Philae lander – nearing the end of hibernation

26 March 2014

A rocket launch in March 2004, multiple swing-bys past Earth and Mars, high-speed fly-bys of asteroids Šteins and Lutetia – after all this, the Philae lander on board ESA's Rosetta spacecraft, which is en route to Comet 67P/Churyumov-Gerasimenko, is in good shape. On 28 March 2014, after more than two and a half years in hibernation, scientists at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) will bring Philae back into operation. Nearly four million kilometres separate the spacecraft and the comet Churyumov-Gerasimenko.

The commissioning of Philae can be followed via a live stream on Friday, 28 March 2014 between 14:00 and 16:00 CET (in German).

http://cdn.livestream.com/embed/dlrlive?layout=4&color=0x000000&autoPlay=false&mute=false&iconColorOver=0xe7e7e7&iconColor=0xcccccc&allowchat=true&height=340&width=560

Sensors on the Rosetta orbiter, which was woken from its hibernation on 20 January 2014, have already delivered the first temperature data from the Philae lander. "This data lies within the allowable range, but we currently do not know what the status of the lander is," says Project Manager Stephan Ulamec from DLR. The scientists had no contact with the probe or lander after 8 June 2011. At a distance of over 800 million kilometres from the Sun, the energy received by the solar arrays was no longer sufficient to power the orbiter, the lander and the instruments. The central computer and the instruments were turned off for over 30 months, while the spacecraft flew on in silence.

Health check for the lander and instruments

In the meantime, using a replica of the lander, the DLR scientists have been testing and optimising the software, which they will be sending to the Rosetta spacecraft on 28 March 2014. The orbiter will then use these programmed procedures to activate the lander and forward its responses to Earth as data. "We will analyse this data thoroughly, so we can find out whether Philae has survived the long flight and hibernation intact," explains Ulamec. Then the shift work at the consoles will begin for the team in the lander control room in the Microgravity User Support Center (MUSC). Both the lander and the 10 instruments on board must be checked over the following four weeks.

The planetary researchers are planning to use 21 instruments on the orbiter and lander to unlock the secrets of comets. This will give scientists the opportunity to look back into the period when the Solar System was formed, 4.6 billion years ago. You could say comets are somewhat like 'flying freezers' – at great distances from the Sun, these bodies have likely preserved primordial material. On Earth, this material has been repeatedly altered and covered over by geological processes, but comets have remained nearly unchanged.

Snapshot of the past

Until now, these bodies have only been investigated from afar or during brief fly-bys. With the European Rosetta mission, an orbiter will circle a comet for the first time, and a lander will touch down on its surface – also for the first time – to carry out in-situ measurements as the comet becomes increasingly active in its approach to the Sun. Comet 67P/Churyumov-Gerasimenko

could provide scientists with 'a snapshot of the past'. Could the water on Earth have originated from cometary impacts? Why are some parts of a comet so active as it approaches the Sun, while others are not? And what functions underlie cometary activity generally? "There are still a lot of unanswered questions, but with the 21 instruments we will gather large quantities of new data that will help us answer them," explains planetary researcher Ekkehard Kührt, Project Leader for the DLR experiments on the orbiter and the lander.

One of the DLR experiments on board Philae is MUPUS; it will hammer its way about 30 centimetres into the surface, where it will conduct thermal experiments. The SD2 drill, made in Italy, will collect samples of the comet's soil at different depths and distribute them to three instruments for chemical and physical analysis. Also on board the spacecraft are a number of camera systems, such as OSIRIS, CIVA and ROLIS. Starting in August, OSIRIS will begin mapping the comet with a resolution in the decimetre range, enabling the planetary researchers to create a more precise image of their target object. "We have never seen images of a comet at this resolution before," says Kührt. Using this data, scientists will decide where Philae will land in November.

The mission

The European Space Agency (ESA) is responsible for this international mission with contributions from its member states and NASA, including major participation by Germany. In addition to DLR, the Max Planck Institute for Solar System Research (MPS), the Technical University of Braunschweig and the Universities of Cologne and Mainz are all conducting experiments on board the orbiter or lander. The DLR Space Administration is using funds from the Federal Ministry of Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie; BMWi) to sponsor the participating German companies and scientists. The Philae lander has been financed by a consortium including DLR, MPS, the French space agency, CNES, and the Italian space agency, ASI. Overall responsibility for the Philae project rests with DLR, which is where the lander control centre is located.

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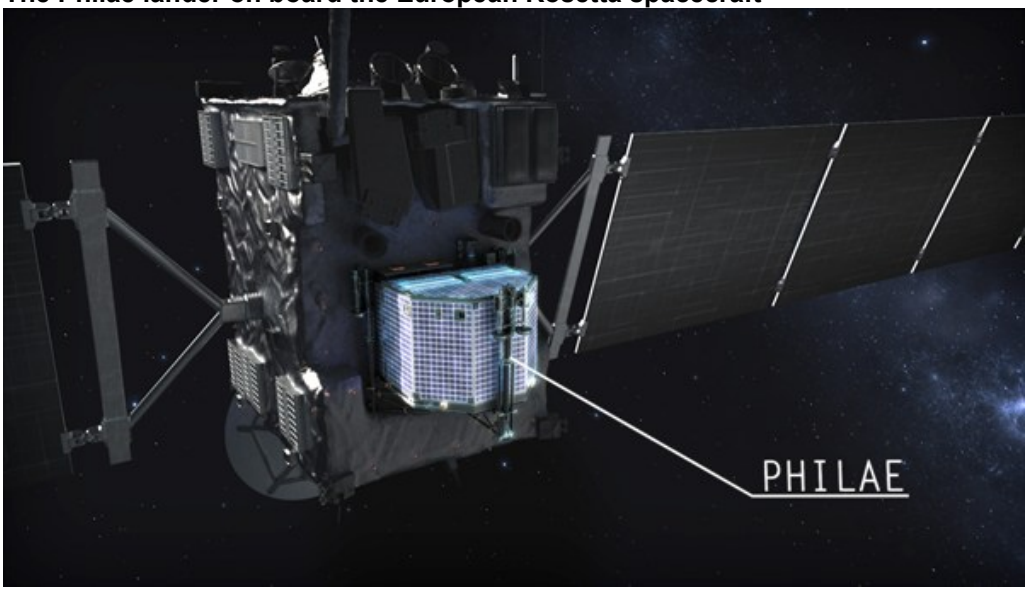
The Philae lander on board the European Rosetta spacecraft



Since its launch in 2004, Rosetta has been 'protecting' the small Philae lander from all the harsh conditions encountered in interplanetary space. (Frame from 'Chasing A Comet – The Rosetta Mission'.)

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Philae landing on comet

Artist’s impression of the Rosetta orbiter deploying the Philae lander to comet 67P/Churyumov–Gerasimenko (not to scale).

Credit: ESA–C. Carreau/ATG medialab.

Philae landing on the comet

In 2014, the Philae lander on board the European Rosetta spacecraft will reach comet 67P/ Churyumov-Gerasimenko. The goal of this first landing on a comet is to learn more about the formation of the Solar System.

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