Activities at the SOFIA Data Center:
Preserving a rich legacy of observations for the scientific community through collaborative software development

Benjamin Greiner, Aaron Bryant, Jonas Früh, Michael Hütwohl, Christof Iserlohe, Thomas Keilig, Bastian Knieling, Mario Ruoff, Karsten Schindler, Bernhard Schulz, Manuel Wiedemann, Oliver Zeile

SOFIA Data Center, Institute of Space Systems, University of Stuttgart, Pfaffenwaldring 29, 70569 Stuttgart, Germany

The Stratospheric Observatory for Infrared Astronomy (SOFIA) concluded flight operations in 2022, but preserving and expanding its scientific legacy also requires continued development of software, data products, and services. This part of the effort at the SOFIA Data Center (SDC), has evolved into a collaborative software engineering project that combines the expertise of astronomers, former SOFIA developers and newly onboarded engineers, ensuring continuity while introducing modern development practices and new capabilities.

SOFIA Redux

- Data reduction suite for 5 SOFIA Instruments
- Continuing development from legacy code keeping up with changing APIs, see ADASS 2025
- Updated calibration file repository on DaRUS
- Documentation: https://redux.sofiadatacenter.de
- Public code repository: https://github.com/SOFIA-Data-Center/sofia_redux
- Current version sofia-redux v1.5.2 is on PyPI

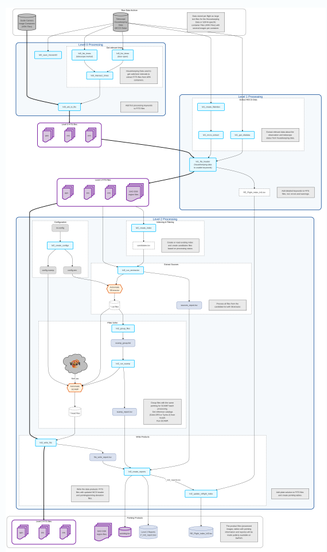
Challenges: Not our own code, large legacy code base. "Software drift" through changing APIs of NumPy, AstroPy, etc.

Solutions: CI/CD with large unit test suite (pytest), established git workflows, designated science instrument experts for individual reduction modules



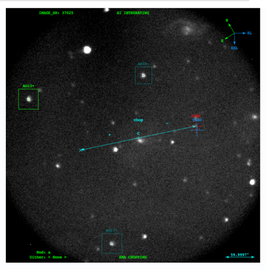
SOFIA Imager Pipeline

- SOFIA had 3 tracking cameras saving images into proprietary .ark format
- Extracts all images to FITS format and add relevant housekeeping data in the header (incl. WCS)
- Conducts plate solves to images where possible to verify / correct telescope pointing
- Use improved pointing to improve Science Data
- The SDC makes all imager data available to the community in FITS format with best possible pointing information



Challenge: Built by telescope and camera experts, not software engineers

Solutions: Code reviews, guidance by engineers, established git workflows, motivated to dive into non-expert areas

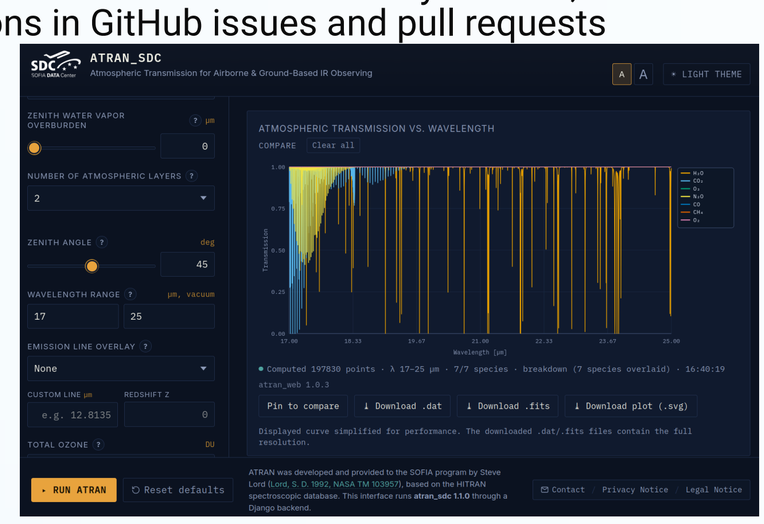


ATRAN_SDC

- Web app for calculation of atmospheric transmission spectra
- Online at https://atran.sofiadatacenter.de
- See ADASS ATRAN Poster by A. Bryant

Challenges: Initial vibe coded version not fit for public facing web service, feature creep through niche user demands

Solutions: Manual code and security reviews, isolated feature discussions in GitHub issues and pull requests



SDC Virtual Observatory

- All of the SOFIA Data is to be hosted by the SDC in a searchable,
- IVOA standards compliant archive
- Software used: GAVO DaCHS
- Host is online at https://vo.sofiadatacenter.de
- No public services yet

Challenges: Large heterogenous source dataset, complex relations and metadata structure, complex setup of resource descriptors for data ingestion

Solutions: Dedicated Science Instrument experts working in collaboration with software engineers. Direct support from upstream software provider (ARI Heidelberg)

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University of Stuttgart
Germany

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contact author: benjamin.greiner@irs.uni-stuttgart.de