SOFIA explores the southern sky over New Zealand

18 July 2013

For the first time, SOFIA – the Stratospheric Observatory for Infrared Astronomy, has been deployed to the southern hemisphere. Based at the airport in Christchurch, New Zealand for three weeks, SOFIA will study celestial objects that are uniquely observable on southern flight routes. On the morning of 18 July New Zealand time, SOFIA landed after the first of its nine planned science flights, which included studies of the Magellanic Clouds, neighbours to the Milky Way galaxy, and of the circumnuclear disk orbiting the black hole in the centre of our galaxy.

As a joint project between NASA and the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), SOFIA carries a telescope with an effective diameter of 2.5 metres in a modified Boeing 747SP aircraft, making it the world's largest airborne observatory. SOFIA flies at altitudes as high as 13,700 meters (45,000 feet) to provide access to astronomical signals at far-infrared wavelengths that would otherwise be blocked due to absorption by water vapour in the atmosphere.

A crew of about 60 scientists, technicians and engineers from the United States and Germany, as well as two shifts of NASA pilots will operate SOFIA while in New Zealand.

The GREAT (German Receiver for Astronomy at Terahertz Frequencies) far-infrared spectrometer will be mounted on the telescope during the entire deployment.

"The more than 30 publications of scientific results from the first observing campaigns in 2011 in the northern hemisphere with SOFIA's first generation of instruments, GREAT and FORCAST, have already demonstrated the tremendous scientific potential of this observatory," said Alois Himmes, DLR's SOFIA programme manager. "The current (and future) deployments to New Zealand will expand this potential substantially," he added.

On 12 July, the aircraft flew from its home base in Palmdale, California, via Hawaii, to New Zealand, where it will be based until 2 August. The scientific targets for the southern deployment of SOFIA include the Large and Small Magellanic Clouds, as well as objects in the central regions of the Milky Way. The Magellanic Clouds, dwarf galaxies in the close neighbourhood of our galaxy, are easily visible with the naked eye in the southern sky (image 2, they are named after explorer Ferdinand Magellan, one of the first Europeans to report seeing them). Their relative proximity allows the detailed investigation of stellar life cycles, from protostars to supernova remnants. Sites of prominent star formation will be studied during the deployment – regions that are well known from optical studies, but barely explored at far-infrared wavelengths. For a number of science objectives the telescope will be pointing at the centre of the Milky Way, which is much more accessible from the southern hemisphere than from the northern hemisphere.

The Deutsches SOFIA Institut (DSI) of the University of Stuttgart manages the German contributions to SOFIA's mission operations. A crew of 13 DSI personnel will support the observatory's first southern deployment with their expertise regarding the instrument.

"We plan to conduct up to three scientific flights per week," explained Holger Jakob, head of the German telescope team. "Thus, we will be quite busy during the deployment."

The high spectral resolving power of the GREAT instrument is designed for studies of the interstellar gas and stellar life cycle, from a protostar's early embryonic phase when still embedded in its parental cloud, to an evolved star’s death when the stellar envelope is ejected back into space.

"With GREAT, we want to explore new frontiers, such as the Magellanic Clouds and embedded Tarantula nebula the most active starburst known in the Local Group of Galaxies, which also includes the Milky Way and about 50 more galaxies," said Rolf Güsten of the Max Planck Institute for Radio Astronomy (MPIfR), leader of the group of German researchers who developed GREAT.

"SOFIA's deployment to the southern hemisphere shows the remarkable versatility of this observatory, the product of years of fruitful collaboration and cooperation between the U.S. and German space agencies," said Paul Hertz, director of NASA's Astrophysics Division. He added: "This is just the first of a series of SOFIA scientific deployments envisioned over the course of the observatory's planned 20-year lifetime."

SOFIA

SOFIA, the Stratospheric Observatory for Infrared Astronomy, is a joint project of the National Aeronautics and Space Administration (NASA) and the Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR; German Aerospace Center, grant: 50OK0901). The German component of the SOFIA project is being carried out under the auspices of DLR, with funds provided by the Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi) under a resolution passed by the German Federal Parliament, and with funding from the State of Baden-Württemberg and the University of Stuttgart. Scientific operations are coordinated by the German SOFIA Institute (DSI) at the University of Stuttgart and the Universities Space Research Association (USRA) headquartered in Columbia, Maryland, USA.

GREAT

GREAT, the German Receiver for Astronomy at Terahertz Frequencies is a receiver for spectroscopic observations in the far infrared spectral regime at frequencies between 1.25 and 5 terahertz (wavelengths of 60 to 220 microns), which are not accessible from the ground due to absorption by water vapour in the atmosphere. GREAT is a first-generation German SOFIA instrument, developed and maintained by the Max Planck Institute for Radio Astronomy (MPIfR) and KOSMA at the University of Cologne, in collaboration with the Max Planck Institute for Solar System Research and the DLR Institute of Planetary Research. Rolf Güsten (MPIfR) is the principal investigator for GREAT. The development of the instrument was financed by the participating institutes, the Max Planck Society and the German Research Foundation (Deutsche Forschungsgemeinschaft; DFG).

