

National Aeronautics and Space Administration



The Dryden X-Press

Xtra



A GREAT Mission

German-built instrument collects first science on the
Stratospheric Observatory for Infrared Astronomy

Astronomy moves forward on the SOFIA

On April 6, the Stratospheric Observatory for Infrared Astronomy, or SOFIA, completed the first science flight on which the German Receiver for Astronomy at Terahertz Frequencies – GREAT – scientific instrument was used. The GREAT instrument is a high-resolution, far-infrared spectrometer that divides and sorts light into component colors for detailed analysis.

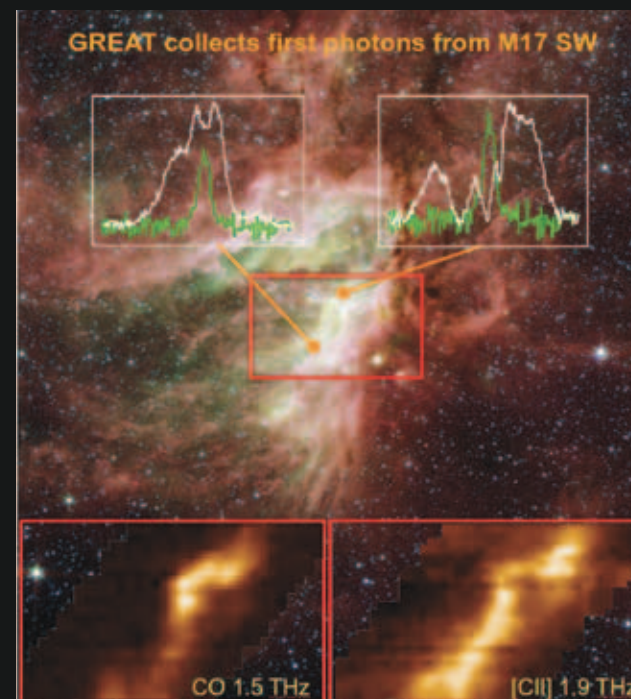
NASA's SOFIA is the only operational airborne observatory currently in use. It is operated through a joint program between NASA and the German Aerospace Center DLR. The observatory is a heavily modified Boeing 747SP aircraft carrying a reflecting telescope with an effective diameter of 100 inches. Flying at altitudes between 39,000 and 45,000 feet, above water vapor in Earth's lower atmosphere that blocks most infrared

radiation from celestial sources, the SOFIA is used to conduct astronomy research not possible with ground-based telescopes.

"SOFIA's on-board crew seamlessly combined scientists, engineers and technicians from the U.S. and Germany, working together on an observatory developed in the U.S., using a telescope and instrument built in Germany, to gather data of great interest to the entire world's scientific community," said Bob Meyer, NASA's SOFIA program manager at Dryden Flight Research Center, Edwards, Calif.

Rolf Guesten, GREAT principal investigator at the Max Planck Institute for Radio Astronomy in Bonn, Germany, and his team conducted

See First Science, page 4



Spectra image courtesy the GREAT team/NASA/DLR/USRA/DSI
Background infrared image courtesy NSA/JPL-Caltech/Spitzer

The image shows high-resolution far-infrared spectra of the nebula Messier 17, or M17, obtained with the GREAT spectrometer and the SOFIA on the night of April 5-6. The image is superimposed on a Spitzer infrared image. The white spectra are singly ionized carbon, or CII, and the green spectra are carbon monoxide, or CO.



ED11-0030-65

NASA Photo by Tom Tschida

Tom Roellig, NASA's SOFIA deputy project scientist, works during initial checkout of the GREAT spectrometer on the SOFIA. On the cover, ED11-0030-67, and, at left, ED11-0030-52, are images of the SOFIA taken by NASA photographer Tom Tschida during nighttime operations prior to flying a mission with the GREAT instrument installed on the airborne observatory.



ED11-0030-43

NASA Photo by Tom Tschida

Above, GREAT principal investigator Rolf Guesten, left, and GREAT team member Urs Graf, senior scientist at the University of Cologne, Germany, discuss preparations for SOFIA flights to be made with the instrument.

First Science ... from page 2

observations high above the central and western United States during the night of April 5-6 with the instrument installed on the SOFIA telescope.

Among their targets were IC 342, a spiral galaxy located 11 million light-years from Earth in the constellation Camelopardalis ("The Giraffe"), and the Omega Nebula (known as M17), 5,000 light-years away in Sagittarius. The team captured and analyzed radiation from ionized carbon atoms and carbon monoxide molecules to probe the chemical reactions, motions of matter and flows of energy occurring in interstellar clouds. Astronomers have evidence such clouds in both IC 342 and M17 are forming into massive numbers of stars.

"These first spectra are the reward for the many years of work creating this technology, and underline the scientific potential of airborne far-infrared spectroscopy," Guesten said.

The GREAT was focused on strong far-infrared emission from interstellar clouds, which cools the clouds' interiors. The balance between heating and cooling processes regulates the temperature of the interstellar material and controls initial conditions for formation of new stars.

"These observations give us unique information about the physical processes and chemical conditions in the stellar nurseries," said Juergen Stutzki, a co-investigator on the GREAT team. "SOFIA will give us new and deep insight into how stars form."

The GREAT was developed by the Max Planck Institute for Radio Astronomy and the University of Cologne in collaboration with the Max Planck Institute for Solar System Research and the DLR Institute of Planetary Research. It is one of two first-generation German SOFIA scientific instruments.

"This first science flight with a German instrument is a huge milestone for the SOFIA," said John Gagosian, SOFIA program executive at NASA Headquarters in Washington. "GREAT, in combination with SOFIA's other German- and U.S.-developed instruments, demonstrates SOFIA's extraordinary versatility, allowing it to play a unique and essential role alongside the Spitzer and Herschel spacecraft."

SOFIA science and mission operations are managed at NASA Ames Research Center at Moffett Field, Calif., in cooperation with the Universities Space Research Association, headquartered in Columbia, Md., and the German SOFIA Institute at the University of Stuttgart, Germany. The SOFIA is based and managed at Dryden's Aircraft Operations Facility in Palmdale, Calif.

For more information about the SOFIA, visit <http://www.nasa.gov/sofia>.

Information about the SOFIA science mission is available at <http://www.sofia.usra.edu> or <http://www.dlr.de/en/sofia>.



ED1-0030-46

NASA Photo by Tom Tschida

Above, Sybil Adams, USRA mission operations specialist; Karen Savage, center, USRA science software test engineer; and Holger Jakob, DSI telescope software engineer, collaborate aboard the aircraft. *Below*, prior to its first use on a science-gathering mission, technicians prepare the GREAT instrument for mounting on the SOFIA telescope and for initial tests.



ED11-0019-105

NASA Photo by Tom Tschida

X-tra is published for civil servants, contractors and retirees of the Dryden Flight Research Center and the center's partners and civil customers.

Address: P.O. Box 273,
Building 4839
Edwards, Calif. 93523-0273
Phone: 661-276-3449
FAX: 661-276-3566

Editor: Jay Levine, Tybrin, ext. 3459

Assistant Editor: Sarah Merlin, Tybrin, ext. 2128

Managing Editor: Steve Lighthill, NASA

Chief, Strategic Communications: John R. O'Shea