



SOFIA Stratospheric Observatory for Infrared Astronomy

*American-German
Stratospheric Observatory for Infrared Astronomy (SOFIA)
Science Mission Operations Briefing*

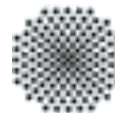
Prof. Dr. Hans-Peter Röser and Helen Hall
June 20, 2009

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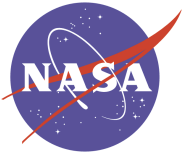
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Agenda



SOFIA Stratospheric Observatory for Infrared Astronomy

Who am I?

What is SOFIA?

What is USRA?

How is the Science & Mission Operations Organization managed?

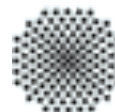
The exciting role of Education & Public Outreach on SOFIA?

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Who am I?



Stratospheric Observatory for Infrared Astronomy

SOFIA

Born Princeton University Hospital

Mechanical Engineer with demonstrated experience as Engineering Chief, Project Manager, Line Manager, Program Manager, Operations Manager, Site Manager from the United States Department of Energy National Nuclear Security Administration sponsored Nuclear Weapons Stockpile Stewardship Program

Technical Experience from the weapons program includes containment structures for High Energy Time Resolution Experiments, Shock Physics Experiments – all with hazardous Special Nuclear Material

Oboe Player - Piano Player - English Horn Player

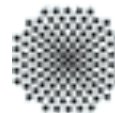


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What is SOFIA?



A 2.5 m telescope in a modified B747SP aircraft

- **Optical-mm performance**
- **The obscured Infrared (IR) (30-300 μm) is most important**

Joint Program between the US (NASA - 80%) and Germany (DLR- 20%)

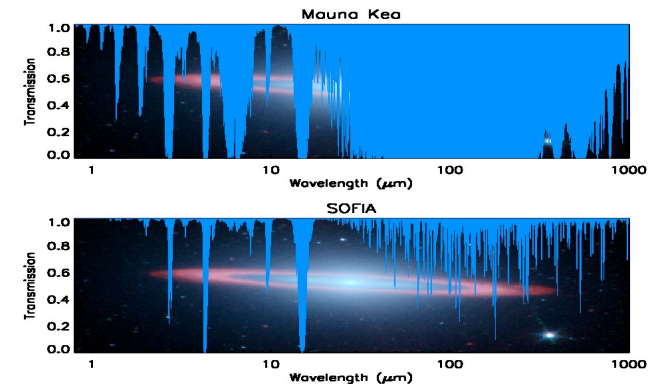
- **USRA and the Deutsches SOFIA Institute (DSI, University of Stuttgart) are the science mission contractors**

Built for 20 year lifetime

- **Operates at 39,000 to 45,000 feet.**
- **Above > 99% of obscuring water vapor .**
- **Wide instrument range. Future Instrumentalist:**

World Wide Deployments, will ramp up to ~1000 science hours per year

- **Science flights to originate from NASA Dryden Flight Research Center**
- **Science Center is located at NASA Ames Research Center**



