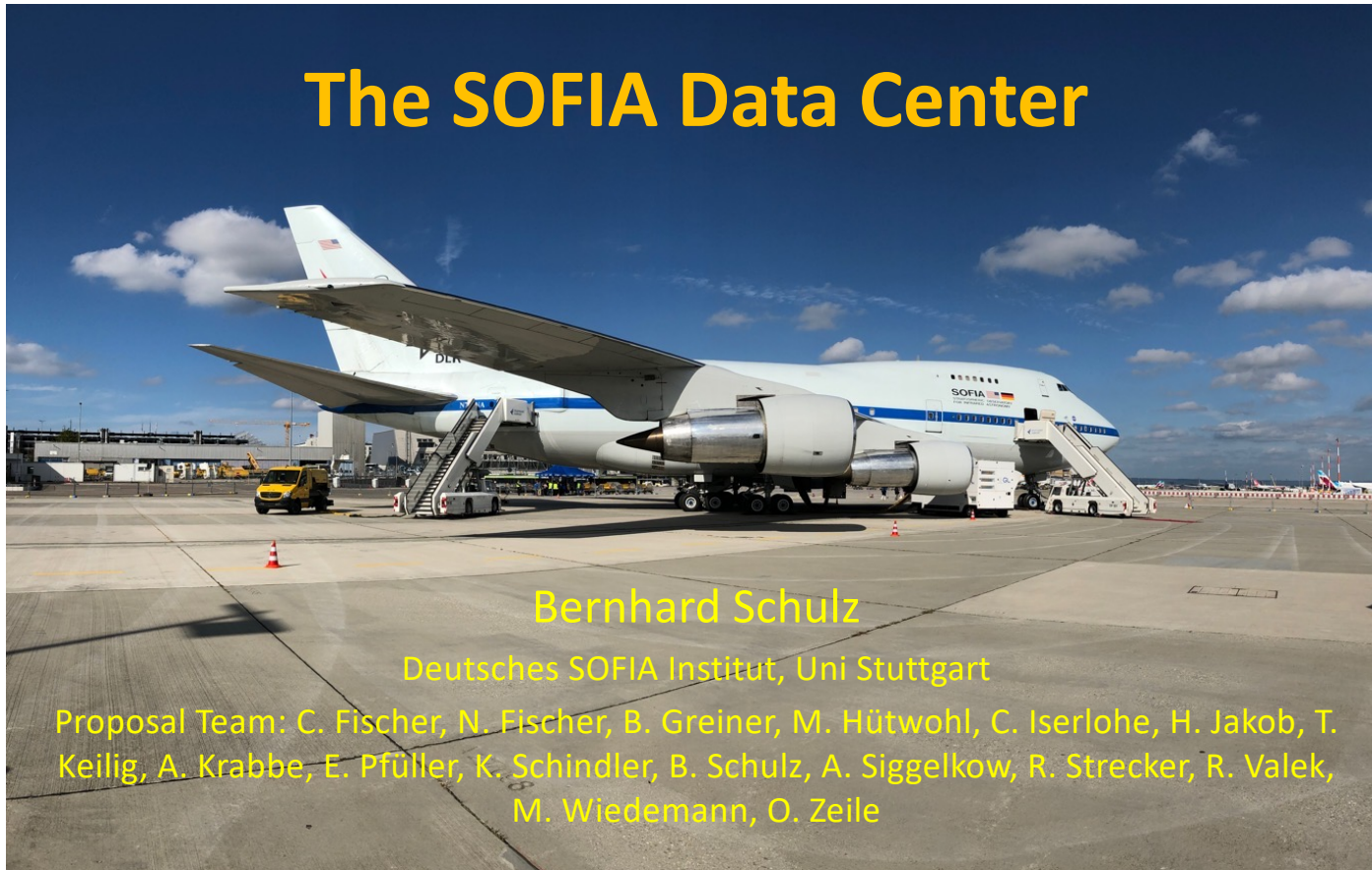


The SOFIA Data Center

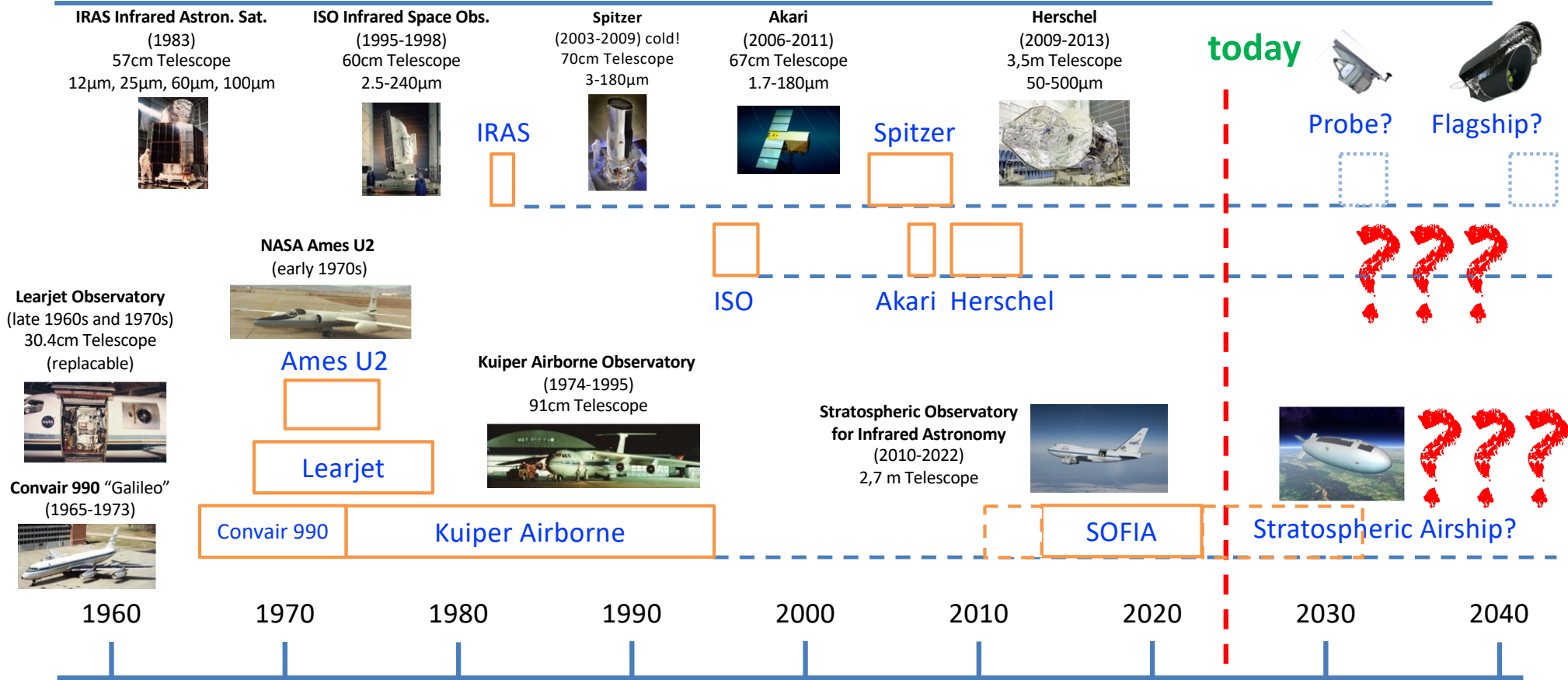


Bernhard Schulz

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Proposal Team: C. Fischer, N. Fischer, B. Greiner, M. Hütwohl, C. Iserlohe, H. Jakob, T. Keilig, A. Krabbe, E. Pfüller, K. Schindler, B. Schulz, A. Siggelkow, R. Strecker, R. Valek, M. Wiedemann, O. Zeile

