

[www.DLR.de/en](http://www.DLR.de/en)

# Overview of DLR Oberpfaffenhofen





# DLR

## Oberpfaffenhofen

DLR is Germany's national research center for aeronautics and space exploration. Its extensive research and development work in aeronautics, space exploration, energy and transport is integrated into national and international co-operations.

Beyond its own research, DLR as a space agency also plans and implements German space exploration activities on behalf of the Federal Government.

At the Oberpfaffenhofen site, DLR's research activities are concentrated on aeronautics and space exploration. The site is home to nine institutes and facilities employing approximately 1,600 people, and is equipped with a powerful infrastructure to support research operations. DLR Oberpfaffenhofen works closely with universities and research institutes in Germany and abroad, with the European space agency ESA and the American space agency NASA.





# History of DLR

DLR has been conducting research at Oberpfaffenhofen since 1937– initially under the name “Flugfunk Forschungsinstitut Oberpfaffenhofen (FFO)”. Research was halted at the outbreak of the Second World War; after the war, the buildings were used as barracks for military flight operations.

Research operations resumed in 1955, mainly in the field of aircraft radio. Additional office buildings were erected in the mid-1960s.

In 1969, the institute in Oberpfaffenhofen was expanded to include a space operations center. In the 1970s, Oberpfaffenhofen carried out various satellite missions in cooperation with NASA. NASA provided carrier rockets and flight paths, while the data from the first satellites were monitored and controlled from Oberpfaffenhofen, enabling DLR to gain initial experience of unmanned space expeditions. Since 1989, the site’s official name has been “DLR Oberpfaffenhofen”. Further research institutions were added and the significance of Oberpfaffenhofen as a location for research has increased steadily.



# Flight Experiments

DLR Flight Experiments with its two flight facilities is located in Oberpfaffenhofen and Braunschweig. The Oberpfaffenhofen flight facility operates special aircraft that are used for Earth observation, environmental and climate research.

Its cutting-edge measurement platforms such as HALO (High Altitude and Long Range Research Aircraft) are able to conduct research in the climate-relevant part of the atmosphere and up into the stratosphere. These aircraft are available for use both by DLR and by external teams of scientists around the world.

DLR Flight Experiments is tasked with planning and implementing research projects in collaboration with scientists. Experienced crews and logistics staff support the researchers in planning and executing flights, and obtain all necessary permits for the projects. The facility's engineers and technicians adapt and integrate the scientific instruments after testing and approving their impact on the airworthiness of the aircraft.

DLR Flight Experiments take a leading role in creating and coordinating a network of European research flight facilities.





# Institute of Atmospheric Physics

The Institute of Atmospheric Physics conducts research into the physics and chemistry of the troposphere and stratosphere from the polar regions to the tropics. It systematically examines and quantifies the most important mechanisms and changes in the atmosphere both on a regional and a global scale, using satellite data, Doppler-polarisation radar, wind and trace gas LIDAR systems, in-situ trace gas instruments, research aircraft (Falcon, HALO and others), global and regional climate-chemistry aerosol cloud models and mesoscale weather models.

The institute's research focuses on weather and climate processes that are of strategic importance to the further development of air transport: wake turbulence, weather information for efficient and safe air travel and the climate effects of emissions and condensation trails. In the field of space exploration, the Institute of Atmospheric Physics develops potential scientific uses of Earth observation missions and contributes significantly to shaping new missions and new LIDAR technologies through its work in atmospheric research and remote sensing. Research on transport aims to evaluate the effects of shipping, rail and road transport on the consistency of the atmosphere (air quality), on climate and noise exposure.