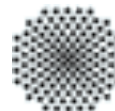
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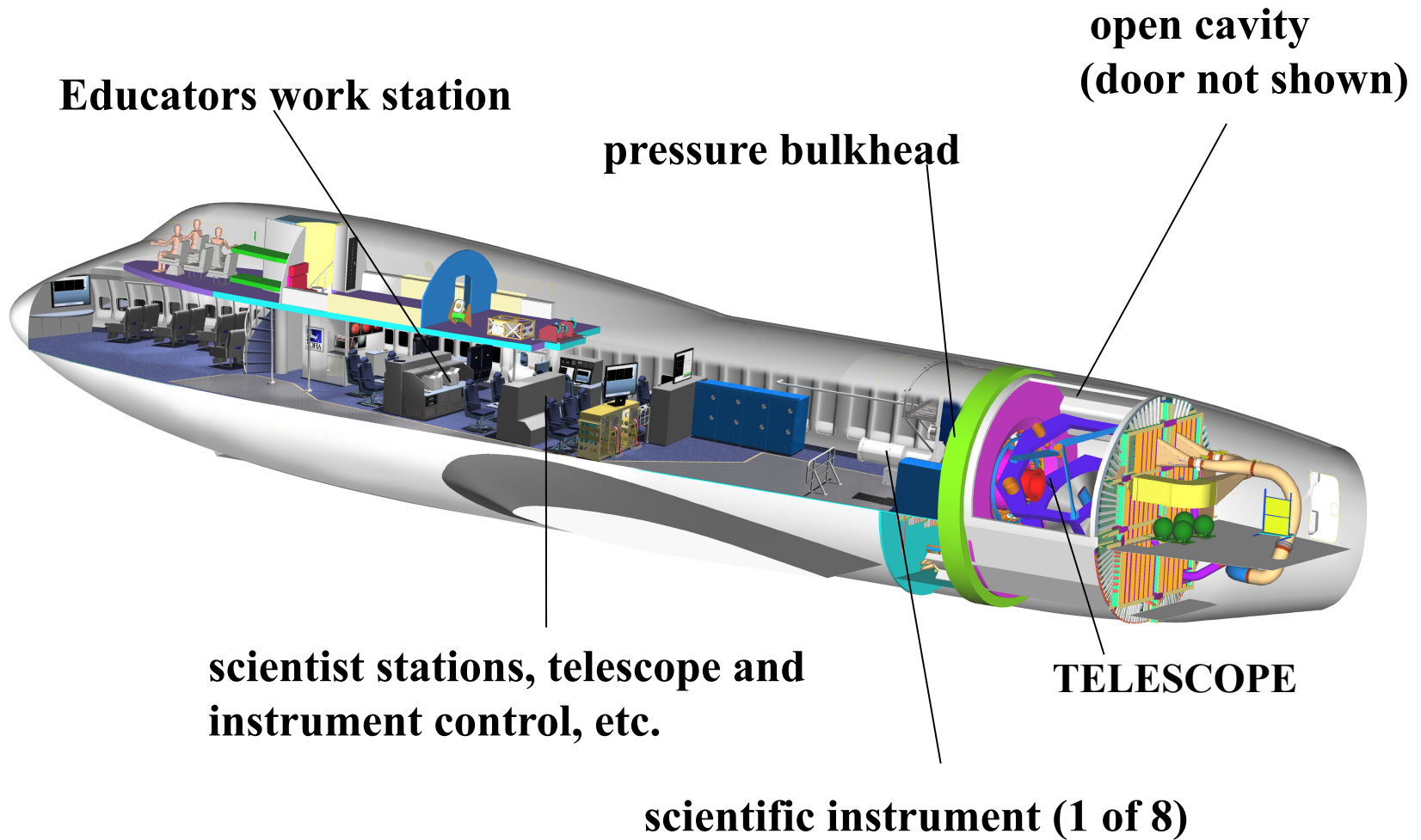
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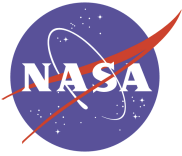




SOFIA — The Observatory

SOFIA Stratospheric Observatory for Infrared Astronomy





What is USRA?



SOFIA Stratospheric Observatory for Infrared Astronomy

Universities Space Research Association (USRA)

Created by James Webb, 2nd NASA Administrator and Frederick Seitz, National Academy of Sciences to serve university researchers by helping them perform on their funded work for NASA with minimal disruption from their university duties, and it would assist NASA by bringing university expertise to the NASA Centers as the Agency's exploration activities took it into new realms of science and technology.