Far-Infrared Astronomy History and Future



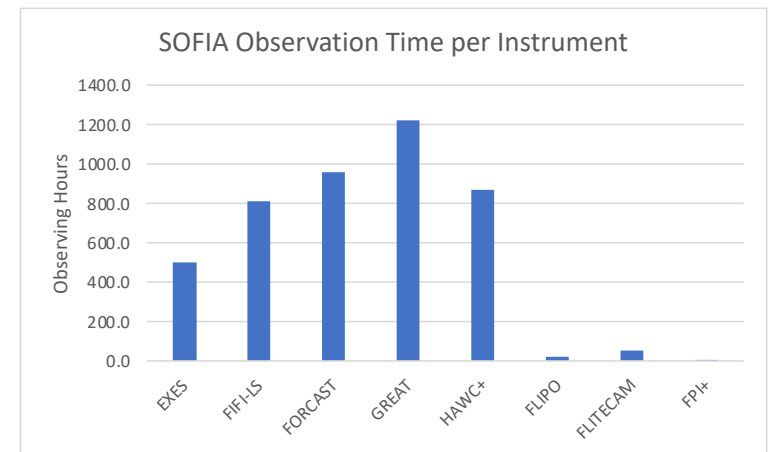
The SOFIA Data Vault

Daten



Data Volume in DCS						
	LEVEL_0	LEVEL_1	LEVEL_2	LEVEL_3	LEVEL_4	Total
EXES	46.6	2013.9	819.6	43.7	0.0	2923.7
FIFI-LS	0.0	972.4	21.1	125.7	35.9	1155.1
FLITECAM	0.3	31.1	46.8	38.2	0.0	116.3
FORCAST	5.6	94.3	548.7	148.0	1.2	797.8
FPI_PLUS	0.0	22.4	43.4	0.3	1.1	67.3
GREAT	0.0	2494.6	0.0	3056.7	75.7	5627.0
HAWC_PLUS	13334.1	0.7	18.5	10.1	4.9	13368.3
HIPOBLUE	0.0	46.8	0.0	0.0	0.0	46.8
HIPORED	0.0	74.8	0.0	0.0	0.0	74.8
Total	13386.5	5751.1	1498.0	3422.7	118.8	24177.0

- SOFIA Raw Data **~141 TB**
- Science Data **~24 TB**
- Total about **5300 h** (SLT)
- Telescope guider cameras FPI+, WFI und FFI were always active (**>5300 h**).

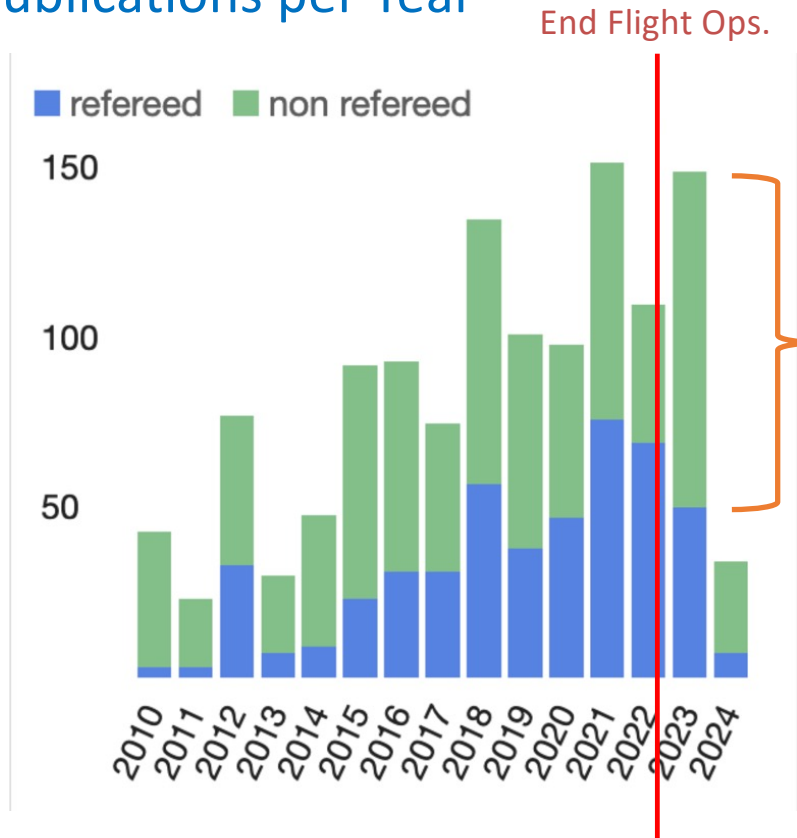


4846 h shown (Data from 67 Flights ~470h not counted here)

SOFIA Publication Statistics



Publications per Year



- Non-refereed publications.
- Mostly AAS talks and posters
- Some preprints of submitted papers
- Proposals are excluded

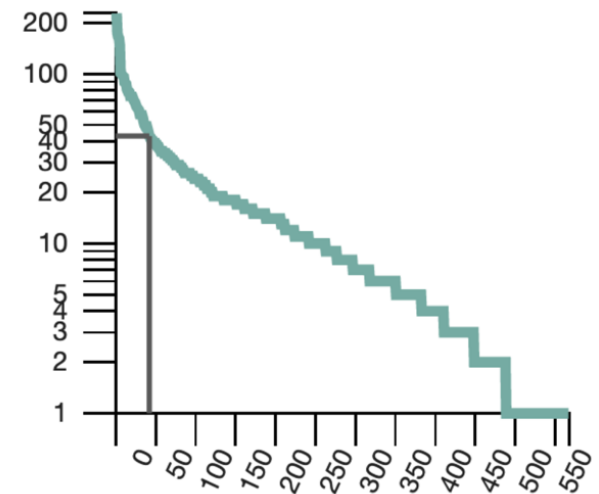
Potential!