# Space Operations

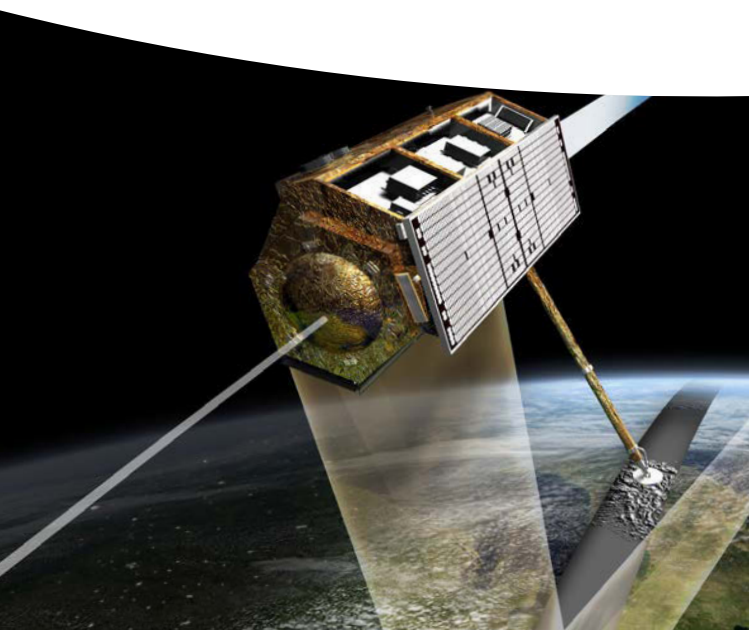
DLR Space Operations is Germany's central facility for carrying out space flight missions. The facility's responsibilities range from satellite missions for Earth observation, communication and reconnaissance to crewed missions and exploration flights into the planetary system.

The German Space Operations Center is responsible for preparing and carrying out space flight missions.

Scientific satellites are monitored and guided from a flexible and reliable multi-mission environment in the control center. Commercial and security-relevant satellite missions are also performed. With its numerous antennas, the affiliated ground station in Weilheim ensures the necessary data transmissions for all satellite missions.

In addition to the German Space Operations Center, the Mobile Rocket Base (MORABA) and joint astronaut training in Cologne form important parts of Space Operations' remit.

The Columbus Control Center, which oversees the safe and efficient operation of the European Columbus module on the International Space Station (ISS), is located in Oberpfaffenhofen.





# Microwaves and Radar Institute

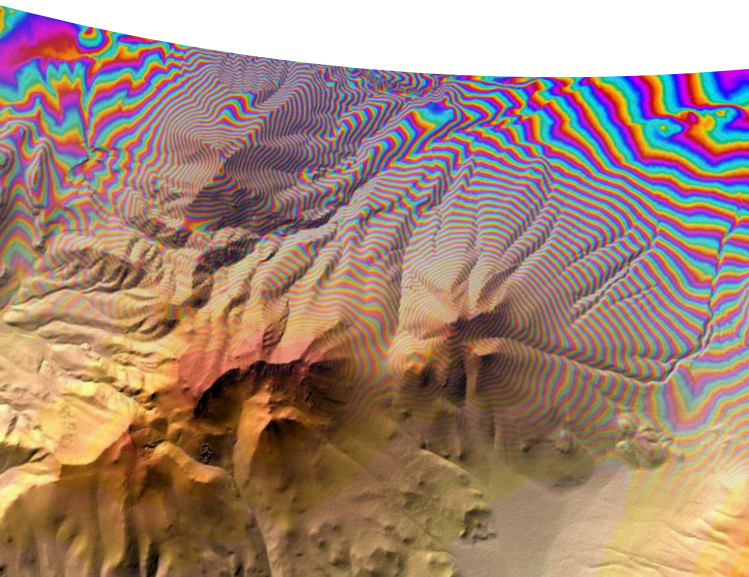
The Microwaves and Radar Institute conducts applied research in the field of microwave sensors and their use in remote Earth exploration. It focuses particularly on advancing the design and implementation of high-resolution imaging radar systems based on the Synthetic Aperture Radar (SAR) principle. Examples include developing and carrying out the TerraSAR-X and TanDEM-X satellite missions, and drawing up new mission recommendations such as Tandem-L. The institute acts as a mission manager for TerraSAR-X and TanDEM-X and is responsible for operating, calibrating and monitoring the performance of the radar instruments. The airborne SAR system (F-SAR) developed by the institute is used to experimentally test innovative radar methods and acquire data for a wide range of applications in numerous flight campaigns. The institute's research activities also include developing and operating microwave sensors and antennas, researching signatures and scatter mechanisms, and calibrating and validating radar data. These activities are brought together in the new TechLab building, which in addition to the various development laboratories also contains several powerful microwave measurement chambers such as the Compact Test Range. Important applications for the technologies developed at the institute are found mainly in the fields of environmental monitoring, hydrology, oceanography, glaciology, climate research, and security-relevant functions, but also in large-scale traffic monitoring.



# Remote Sensing Technology Institute

The Remote Sensing Technology Institute conducts research and development in the field of remote sensing technologies, focusing on procedures for extracting geo-information from remote sensing data. Together with the German Remote Sensing Data Center, it forms the Earth Observation Center (EOC) – the center of excellence for Earth observation in Germany. The institute's key topics include algorithms and processors for the German TerraSAR-X and TanDEM-X satellites, where SAR interferometry for generating digital elevation models and analysing movements is a key research area.