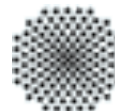
- Consortium of 103 universities in the US and abroad
- 14 research facilities and programs - some at each NASA center
- Operates the Lunar and Planetary Institute in Houston
- SOFIA is a USRA program headquartered at NASA Ames

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The Science Mission Operations has Split Geographic Locations:



SOFIA Stratospheric Observatory for Infrared Astronomy



SOFIA Science Center at NASA Ames Research Center

- Science Mission Operations Director & Deputy in place
- Science Staff**
- Science Data Network (SOFIA Data Cycle System & Archive)
- Mirror Coating Facility
- Mission Planning
- Systems Integration Laboratory
- Science Instrument Laboratories
- Education & Public Outreach



SOFIA Operations Center at NASA Dryden Aircraft Operations Facility in Palmdale

- Telescope Assembly & Science Instrument Integration Team
- Operations Staff
- Early Science Instrument Laboratories
- Systems Integration Laboratory
- Mission Systems Development (Flight Data & Observatory Data Cache)

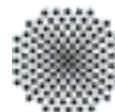
***PhD Internships being sponsored between University of Stuttgart and USRA.*

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SOFIA Basic Roles & Responsibilities.



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Dryden Flight Research Center Program Office

- **Aircraft development, testing, operations and maintenance.**
- **Palmdale Regional Airport Operating Location**

Ames Research Center

- **“Science Project” management & SOFIA Science Center**

USRA and DSI

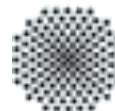
- **Science Mission Contractors – Instruments, Observing Time, etc.**
- **Together form a roughly 76 person Science Center at Full Operational Capability**
 - **32 Personnel at Palmdale**
 - **44 Personnel at Ames**
- **DSI is an associate contractor to USRA**
 - **USRA relations with DSI are very strong.**



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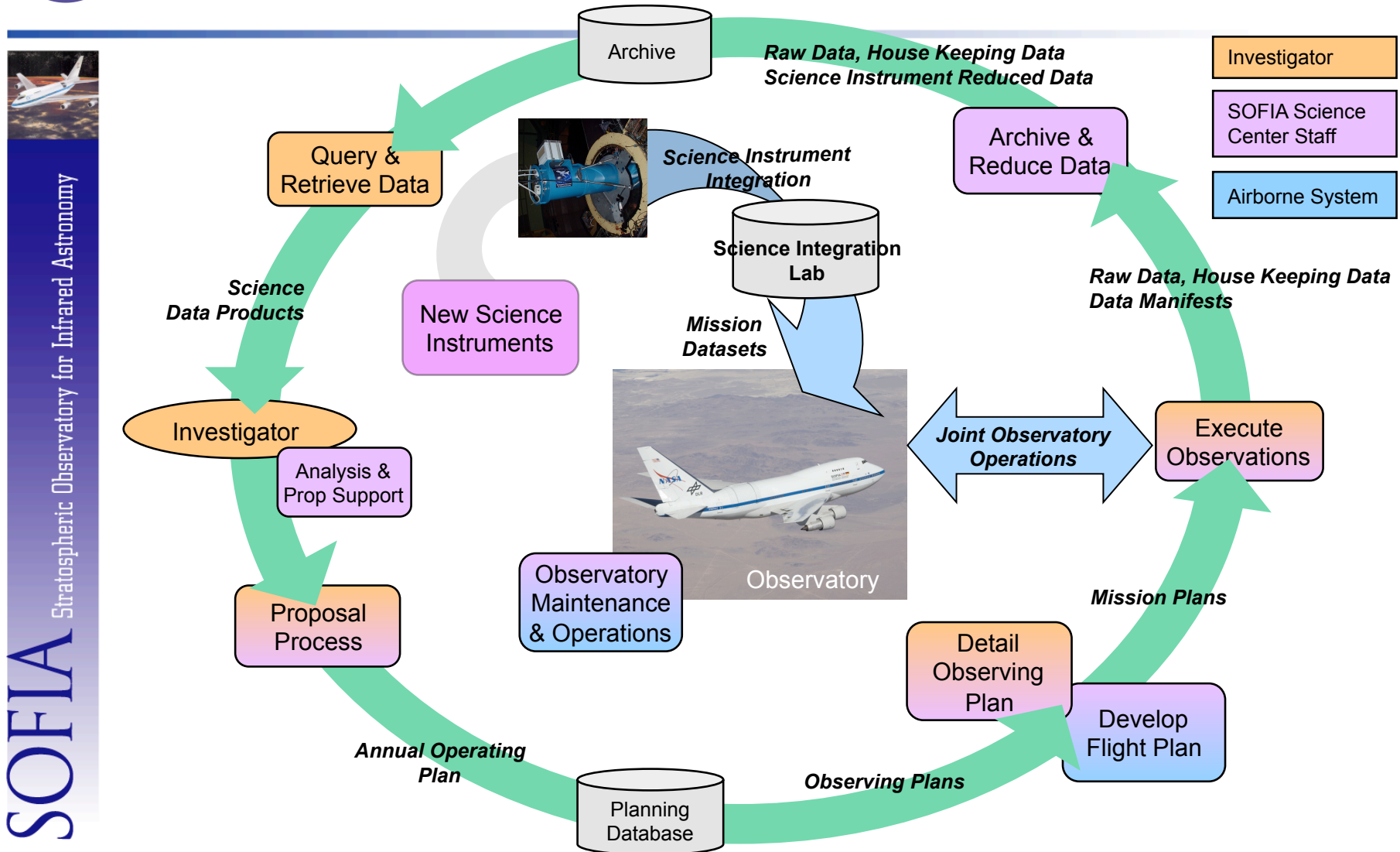
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Data Cycle System Tools for Annual Lifecycle