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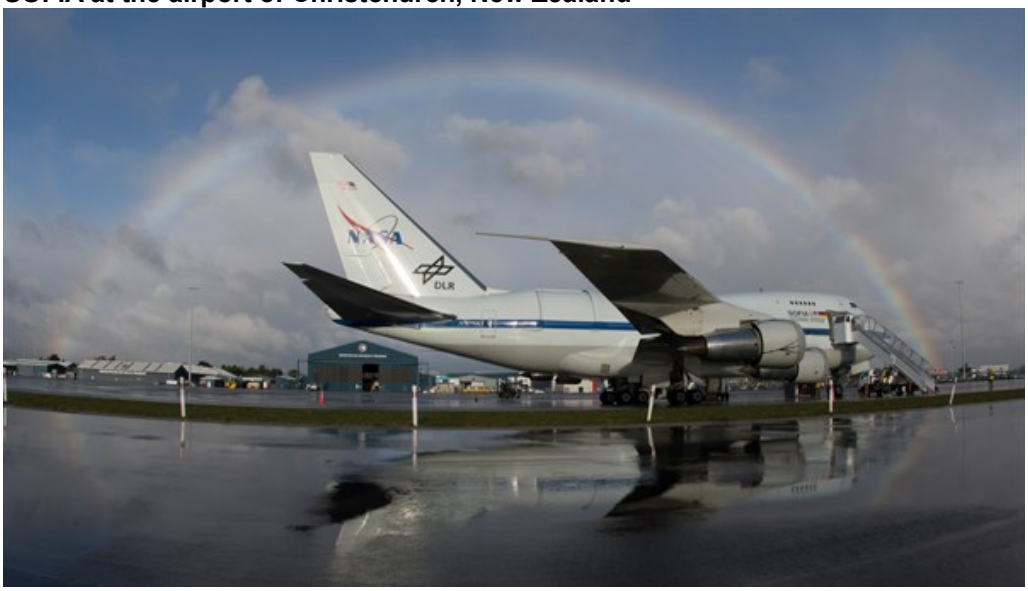
SOFIA at the airport of Christchurch, New Zealand



SOFIA, the Stratospheric Observatory for Infrared Astronomy, has been deployed to a base at Christchurch, New Zealand, for a series of science flights to observe astronomical targets in the southern sky. From 17 July until 2 August 2013, SOFIA will study celestial objects that are uniquely observable on southern flight routes.

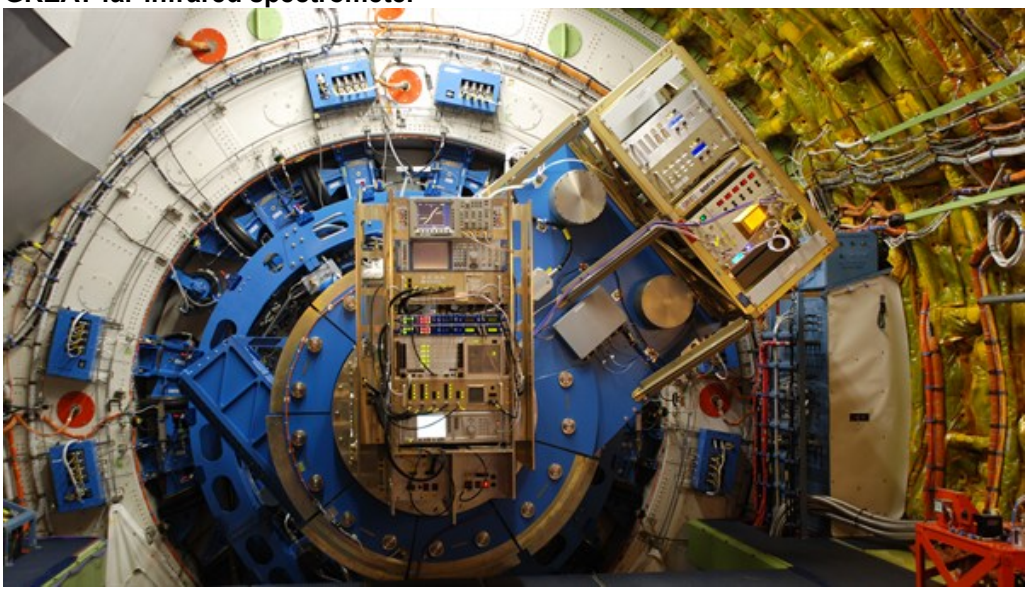
Credit: NASA/C. Thomas.

The two Magellanic Clouds

Some targets for astronomical investigations are only visible from Earth's southern hemisphere. This photo of the southern sky, taken at Cerro Paranal in the Chilean Atacama Desert, shows a total of three galaxies – stars and gas from the inner Milky Way and the two Magellanic Clouds. The Large and Small Magellanic Clouds, two dwarf galaxies accompanying the Milky Way, are both targets of the first science flights of SOFIA starting from Christchurch, New Zealand.

Credit: ESO/Y. Beletsky.

GREAT far-infrared spectrometer



The GREAT far-infrared spectrometer (gold vertical structure in the foreground) is mounted on SOFIA's telescope during the observatory's first southern hemisphere deployment.

Credit: NASA/GREAT Consortium/R. Güsten.

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