H-Index

1,260 top cited records with 8,903 total citations

H-Index for results: 42

Y-axis: linear log

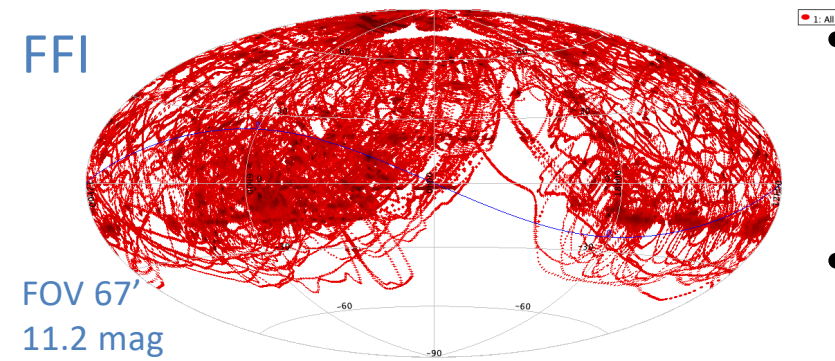
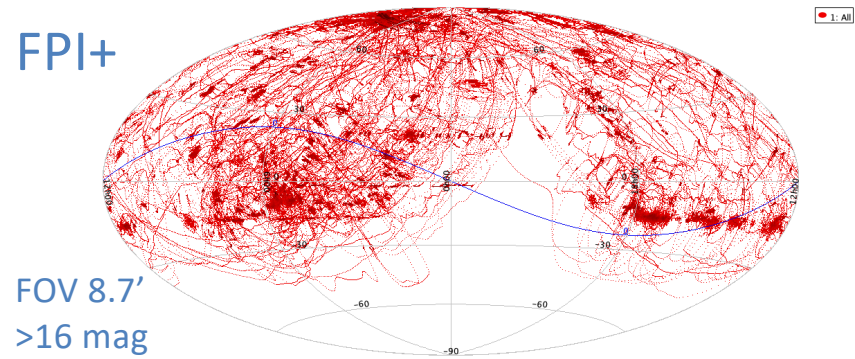
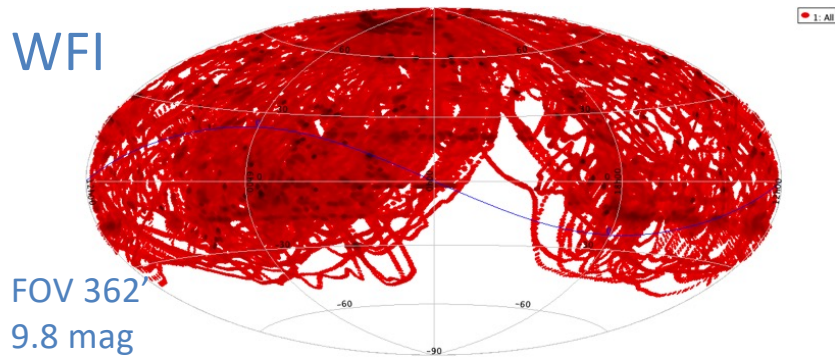


Aims of a SOFIA Data Center



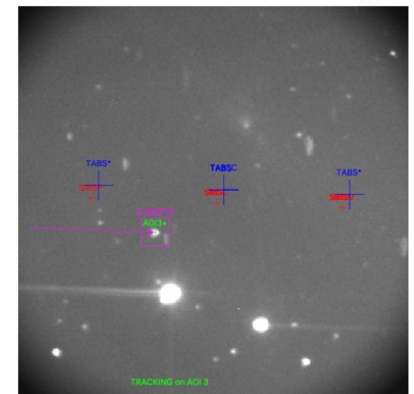
- Creation of a powerful **scientific resource** for the time after the mission
- Bridging the **expected 10-20 year gap** in regular new Far-IR data availability
- Ensuring the quality of the SOFIA data archive and its documentation to secure its **scientific productivity for the long term**
- Enable future scientific data exploitation **without the need for expert knowledge** of SOFIA subtleties
- Complete the work within **5 years** with subsequent **transfer to DZA**
- **Staying in sync** with the current SOFIA data repository hosted within IRSA