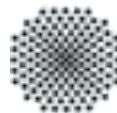
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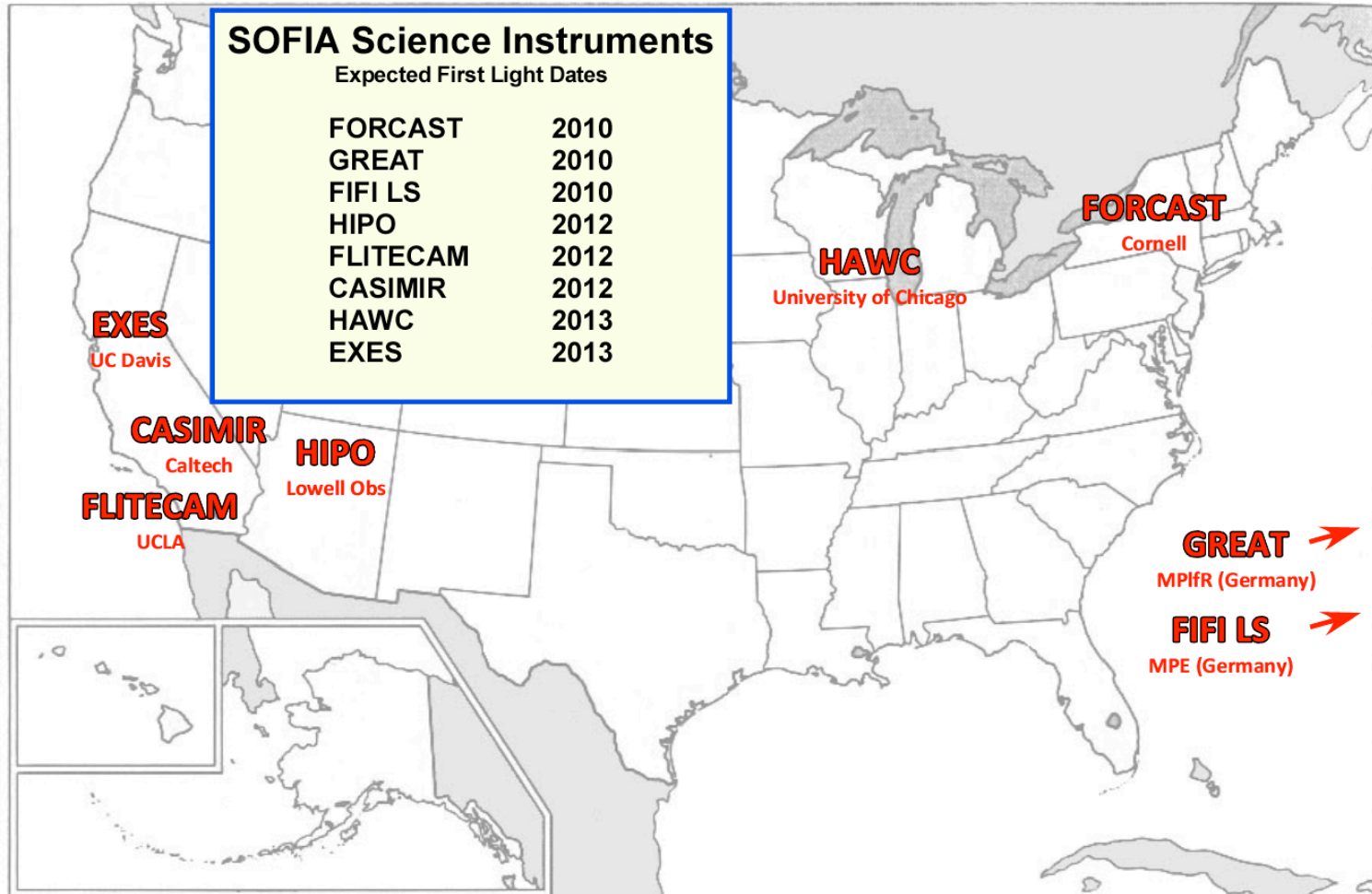
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Geographic Distribution of SOFIA Instruments

