2014 – A successful year comes to an end

23 December 2014

2014 was an extraordinarily eventful and exciting year at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). The landing on comet 67P/Churyumov-Gerasimenko and the mission by German ESA astronaut Alexander Gerst were undisputed highlights. But the research conducted in other areas was extremely diverse, and sought to find answers to questions in the fields of aeronautics, aerospace, energy, transport and security. We have put together some of these research highlights in the DLR year in review. What makes it special this time are five faces of DLR: protagonists introducing themselves and their field of work.

//www.youtube.com/embed/lSD_SIDnxQ8?rel=0

Science in space, in the air and on the ground

Naturally, it was not possible for the film to include every topic. There are other important examples of DLR's research throughout 2014: for over 10 years now, using the HRSC camera on board Mars Express, scientists at DLR have been photographing and mapping Mars. Another DLR researcher experienced what it must be like to live on the Red Planet by spending four months in a habitat on Hawaii that simulated a Martian environment. This year it was also decided that the space telescope PLATO, scheduled to launch in 2024, will search for a 'second Earth'.

https://twitter.com/DLR_de/status/545598468459618306

Our fleet of research aircraft have been flying around the world. With HALO, scientists investigated the emergence of thunderclouds over the Amazon region, while the Falcon 20E was in California, cooperating with NASA to analyse the condensation trails left behind by biofuels. Additionally, DLR achieved another first: the first camera used to investigate the in-flight behaviour of propellers.

Back on terra firma, scientists engaged in research to create a green and innovative design for the mobility of tomorrow. For instance, the 'Next Generation Train' is engineered to source its energy from the track bed itself by means of induction. Meanwhile in Braunschweig, an entire city was spontaneously transformed into a test laboratory as part of the AIM project, designed to investigate individual stages along the way to vehicles with automatic driving capabilities. Transport researchers in the transport development and environment project showed how we can remain mobile in future without impacting negatively on the environment or the economy. The camera system Vabene++ will ensure we receive a clear aerial view of congestion on the road or during major events. It was already deployed during a catastrophe response exercise.

Development of solar energy

Researchers from the energy sector raised eyebrows with the first aircraft fuel produced using sunlight, water and carbon dioxide as part of the Solar-Jet project. The developers in the innovative solar tower concept CentRec, designed to make solar power plants more cost-effective and to facilitate energy storage, also exploited solar energy. Moreover, a study indicated that the power plant capacity currently available in south Germany might, under certain circumstances, not be able to satisfy peak load demand from 2018 forward. Over the next 30 years, more efficient and quieter gas turbines will be tested in the new high-pressure combustion chamber test rig HBK5 at the DLR site in Cologne.

The solar-powered aircraft Solar Impulse, which will circumnavigate the globe using only solar power sometime in the future, is yet another development that uses sunlight. DLR put this innovative lightweight aircraft through its paces in a rigorous series of static vibration tests. This concept, however, is not initially intended for use as a passenger airline. But in this area, among other things, DLR is conducting research into slower – and therefore substantially quieter – landing procedures as part of the HINVA project. A steering wheel for helicopters was also presented in Braunschweig in the autumn.

https://www.facebook.com/video.php?v=10152573650310784

Multitude of new projects

Together with a multitude of new projects, a number of names will continue to accompany us as we progress through 2015, among them the asteroid landing craft MASCOT on board the Japanese Hayabusa II spacecraft, or the research conducted with the flying observatory SOFIA, recently returned to California after six months of maintenance in Hamburg. Last but not least, although the last ATV was dispatched into space back in August, the technology developed for this purpose will remain in use as part of the new NASA spacecraft ORION.

So we have achieved plenty, and there is more on our plate. What remains now, dear readers, is to wish you all a happy and restful festive period and a good start in 2015.

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Alexander Gerst during his EVA outside the ISS

Selfie Alexander Gerst. The picture with the ‘Blue Dot’ in the background was taken during his EVA (extravehicular activity) on 7 October 2014.

Credit: ESA/NASA.

Welcome to comet 67P!

The Rosetta lander, Philae, landed on the surface of Comet 67P/Churyumov-Gerasimenko on 12 November 2014. This image was acquired by the CIVA camera system onboard the lander. On the left of the image, one of the three lander legs can be seen.