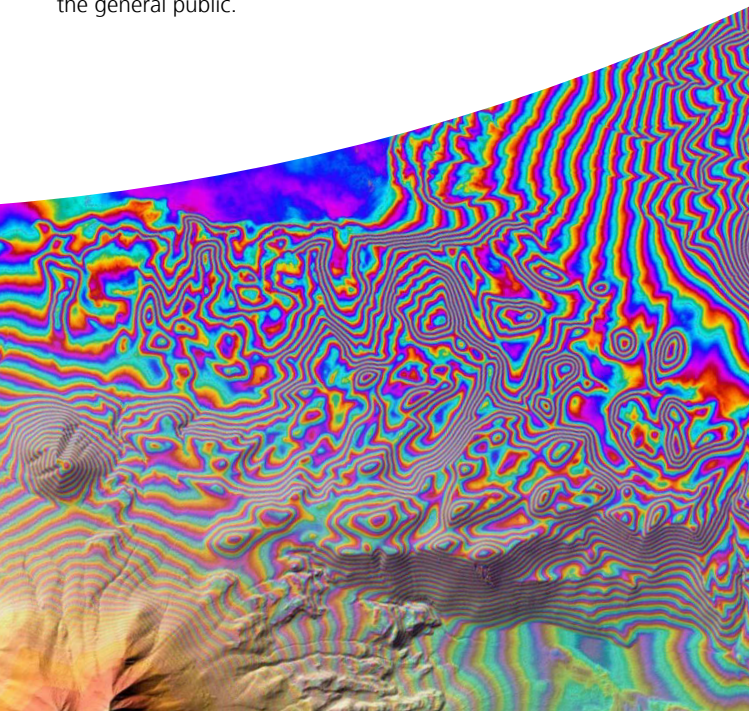
The institute also develops image analysis and photogrammetric methods to interpret high-resolution optical satellite image data, e.g. for 3-D mapping of urban areas and to automatically detect hidden information. Biological and ecological state variables of water bodies are derived from imaging spectrometer signals. A further key area is the development of software systems for determining atmospheric state variables, such as climate-relevant trace gases, from satellite data. In addition, the institute operates spectrometric laboratory facilities in the visual and infrared spectrum, calibrating the instruments and providing scientific support for applications.



# German Remote Sensing Data Center

The German Remote Sensing Data Center performs research, development and services relating to the use of data acquired via satellite- and aircraft-based Earth observation. The results are used both in research and for a wide range of applications in the geo- and environmental sciences, commercial uses and matters of civil security. A multi-mission ground segment integrates receiving, processing, archiving and provision of data from national and international Earth observation satellites. The German Remote Sensing Data Center maintains a network of receiving stations in Oberpfaffenhofen and Neustrelitz, in Antarctica, the Arctic and in Central America. Specific data and information management systems enable rapid utilisation of the data. In addition, the center is tasked with long-term archiving in the National Remote Sensing Data Library (NRSDL).

Application research is concentrated on land surface, urban areas, civil security, climate and atmosphere, and the development of information systems for environmental issues and use in civil disasters. Humanitarian aid campaigns following natural disasters are supported by the dedicated Center for Satellite-based Crisis Information (ZKI). On behalf of the International Council of Scientific Unions (ICSU) and the World Meteorological Organization (WMO), the German Remote Sensing Data Center operates a World Data Center for Remote Sensing of the Atmosphere (WDC-RSAT). A dedicated GeoVisualization Center presents its research results to the general public.



# Institute of Communications and Navigation

The Institute of Communications and Navigation designs new, mostly satellite-based systems and procedures for radio transmission and radio location. Key applications are found in aeronautics and transport.

In satellite communications, the institute develops additional areas of application and increases performance and cost efficiency through improved transmission methods and new system designs. In order to network satellites and aerial vehicles at extremely high data rates, the institute conducts research into optical transmission through the atmosphere. It is also designing the next generation of aircraft radio with complete networking of aircraft and ground control, to some extent also via satellites. The institute is involved in advancing the Galileo system and supports its development. A particular focus in the field of applications is on safety-critical issues such as navigation for landing aircraft or collision avoidance for ships and trains. In areas where positioning via satellite signals is difficult or even impossible, other signal sources must be used; these include inertial sensors, radio signals and even photographic images.



