News Archive Space 2010

'First light' as SOFIA completes observation flight

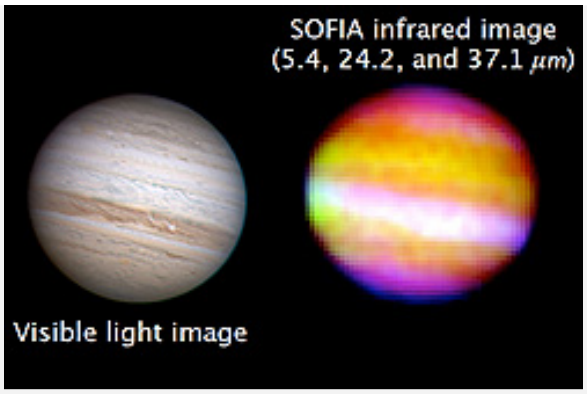
28 May 2010

Galaxy M82 and Jupiter imaged

The Stratospheric Observatory For Infrared Astronomy, SOFIA

The German-American Stratospheric Observatory for Infrared Astronomy, SOFIA, completed an important milestone by achieving 'first light' when it performed its first observations during the night between 25 and 26 May 2010. SOFIA is the only airborne observatory in the world, operated jointly by NASA and the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). The observatory carried out observations of astronomical objects at infrared wavelengths in flight.

First Light



Jupiter in the optical and, as seen by SOFIA, in the infrared

The modified Boeing 747SP houses a 2.5-metre reflecting telescope built in Germany under DLR management. The aircraft took off at 21:45 local time from its home base, the NASA Dryden Aircraft Operations Facility in Palmdale, California. During a eight-hour flight that reached 11,000 metres in altitude, the 18-person crew of scientists, engineers and technicians tested the telescope's performance to its limits and took the first infrared images of test objects in the night sky.

The crowning achievement of the night: scientists recorded images of the Messier 82 (M82) galaxy and of Jupiter, at wavelengths unobservable by ground- or space-based telescopes. The composite image of Jupiter shows heat pouring out of the planet's interior through holes in its clouds. In the infrared image of M82, it is possible to look through the galaxy's interstellar dust clouds to show several 'starburst' knots in which stars are forming by the tens of thousands. "It's tremendous for me personally to see these images; this feels like the culmination of my career," said USRA SOFIA Chief Science Advisor Eric Becklin. Becklin led the team that wrote the original proposal to NASA for the development and operation of SOFIA, and performed some of the first infrared observations of planets and galaxies in the 1960s.

Flying observatory

Infrared image of the galaxy M82 acquired during SOFIA's first light flight

"SOFIA combines the effectiveness of satellite-based telescopes with the relatively easy maintenance of ground-based observatories," said Alois Himmes, SOFIA Project Manager at DLR, summing up its advantages. "SOFIA is comparable to a space observatory that comes home every morning," explained Himmes. "At its maximum observation ceiling, SOFIA is above more than 99 percent of the water vapour in Earth's atmosphere, and so can receive a large part of cosmic infrared radiation which is otherwise absorbed by Earth's atmosphere," added Paul Hertz, programme scientist at NASA.

The team that carried out the first light observations consisted of an international crew from NASA, the Universities Space Research Association (USRA) and the German SOFIA Institute (Deutsches SOFIA Institut; DSI). Also on board were Terry Herter and his colleagues from Cornell University in Ithaca, New York. They operated their Faint Object InfraRed CAmera for the SOFIA Telescope, FORCAST, for this first in-flight observation. "With FORCAST, within minutes, we can make observations that are either impossible from the surface of the Earth or can be obtained only after many hours of exposure," said Herter.

US-German cooperation

The telescope itself has exceeded expectations. "The image stability and precision of the telescope alignment, which can only be obtained through extensive control engineering, has met all our targets and even exceeded them in some respects. This is exceptional performance, especially when you recall that these astronomical observations have been made with a huge telescope mounted in an aircraft flying at 800 kilometres per hour," pointed Thomas Keilig, from DSI, SOFIA Telescope Assembly and SI Integration Manager, responsible for testing the telescope.

Made in Germany: the 2.5-metre infrared telescope in the fuselage of the Boeing 747SP

"A preliminary examination of the first light data shows that the images are in fact sharp enough to enable cutting-edge astronomy. Now at last, the fun begins," said Alfred Krabbe, Director and scientific head of DSI. USRA and DSI direct the scientific operation of SOFIA on behalf of NASA and DLR.

Project duration 20 years

For Bob Meyer, the SOFIA programme manager at NASA, this successful first light flight is "the reward of many years of hard work. Hundreds of motivated and dedicated people have contributed to providing the international scientific community with this fantastic observation platform."

As its crowning achievement for the night, FORCAST acquired an image of Jupiter at a wavelength of 40 micrometers. For Earth-bound telescopes – even those on the highest mountaintops – such data is totally inaccessible. The image obtained with SOFIA shows the heat trapped within the planet since its birth, only escaping through gaps in its cloud cover. "For me personally, this is a dream come true after a wait of nearly 25 years," beams Hans-Peter Röser, Director of the Institute of Space Systems at the University of Stuttgart, where DSI is located. He has promoted German-American cooperation with SOFIA since 1985.

"This is an enormous step towards spectroscopic observations of the cold universe," added DSI Director Alfred Krabbe. "We are now awaiting forthcoming observations with GREAT, the German infrared spectrometer, under the leadership of Rolf Güsten at the Max Planck Institute for Radio Astronomy in Bonn." GREAT is the German REceiver for Astronomy at Terahertz Frequencies.

SOFIA over the NASA Dryden Aircraft Operations Facility in Palmdale

Erick Young, SOFIA Science Mission Operations Director at USRA, added, "SOFIA's first light heralds a new era of astronomical discoveries. We stand at the threshold of a 20-year period of unprecedented infrared observations that will significantly expand our knowledge of the Universe."

About SOFIA

SOFIA, the 'Stratospheric Observatory for Infrared Astronomy' is a joint project of the Deutsches Zentrum für Luft- und Raumfahrt e.V. (German Aerospace Center; DLR, grant: 50OK0901) and the National Aeronautics and Space Administration (NASA). It is funded on behalf of DLR by the German Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi) on the basis of legislation by the German Parliament of the state of Baden-Württemberg and the Universität Stuttgart. Scientific operation for Germany is coordinated by the German SOFIA-Institute (DSI) of the Universität Stuttgart, in the USA by the Universities Space Research Association (USRA). The development of the German Instruments is financed by the Max Planck Society (Max-Planck-Gesellschaft; MPG) and the German Research Foundation (Deutsche Forschungsgemeinschaft; DFG).

Related Contacts

Henning Krause
German Aerospace Center
Corporate Communications
Tel: +49 2203 601-2502
Fax: +49 2203 601-3249
E-Mail: henning.krause@dlr.de

Alois Himmes
German Aerospace Center
Space Administration, Space Science
Tel: +49 228 447-346
Fax: +49 228 447-745
E-Mail: Alois.Himmes@dlr.de

Dr Dörte Mehlert
German SOFIA Institute
Education and Public Relations
Tel: +49 711 685-69632
Fax: +49 711 685-63596
E-Mail: mehlert@dsi.uni-stuttgart.de

Contact details for image and video enquiries as well as information regarding DLR's terms of use can be found on the DLR portal imprint.