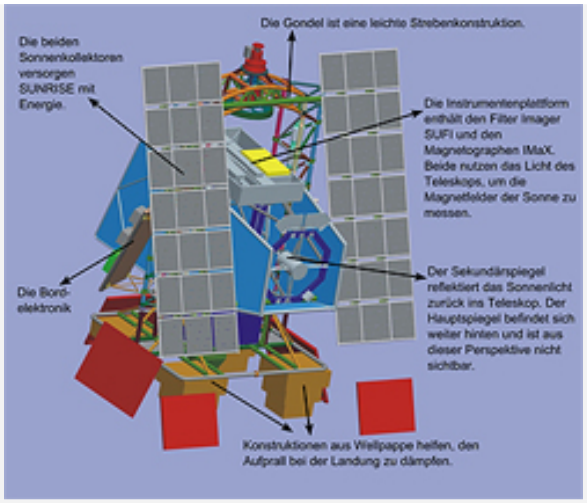
Journey round the North Pole



The route of the Sunrise flight

During its mission, the Sunrise telescope will undertake a journey over the Arctic Ocean to northern Canada lasting several days. Once over the recovery area in Canada, the balloon will be separated by radio command and the telescope will return to Earth by parachute. The balloon is destroyed in the process and falls separately to Earth. Once it has been successfully recovered, the telescope can be used for further missions.

The technological aim of the mission is to test new observational instruments for future space missions. This and the excellent scientific objectives are the reasons why DLR's Space Agency is supporting the mission. At about 30 million Euro, Sunrise is considerably less costly than an equivalent space mission. However, the observation period is restricted to a few days.



Graphical representation of the Sunrise solar observatory

Germany will contribute some 20 million Euro, which is about two-thirds of the project costs. The Max Planck Institute for Solar System Research (MPS) in Katlenburg-Lindau near Göttingen is in charge of the project. MPS is supported by the Kiepenheuer Institute for Solar Physics in Freiburg. Two American partners, the High Altitude Observatory of the National Center for Atmospheric Research (NCAR) in Boulder and the Lockheed Martin Laboratories in Palo Alto, are also involved as well as researchers from the Instituto Astrofisica de Canarias, La Laguna.

The development of the Sunrise telescope was supported by DLR's Space Agency with funding from the German Ministry of Economics and Technology (Bundesministeriums für Wirtschaft und Technologie; BMWi) on the basis of a decision by the German Parliament.

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