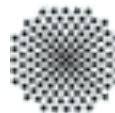
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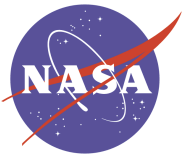
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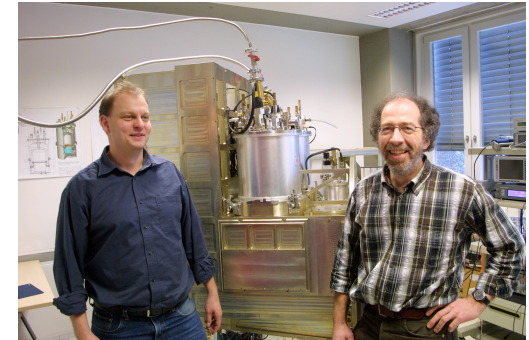
The Four “First Light” Instruments are in an advanced state of readiness

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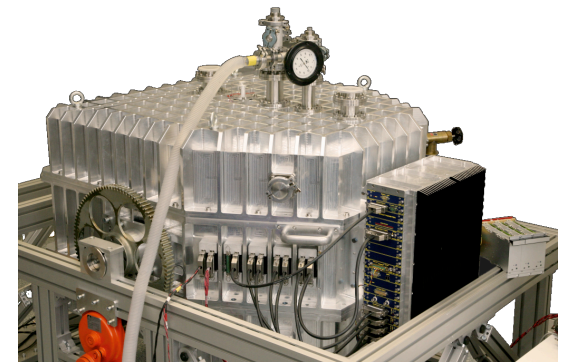
High Speed Imaging
Photometer for
Occultation (HIPO)
instrument
performed
characterization
operations on Telescope
Assembly
during Dec 2008

Second SI to
fly, German
Receiver for
Astronomy at
Terahertz
Frequencies
(GREAT)
Bonn,
Germany
Summer 2010



Faint Object
InfraRed
Camera for the
SOFIA
Telescope
(FORCAST)
First Science
Instrument (SI)
to fly this winter

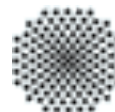
Field
Imaging Far-
Infrared Line
Spectrometer
(FIFI-LS),
Garching
Germany,
Will be
flying in
early 2011



