



## Moles, crabs and Moon dust: DLR at the ILA Space Pavilion

24 August 2012

### **'Space for Earth': DLR researchers demonstrate 28 spectacular spaceflight subjects related to Earth**

Satellites with electric propulsion, a 'mole' for exploring the Martian subsurface, a mobile robot that moves sideways like a crab, a pinch of Moon dust and a hands-on medical experiment where test subjects can use their own bodies to understand the conditions to which the cardiovascular system is subjected during weightlessness; these and 23 other spaceflight subjects are being presented by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) in the Space Pavilion at the ILA Berlin Air Show 2012, the International Aerospace Exhibition (Internationale Luft- und Raumfahrtausstellung), from 11 to 16 September 2012.

Along with the European Space Agency (ESA), DLR is an institutional partner at the Space Pavilion in Hall 4, which will take place at the new ILA exhibition area in Berlin-Schönefeld. DLR's number of exhibits has increased from 17 to 28 since ILA 2010 - and so has the scope of themes. Under the title 'Space for Earth', the main focus is on spaceflight projects with particular Earth-related applications. In this regard, using highly accurate data acquired with the German TerraSAR-X and TanDEM-X Earth observation satellites, researchers from DLR's German Remote Sensing Data Center (Deutsches Fernerkundungsdatenzentrum; DFD) have generated a three-dimensional relief model of the Alps. In this way, multimedia technology helps to illustrate the significance of remote sensing data for geoscientific research and its applications. From this example visitors can gain a firm understanding of how climate change is affecting this unique ecosystem.

### **Autonomous lunar rover**

With ROboMObil, engineers at DLR's Robotics and Mechatronics Center (RMC) have developed an electromobility concept derived from planetary rover technology and robotics. 'ROMO' is as agile as a crab and can accommodate up to two passengers. It can travel in an oblique to sideways direction and turn 360 degrees on the spot. And, like the Asimov lunar rover also being exhibited in the Space Pavilion, ROMO can operate autonomously. One day it might deliver new Moon dust to Earth. In the Space Pavilion, DLR is exhibiting a small sample of Moon dust from the Soviet Luna 24 probe, which brought a total of 326 grams of the Moon back to the Earth in 1976.

### **Measuring heat flow on the Red Planet**

Besides the Moon, Mars is also prominently represented in the Space Pavilion. DLR scientists eagerly await NASA's InSight mission. InSight is scheduled for launch in 2016 and will reach Mars after a six-month flight. Once there, geophysical experiments are expected to give an 'insight' into the interior of the Red Planet. On board will be the HP<sup>3</sup> heat flow probe developed at the DLR, which will dig into the Martian surface to a depth of several metres, where it will carry out heat flow measurements to investigate the thermomechanical properties of the Martian crust. The electromechanical 'mole' will be on display in the Space Pavilion at ILA.

### **Weightlessness in parabolic flight**

In the 'ISS - International Space Station' area of the Space Pavilion, DLR space medicine researchers will literally be grabbing test subjects under the arm: anyone taking part in the tilt-table experiment can personally experience how - in principle - weightlessness affects the

cardiovascular system. Normally, this experiment is carried out during DLR's parabolic flights on board the Airbus A300 ZERO-G; 31 parabolas are flown in each parabolic flight campaign. This involves the aircraft climbing steeply upwards from horizontal flight, cutting the thrust of the turbines and hence flying in a parabola, where weightlessness prevails for around 22 seconds. In total such a campaign provides some 35 minutes of weightlessness - alternating between normal and double gravitational acceleration - which researchers can use for their experiments.

Furthermore, visitors to the Space Pavilion can learn how satellites influence our everyday lives in communication and navigation. DLR will also be demonstrating its research in detecting space debris, its expertise in rocket propulsion testing methods and more.

You can find all the DLR exhibits on show at the ILA Space Pavilion, with photos and background information, on DLR's ILA Berlin Air Show 2012 special website. DLR and ESA are also holding the second joint SpaceTweetup at ILA 2012.