# Galileo Control Center

Galileo is the European satellite navigation system that will deliver precise positioning data worldwide.

DLR Gesellschaft für Raumfahrtanwendungen (GfR) mbH, a DLR company, operates the Galileo Control Center in Oberpfaffenhofen on behalf of the European Space Agency ESA.

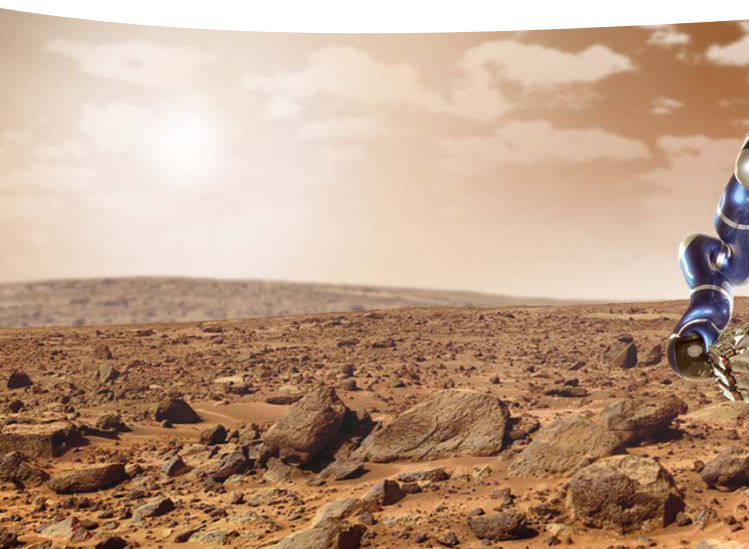
From this control center, up to 100 scientists and engineers cooperating with other European centers will ensure proper functioning of the Galileo constellation of 30 satellites and the associated 40 receiving stations around the world.

The control center is equipped with state-of-the-art infrastructure in order to meet the attendant high security and availability requirements. An ensemble of atomic clocks supplies the reference time by which the satellites are synchronised. High-precision trajectory calculation, monitoring of satellite functions and all ground systems will ensure fault-free operation over a period of 20 years.



# Robotics and Mechatronics Center

The fundamental remit of the Robotics and Mechatronics Center, located in Oberpfaffenhofen and Berlin, lies in mechatronics, i.e. the greatest possible integration of mechanics/optics, electronics and computer science (software) in order to create "intelligent mechanisms" up to and including robots that interact with their environment. The center's work is concentrated on modelling and implementing such systems and human-machine interfaces. The main objective of the center is to develop "robonauts" and planetary rovers to support humans in space (robot servicing and exploration). DLR lightweight robots and multi-fingered hands ranging all the way to mobile, two-armed JUSTIN have helped DLR's "soft robotics" concepts achieve worldwide recognition. In the field of planetary exploration the main focus is on developing autonomous rovers for use on the Moon and on Mars. Photorealistic 3-D world modelling using satellite- and aircraft-based cameras is flanked by the development of multispectral sensors and highly agile satellites in Berlin. Examples of technology transfer for terrestrial applications are the use of DLR lightweight robots as production assistants in vehicle assembly or the development of minimally invasive surgical robots. In addition, the center works intensively on modelling and developing mechatronic systems for aviation and vehicle technology. Synergy effects with work in the field of intelligent and cognitive control systems are increasingly coming to bear in the development of "flying robots" that are even able to manipulate from the air, and through the fusion of robotics and electromobility (with ROBOMOBIL as a demonstrator).





# Technology Marketing

Beyond its research in the key areas of aviation, space exploration, transport, energy and security, DLR also aims to serve the requirements of businesses and invests in cutting-edge technologies and solutions that can be used by all industries. In this field, DLR Technology Marketing sees itself as a broker for innovative DLR technologies and acts as a partner to industry in generating and implementing new product and service ideas on the market. DLR offers its skills to innovation-seeking companies for their direct use, reducing their development risks. Businesses from all industries can avail themselves of DLR's efficiency and expertise in research and development as a basis for new products and services. In DLR Technology Marketing companies will find a competent partner focused on catering to industrial requirements and providing central access to DLR research and development skills. The numerous spin-offs have been and remain a central tool for market access. As an ESA BIC, Anwendungszentrum Oberpfaffenhofen GmbH (AZO), of which DLR is a shareholder and which is headquartered in direct proximity to DLR, offers an incubation program.