TA-Camera Images and Pointing Reconstruction



Example Coverage
17-Jan-2020 – 13-Mar-2020

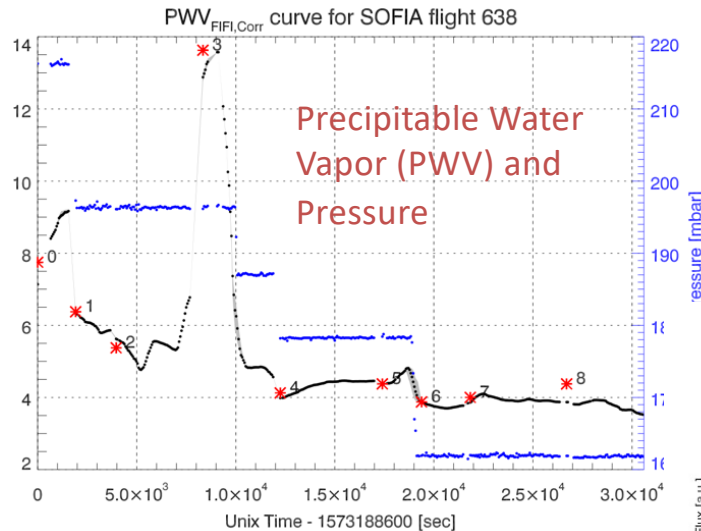
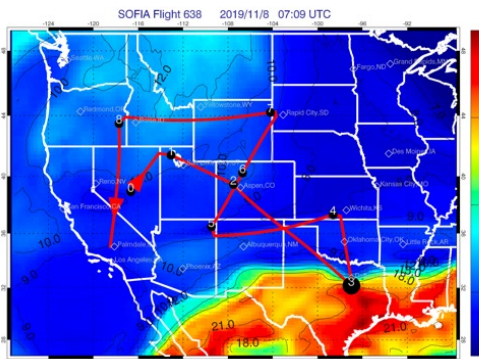
- CCD Images to be released in FITS-format for serendipity research
- Telescope pointing reconstruction via plate solving



Example FPI+ image

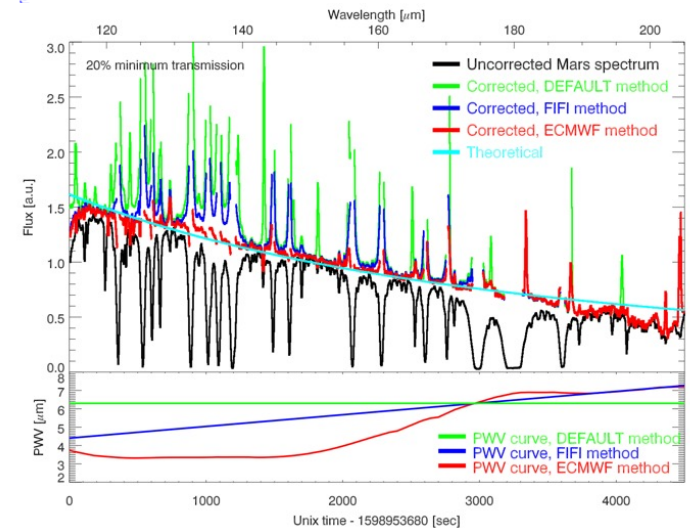
Water Vapor Calibration

Flight 638 SOFIA Flight Path



- The FIFI-LS correction uses water vapor measurements before and after measuring the object.
- The ECMWF method covers all changes during the observation.

Example Mars Spectrum



- In-situ measurements of water-vapor overburden with FIFI-LS correlate well with values derived from ECMWF ERA5 atmospheric re-analysis model.