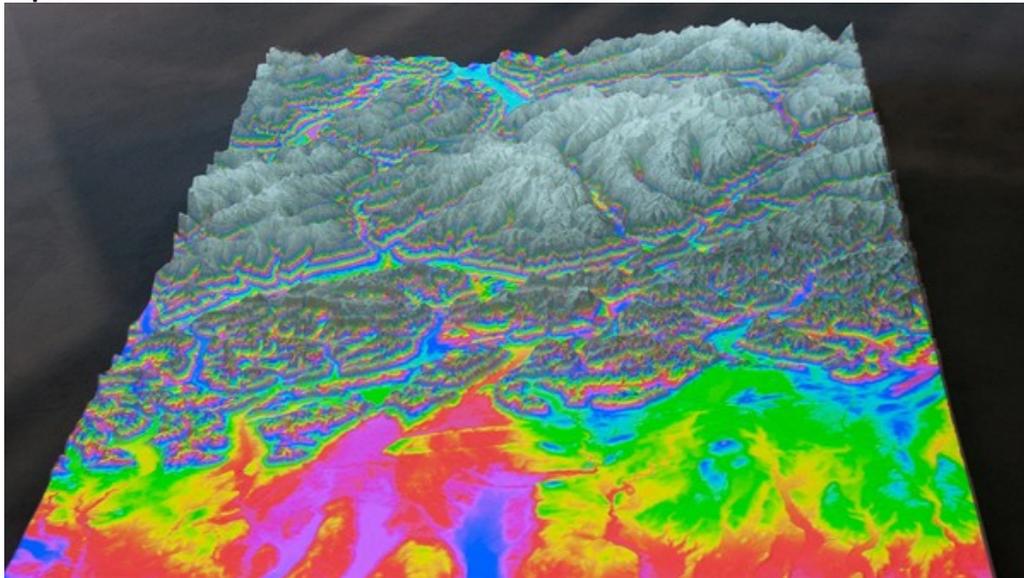
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## Relief projection showing the impact of climate change on the ecosystem of the Alps



Remote sensing data from Earth observation satellites are essential for many geoscientific questions. They document, for example, degrees of urbanisation and industrialisation, traffic loads, air pollution, and areas that are used for agriculture and forestry. Using the Alps as an example, DLR scientists illustrate the impact of climate change on this unique ecosystem.

Credit: DLR (CC-BY 3.0).

### **DLR's ROboMObil (ROMO)**



Developed by DLR, the RoboMobil (ROMO) embodies a two-seater electro-mobility concept derived from robotics and planetary rover technology.

Credit: DLR (CC-BY 3.0).

### **Autonomous Moon rover**



Developed in collaboration with partners, the Moon rover uses a drive technology developed by DLR as well as semi-global matching (SGM) environmental perception technology to explore its surrounding terrain autonomously.

Credit: DLR (CC-BY 3.0).