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SOFIA's exciting EPO Program: Education Partnerships at 41,000 feet



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SOFIA

Education

Research flight experience for educators
Summer workshops for college faculty and students to encourage research, Production and dissemination of curricula & class activities; school visits

Public Outreach

Displays at public events
April: "Spaceward Bound," Yuri's night
May: SOFIA podcast for "365 days of astronomy"

Public Affairs (Public Information & Press Relations)

Press releases and media productions:
First open-door flight
First Light flight
Short Science results
SOFIA *Branding*

Science Community Outreach

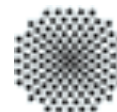
SOFIA exhibits, talks, posters at science conferences
Support for colloquia by SOFIA scientists and engineers
Convince the Community that we are real



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SOFIA modeled after the Kuiper Airborne Observatory FOSTER educator flight program



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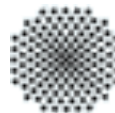


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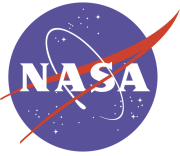
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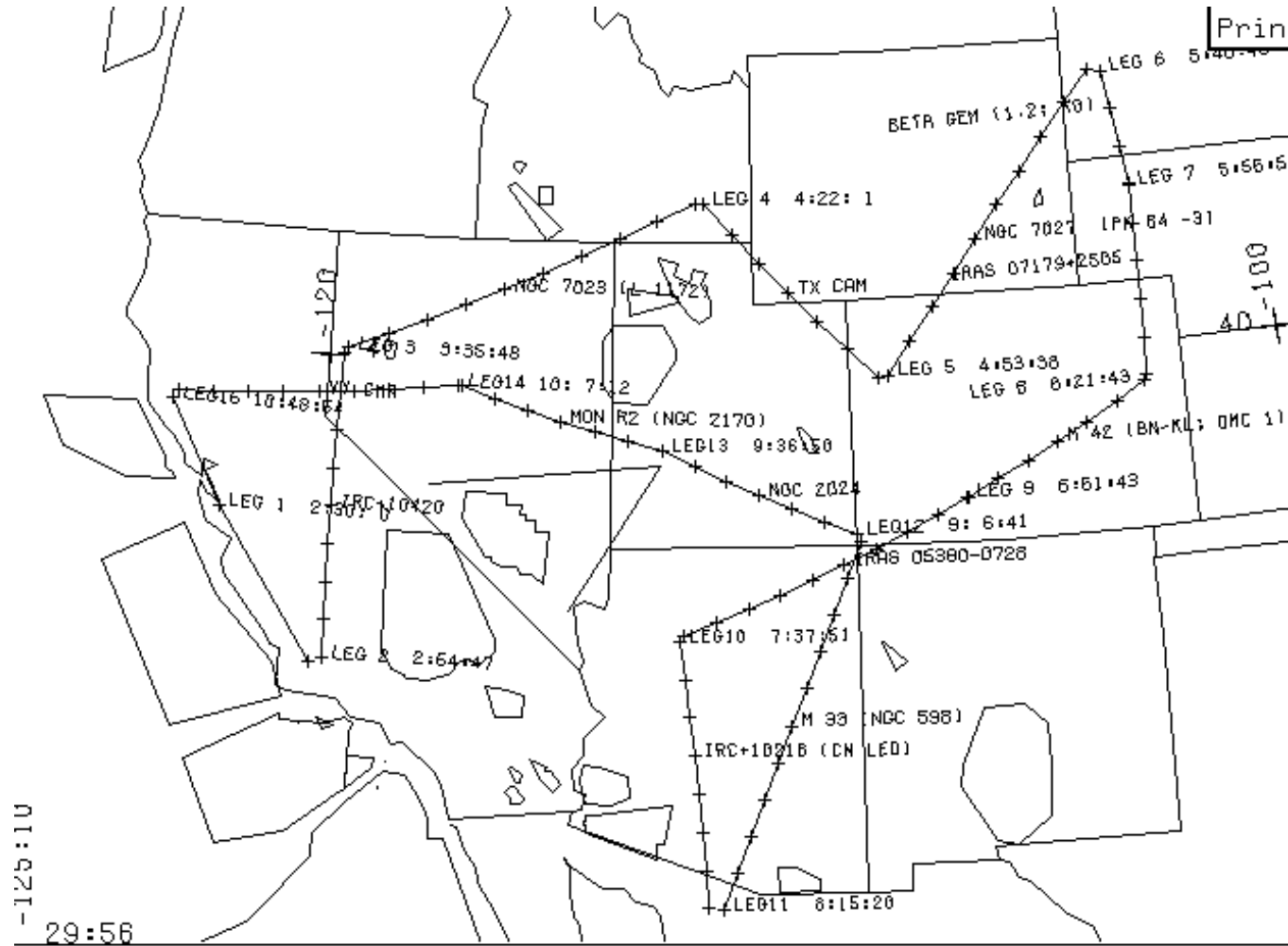