Fischer + 2021, Iserlohe + 2021, Iserlohe + 2022, Vacca + 2023

More Tasks



- Update of metadata to enable reprocessing of **Cycles 0 - 4**
- Develop **additional pipeline improvements**
- Create automatic reprocessing environment
- Reprocess instrument data
 - (GREAT separately done in Cologne)
- **Iteratively** implement pipeline improvements
- Develop supporting **software tools**

Instrument-Priorities

GREAT (Cologne)

FIFI-LS

FPI+/TA-Kameras

HAWC+

FORCAST

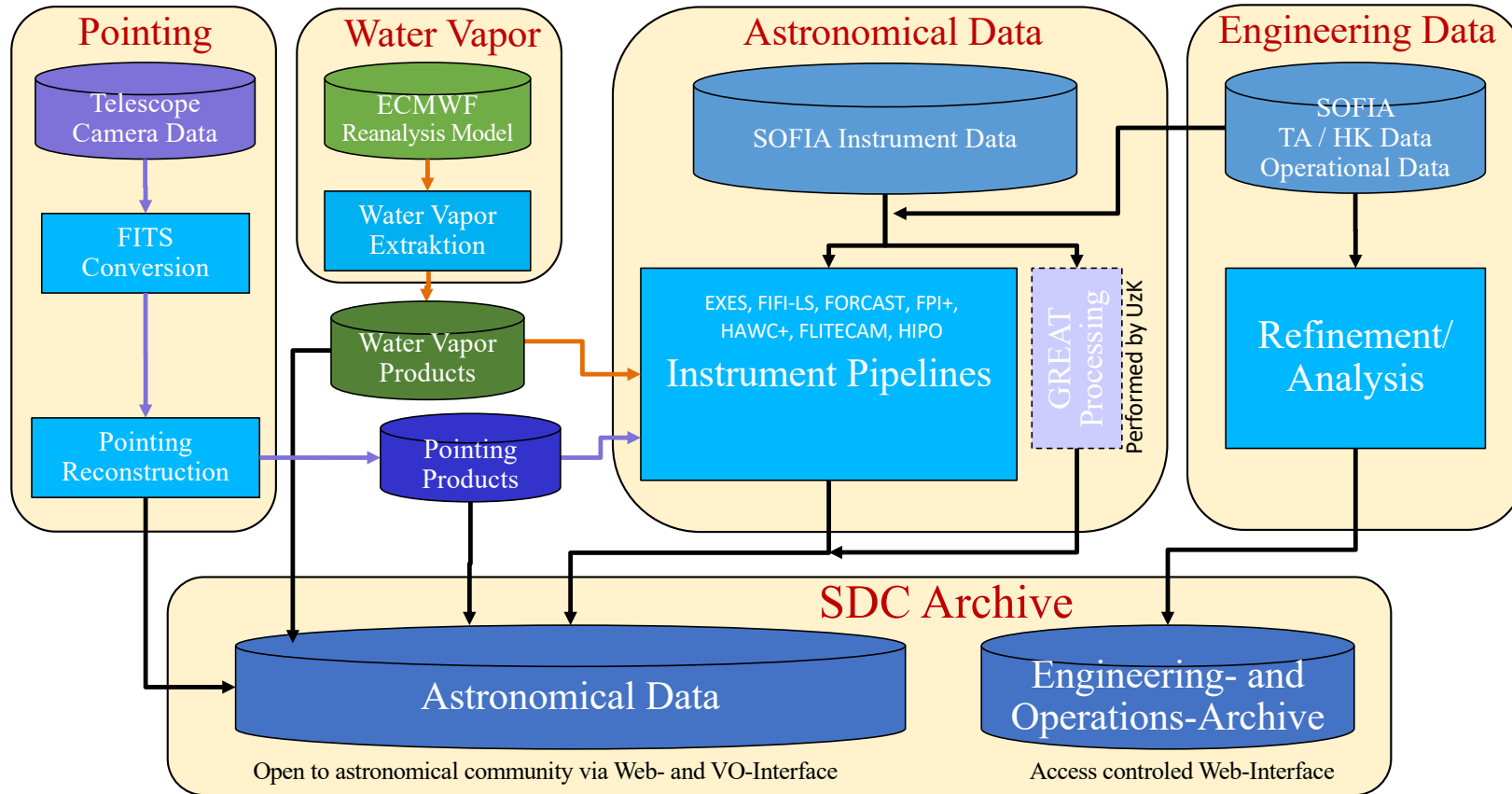
EXES

FLITECAM

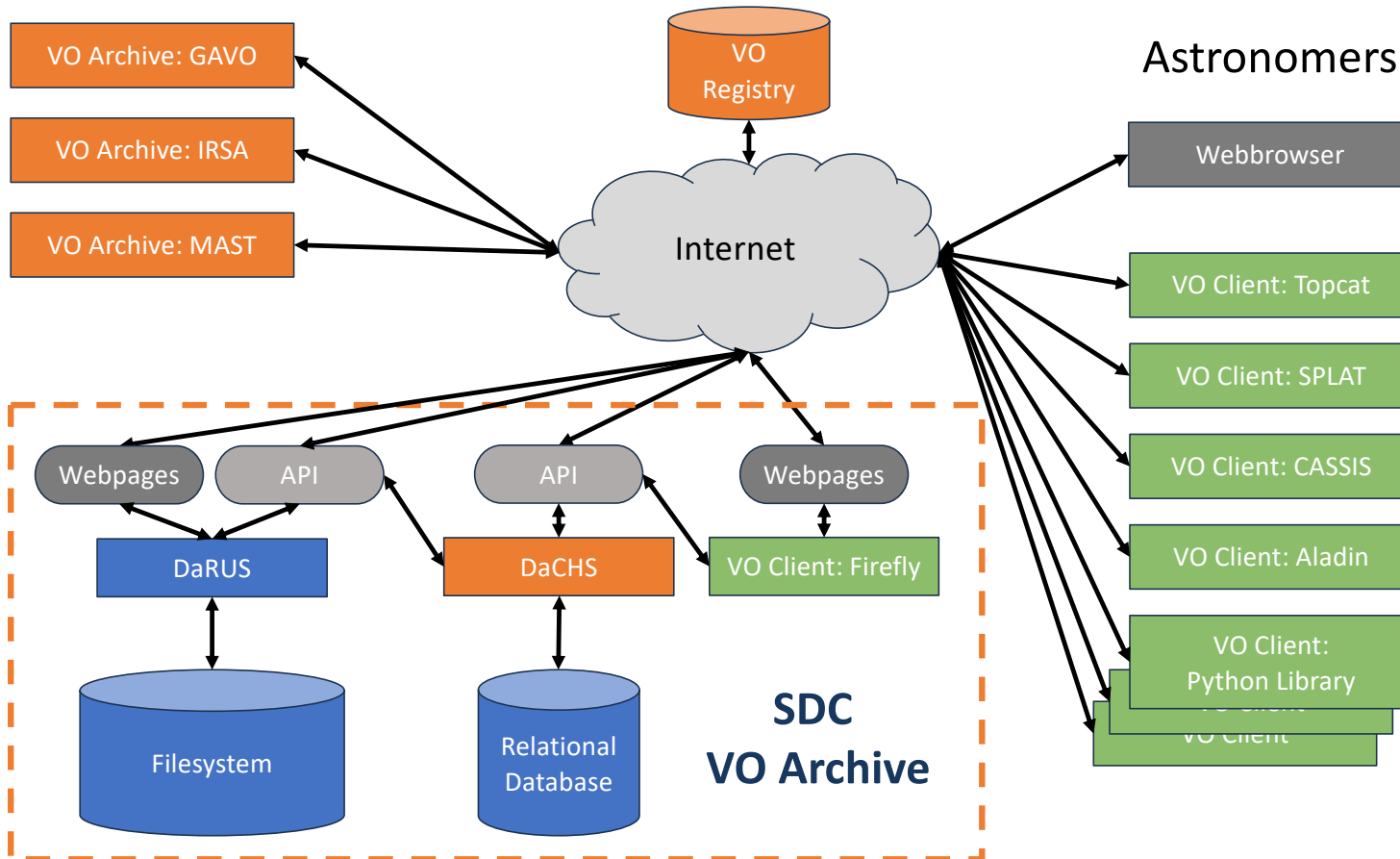
HIPO

- Create a **SOFIA Science Archive** hosting raw and processed data
- **Reorganize science data** rather by astrophysical criteria than operational ones
- Create an **Operations- and Engineering-Archive**
- Update documentation where necessary
- Support scientists through **webinars, conferences** and **direct advice**
- Support **engineering research** by interested parties