# DLR\_School\_Lab

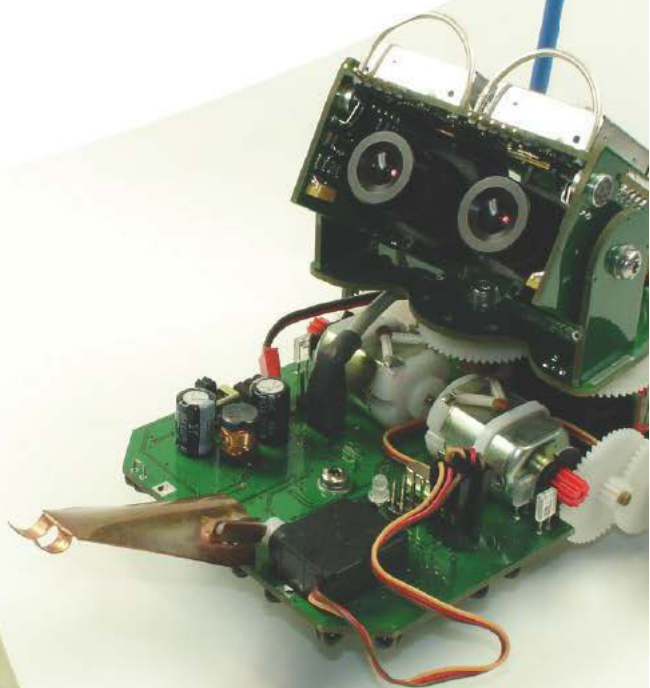
“Out of the classroom, into the lab!” is the motto of the DLR\_School\_Lab in Oberpfaffenhofen. Pupils from middle- and upper-level secondary education are given the opportunity to conduct experiments themselves in specially designed laboratories, and to experience science up close. Exciting experiments from aeronautics and space research offer young people informative insights into the content and methods of modern research work. The pupils can make use of high-tech sensors, rockets, robots, professional simulation software and even current satellite images. The youths are assisted by an experienced team of researchers and students of the natural and engineering sciences who answer questions relating to training and careers in science and research, but also on the day-to-day work of scientists and engineers. DLR\_School\_Lab also benefits teachers, who are shown new ways to make science accessible via research. They are prepared for their pupils’ visit to the School\_Lab and supported in integrating the experiences from the experiments conducted there into their lessons. In addition, this further training also offers them insights into the technological areas of expertise of the DLR research institutes in Oberpfaffenhofen.

**DLR\_School\_Lab**  
Oberpfaffenhofen



# DLR\_Graduate\_Program

The DLR\_Graduate\_Program is an attractive training program for employees completing their doctorate. It consists of carefully tailored support that teaches doctoral candidates important skills and knowledge – in addition to their work on the subject of their doctorate. The project is designed for a duration of three years and covers three modules: training measures by the institutes and a cross-institutional training and development program. The DLR\_Graduate\_Program helps doctoral candidates make the most effective use of their doctoral period; in addition, these newly acquired skills also provide a solid foundation for their further careers.



# Contacts

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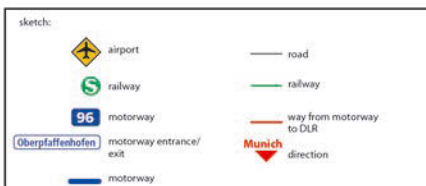
# Location and transport links

The Oberpfaffenhofen site is approximately 25 kilometres west of Munich on the Munich-Lindau motorway (A96). There are several ways of getting to DLR:

By car: Motorway Munich-Lindau A 96; exit 32, Oberpfaffenhofen. Turn left towards Herrsching/Oberpfaffenhofen/Weßling at the motorway exit traffic lights. You will see the turnoff for DLR after approximately 800 m on your left.

By train: Train to München-Pasing or München-Hauptbahnhof (Hbf). There, take S-Bahn S8 for Herrsching as far as Neugilching or Weßling. You can walk to DLR from there (approx. 2.5 km from either station).

By plane: From Munich Airport ([www.munich-airport.de](http://www.munich-airport.de)) take S-Bahn S8 for Herrsching as far as Neugilching or Weßling. You can walk to DLR from there (approx. 2.5 km from either station).



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Approximately 7,000 people work for DLR at 16 locations: Augsburg, Berlin, Bonn, Braunschweig, Bremen, Cologne (headquarters), Göttingen, Hamburg, Jülich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen and Weilheim. DLR also has offices in Brussels, Paris and Washington, D.C.



**DLR**

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