Airborne observatory SOFIA returns to California

15 December 2014

Looking almost brand-new, the Stratospheric Observatory for Infrared Astronomy (SOFIA) set off from Hamburg, destined for its home base at the Armstrong Flight Research Center in in Palmdale, California, at 13:16 CET on 14 December 2014 after its five and a half month visit. It landed in Palmdale at 15:20 local time (00:20 on 15 December, CET) after an 11-hour flight. Since arriving in Hamburg on 28 June, the modified Boeing 747SP, operated jointly by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and the US space agency NASA, has undergone an extensive overhaul conducted by Lufthansa Technik. Besides the 37-year-old aircraft itself, servicing also included the 17-ton telescope with a mirror diameter of approximately 2.7 metres that is installed on board SOFIA.

"This means that DLR has provided part of its 20 percent contribution to the operation of the observatory, as agreed with NASA," explained Gerd Gruppe, DLR Executive Board Member responsible for the Space Administration, when saying farewell to SOFIA at Lufthansa Technik in Hamburg. "DLR considers participation in SOFIA to be an important component of its ongoing exploration of the Universe. Over recent decades, German scientists have played a crucial role in developing observation instruments for the infrared part of the spectrum. In this way, they contributed to the immense successes of the ESA missions ISO (Infrared Space Observatory) in the mid-1990s and also Herschel between 2009 and 2013," Gruppe added. SOFIA is now – and will remain for the foreseeable future – the only infrared observatory that will permit this research to continue.

Andrea Razzaghi, Deputy Director of Astrophysics at NASA Headquarters, looked back briefly over the milestones achieved during the SOFIA Project: "In 2011, SOFIA was the first observatory to record the occultation of a star by the dwarf planet Pluto, which allowed scientists to evaluate Pluto's atmosphere. Back in 2011 and 2013, the German GREAT spectrometer was the first to discover molecules in the interstellar medium, which are crucial to understanding how water and organic substances form in the Universe. Among other things, we studied the comet ISON and the supernova SN2014J in 2013 and 2014." There is a saying that to correctly perform a task, one needs the right tools in perfect working order – now, following the rigorous overhaul of SOFIA, she is looking forward to many more years of frequent scientific flights in the interest of infrared astronomy.

DLR and NASA selected Lufthansa Technik to perform the aircraft's general overhaul as this company is the world's most experienced organisation when it comes to servicing this type of aircraft. "In total, we worked over 60,000 hours on SOFIA; we disassembled and reassembled the entire cockpit, replaced the undercarriage, checked and serviced all the aircraft structures, replaced two engines and brought all the engines and pylons up to date," said Andreas Britz, SOFIA Project Manager at Lufthansa Technik.

The observatory uses infrared radiation to look at the birth of stars

DLR commissioned the German SOFIA Institute (DSI) at the University of Stuttgart with coordinating German contributions to the project. "We used the layover period in Hamburg to also complete maintenance work on the telescope, replacing worn parts and improving the telescope functionality," explained DSI Director Thomas Keilig. After returning to California, SOFIA will resume scientific flights in January. "Right at the start, the GREAT spectrometer provided by the Max Planck Institute for Radio Astronomy (MPIfR) in Bonn will play a part in six flights to continue observing star-forming systems," explains Alois Himmes, SOFIA Project Manager at DLR. "GREAT – joined by a second German instrument, the imaging spectrometer FIFI-LS from the University of Stuttgart, and the US instruments FORCAST, EXES and FLITECAM – will then conduct additional observations over the course of the year," Himmes

reports. Also, the first flight tests of upGREAT will be performed; this enhanced instrument is fitted with 14 detectors – instead of one in GREAT – and therefore offers substantially better performance. "The five-week observation campaign headquartered in New Zealand and scheduled for the summer of 2015 will undoubtedly be a highlight. It will involve 15 flights with GREAT and the NASA instrument FORCAST, and is intended to exploit the extremely low levels of water vapour found in the stratosphere during winter there, as we did in 2013," says Himmes, looking ahead.

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SOFIA departs from Hamburg on 14 December 2014

Take off in sunshine – at 13:16 CET on 14 December 2014, SOFIA departed from Hamburg Airport after a five and a half month major overhaul at Lufthansa Technik and flew back to California. The airborne observatory, operated by NASA and DLR, is based at the Armstrong Flight Research Center in Palmdale.

Credit: Alexander Golz.

Official departure of SOFIA from Hamburg

From 28 June to 14 December 2014, the SOFIA airborne observatory operated by NASA and DLR underwent an extensive overhaul at Lufthansa Technik AG in Hamburg. The telescope (visible behind the group of people) was also serviced. There was an opportunity for a meeting between (from left): Alois Himmes, DLR SOFIA Project Manager; Steve Zornetzer, Associate Director of the NASA Ames Research Center; Alfred Krabbe, Director of the German SOFIA Institute (DSI), Andrea Razzaghi, Deputy Director of Astrophysics at NASA Headquarters; Gerd Gruppe, DLR Executive Board Member responsible for the Space Administration; Walter Heerdt, Senior Vice President, VIP and Executive Jet Solutions at Lufthansa Technik; Eddie Zavala, SOFIA Program Manager at NASA; David McBride, Director of NASA's Armstrong Flight Research Center.

Credit: Lufthansa Technik AG/S. Brüggemann.

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