Typical (hypothetical) flight path



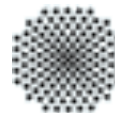
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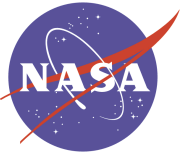
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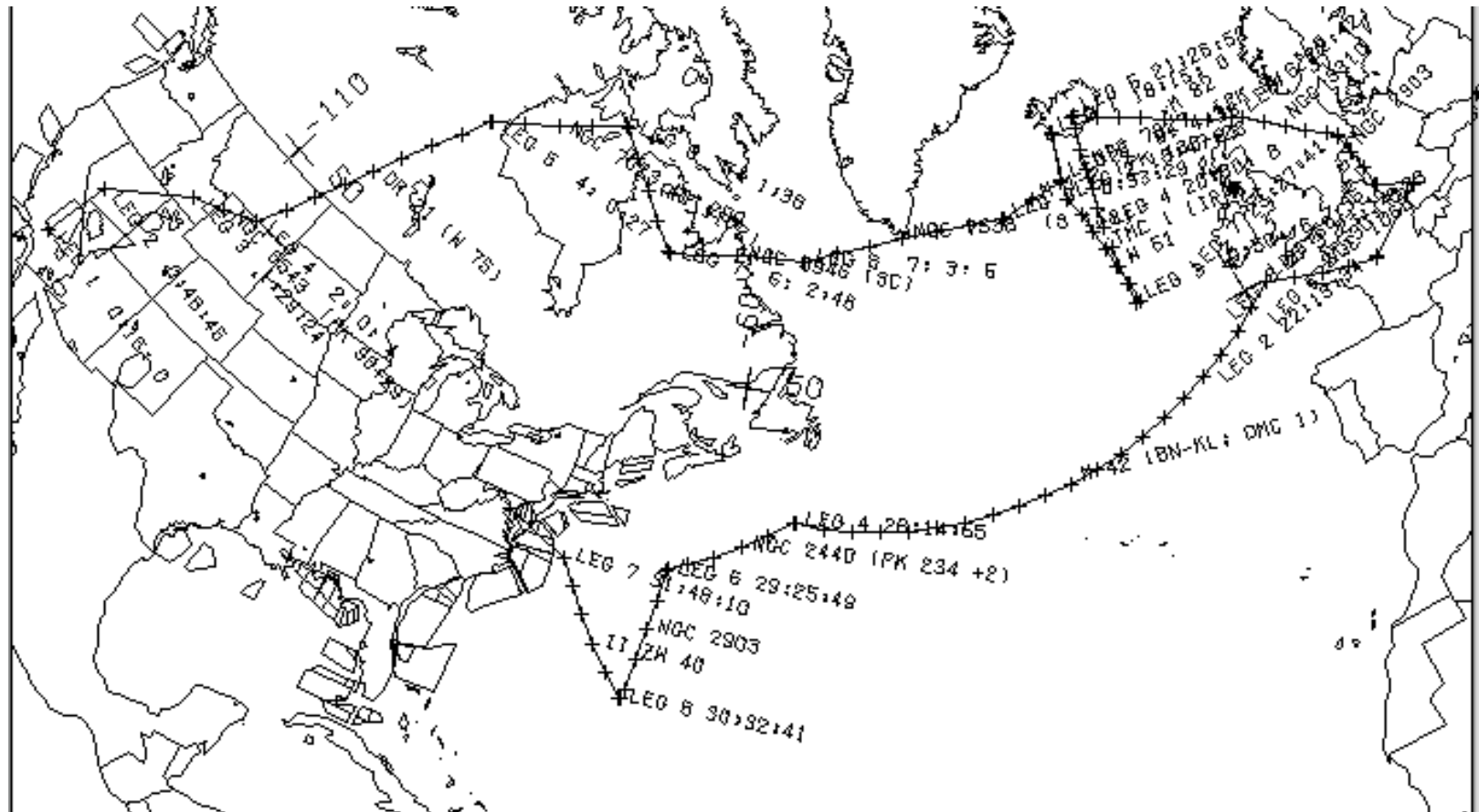