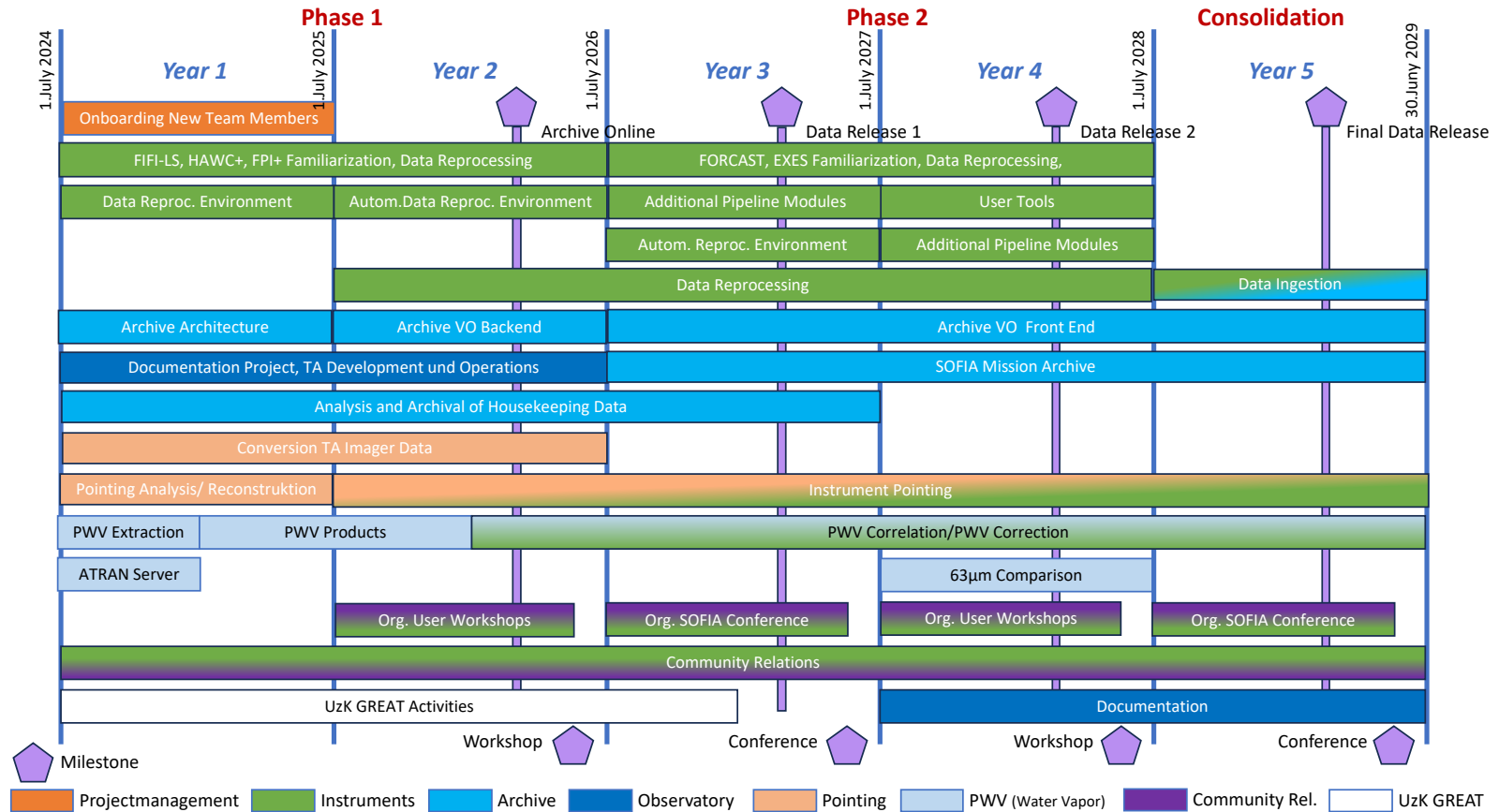
Reprocessing Workflow



Science Archive (Virtual Observatory Compatible)



Project Timeline



Conclusions



- To provide an adequate post-processing and archival phase for SOFIA, we advocate the **creation of a SOFIA Data Center (SDC) at the University of Stuttgart**.
- Such a **proposal was submitted** to DLR with a planned start date in July 2024.
- The planned active phase for the SDC is **5 years**.
- Within this period the data should be **substantially improved**, be placed into a well searchable and documented **online-archive**, and scientists should receive **expert support** in understanding residual instrumental effects and finding valuable, yet unpublished data.
- At the end of this period the archive contents are planned to be transferred into a **permanent archive at the DZA**.