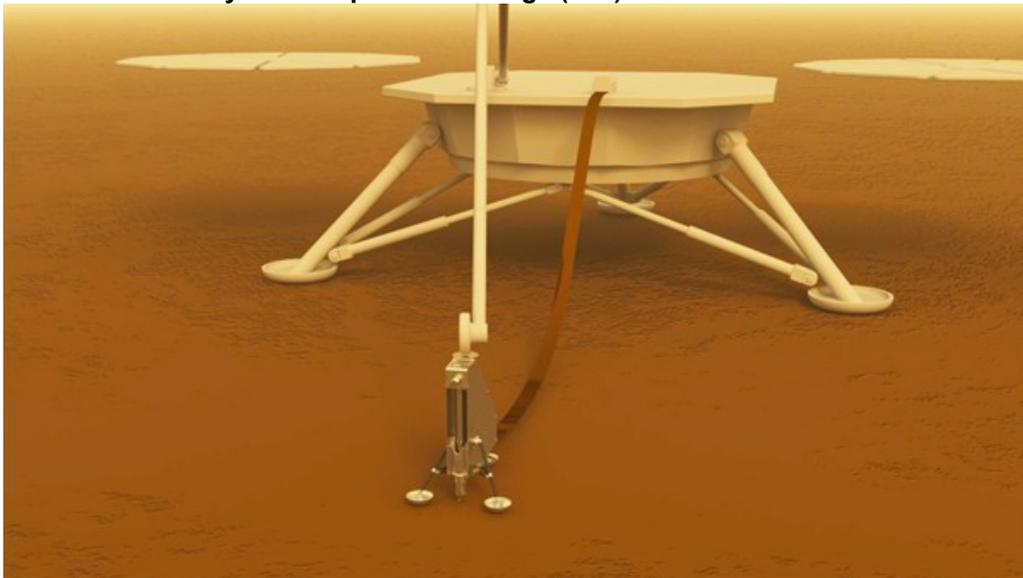
## Moon dust



Analyses of lunar rock and dust samples have yielded fundamental insights into the evolution of all bodies in the Solar System.

Credit: DLR (CC-BY 3.0).

## Heat Flow and Physical Properties Package (HP<sup>3</sup>)



DLR is developing the HP<sup>3</sup> (heat flow and physical properties package) probe. It will be the first probe after Apollo to measure the heat flow in the subsoil of a terrestrial body. HP<sup>3</sup> will be one of the experiments carried by the lander module of NASA's proposed InSight mission scheduled for launch in 2016.

Credit: DLR (CC-BY 3.0).

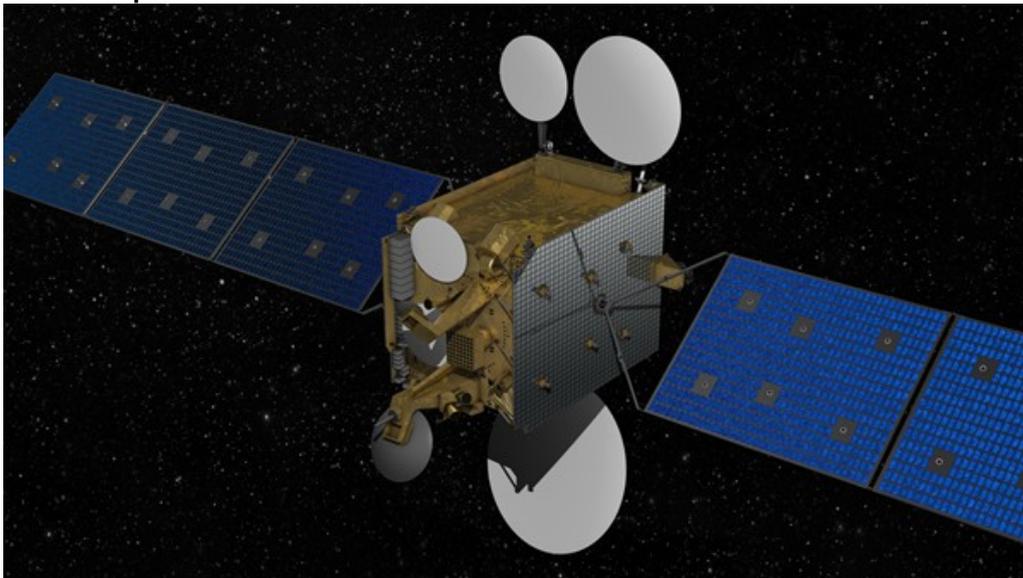
### Orthostasis experiment during a parabolic flight



On a parabolic flight DLR scientists have examined orthostasis under the gravity conditions prevailing on Mars and the Moon.

Credit: DLR (CC-BY 3.0).

### Artist's impression of Heinrich Hertz satellite



In the Heinrich Hertz satellite mission, new satellite payload, ground station, antenna, and satellite platform technologies will be tested for up to 15 years under the extreme conditions prevailing in a geostationary orbit, such as high radiation levels and extreme temperature fluctuations.

Credit: OHB System AG .

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