Flight Plan to Stuttgart in Winter



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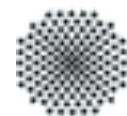
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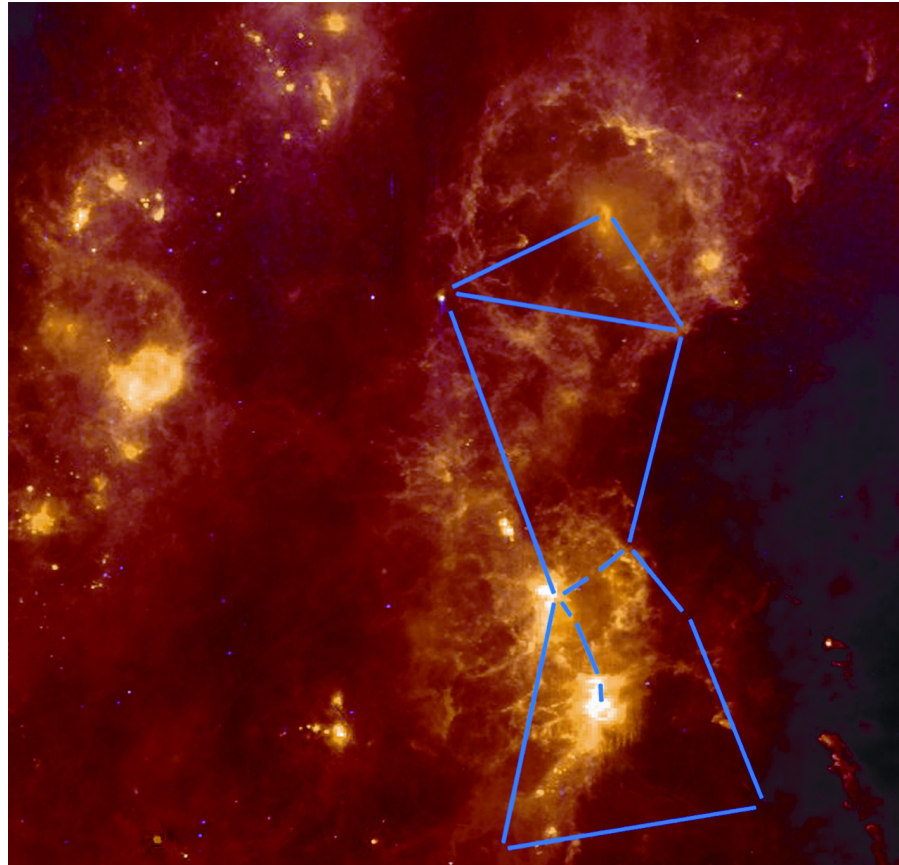




Let's get the Data



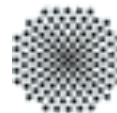
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