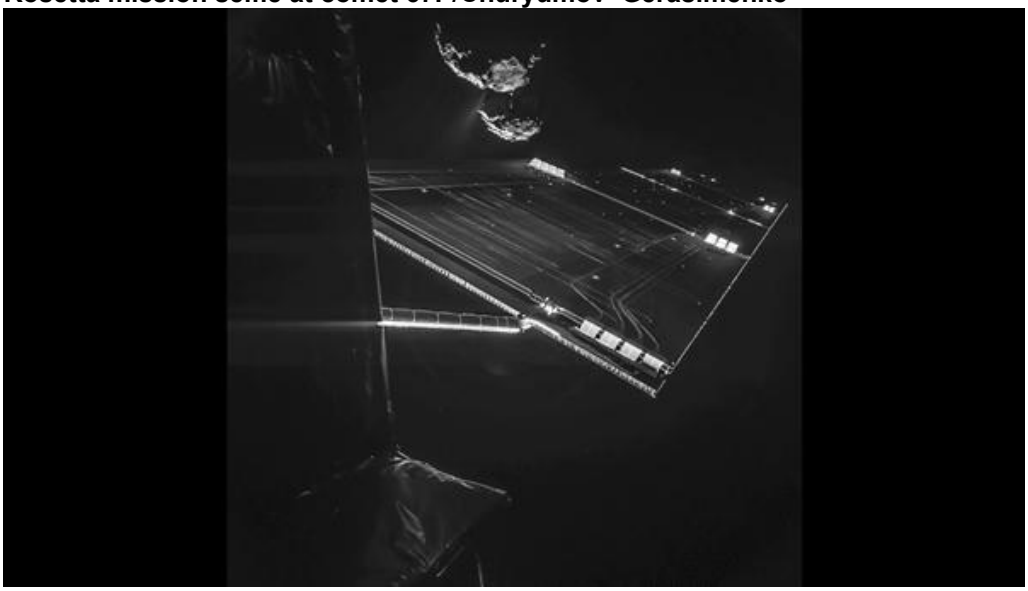
Credit: ESA/Rosetta/Philae/CIVA.

Flight in the Himalayas with new DLR camera system

In January 2014, a German team of pilots from the Mountain Wave Project (MWP) and scientists from the Institute of Optical Sensor Systems at DLR Berlin succeeded, for the first time, to fly along the highest mountain in the world, Mount Everest, with a motor glider. On board was a camera system specially developed for this expedition. It provides a highly accurate 3-D model of the Nepalese Everest region with a ground resolution of up to 15 centimetres.

Credit: DLR/Daniel Hein (CC-BY 3.0).

Rosetta mission selfie at comet 67P/Churyumov–Gerasimenko



The Rosetta orbiter took what is, doubtless, the most famous selfie of 2014. The image was acquired using the CIVA panoramic camera on board the Philae landing craft at a distance of 16 kilometres from the comet Churyumov-Gerasimenko.

Credit: ESA/Rosetta/Philae/CIVA.

View from the cockpit of HALO over the Amazon region

The ACRIDICON measurement flights lasted about seven hours. Among other things, the analyses included how clouds in clean rainforest air differ from those found over polluted and deforested regions. The image shows the nose boom of the HALO (High Altitude and LOng Range) research aircraft as it approaches a disintegrating storm.

Credit: DLR (CC-BY 3.0).

Centrifugal receiver CentRec

Ceramic particles measuring approximately one millimetre are heated to 1000 degrees Celsius in a radiation receiver developed for innovative solar tower power plants. Centrifugal forces in the revolving receiver keep the particles in the drum until they are hot enough to drive steam turbines in a power plant, to name one example.

Credit: DLR (CC-BY 3.0).

Contrail measurement in formation flight

Contrail measurement in formation flight. Scientists on board the DLR Falcon follow the DC-8 to measure the biofuel's contrail composition.

Credit: NASA.

Simulator center AVES (Air Vehicle Simulator)

The simulation center is home to a moving and a stationary simulator with an interchangeable cockpit.

Credit: DLR (CC-BY 3.0).

On Mars, yet in Hawaii

On Mars, yet in Hawaii. Lucie Poulet lived and worked in a Mars habitat on Hawaii for four months. Expeditions into the ‘outside world’ were also part of the simulated sojourn

Credit: DLR (CC-BY 3.0).

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