Close collaboration in optical communication between space and Earth

16 April 2014

An exchange of knowledge and scientists across borders, joint research projects and workshops – with the signing of a Memorandum of Understanding on 16 April 2014, the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and the Japanese National Institute of Information and Communications Technology (NICT) are strengthening their cooperation in the crucial research area of optical satellite-Earth communication. "NICT is not an unknown partner to us, and we are delighted that the already existing collaboration will become even stronger in the future," stated DLR Executive Board Chairman Johann-Dietrich Wörner.

In 2006 and 2009, the DLR Institute of Communications and Navigation, JAXA and NICT collaborated in Project KIODO. Within the project, they executed optical downlink experiments with JAXA's Kirari satellite to measure and assess the influence of the atmosphere on data transfer. This collaboration will be extended to continue the exploration of optical data transfer.

The future of data transfer

The two research institutes already have infrastructure and expertise in this area. DLR operates both a stationary and a transportable optical ground station for laser communication with satellites and NICT has an optical ground station in Tokyo. Both institutes are currently conducting experiments for space missions; the Institute of Communications and Navigation is working with the University of Stuttgart and the DLR Institute of Optical Sensor Systems to develop OSIRIS (the Optical Space Infrared Downlink System), an experimental optical system for small satellites. The suitability of the system for use in space will be tested on board the Flying Laptop (University of Stuttgart) and BIROS (DLR) satellites. Meanwhile, Japanese colleagues are working on SOTA (Small Optical Transponder), an optical communication terminal with the same objectives as DLR's undertaking. Under the Memorandum of Understanding, the two partners will, for example, both receive data acquired by their partner's experiment in space at their ground stations.

"The high data rate achievable using optical communication systems will increasingly make them the method of choice for intersatellite and ground station-satellite communication," explains Christian Fuchs from the DLR Institute of Communications and Navigation. Cameras and sensors on board Earth observation satellites are consistently becoming more powerful. Similarly, communication systems are required to have the capability of sending all the data acquired back to Earth. Optical data transfer systems can relieve the capacity bottleneck that arises as a result. They enable very high data rates compared to conventional radio systems, are power-efficient and are not subjected to any frequency regulations. The collaboration between the two research institutes is expected to promote the research and application of this technology.

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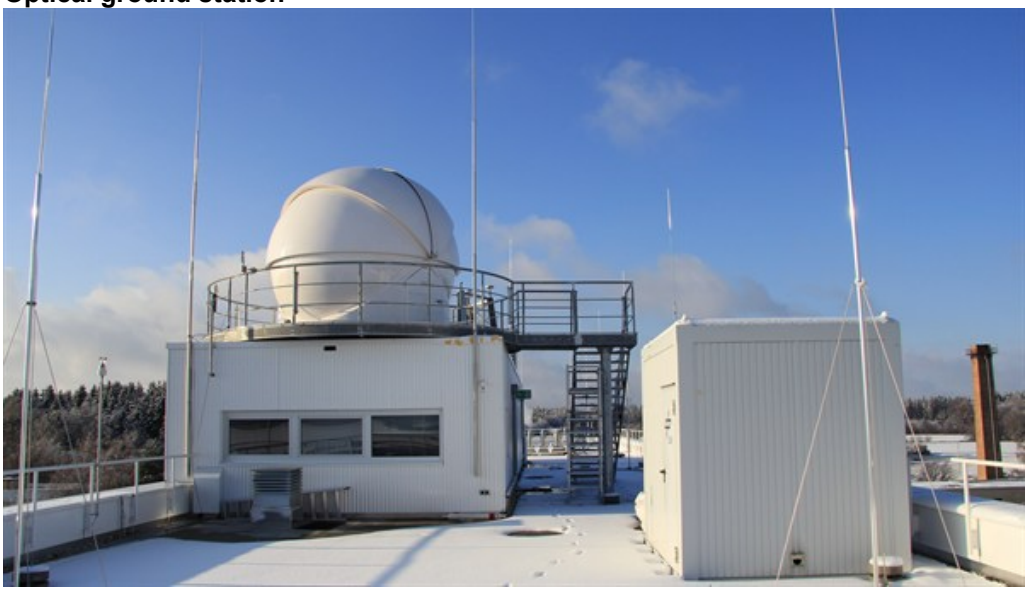
Optical ground station



The German Aerospace Center (DLR) operates both a fixed and a portable optical ground station for laser communications with satellites.

Credit: DLR (CC-BY 3.0).

Close cooperation in the field of optical communications

Signing the Memorandum of Understanding between the German Aerospace Center (DLR) and the Japanese National Institute of Information and Communications Technology (NICT). From left to right: Hansjörg Dittus, DLR Executive Board Member for Space Research and Technology, Johann-Dietrich Wörner, Chairman of the DLR Executive Board, and Masao Sakauchi, President of NICT.

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