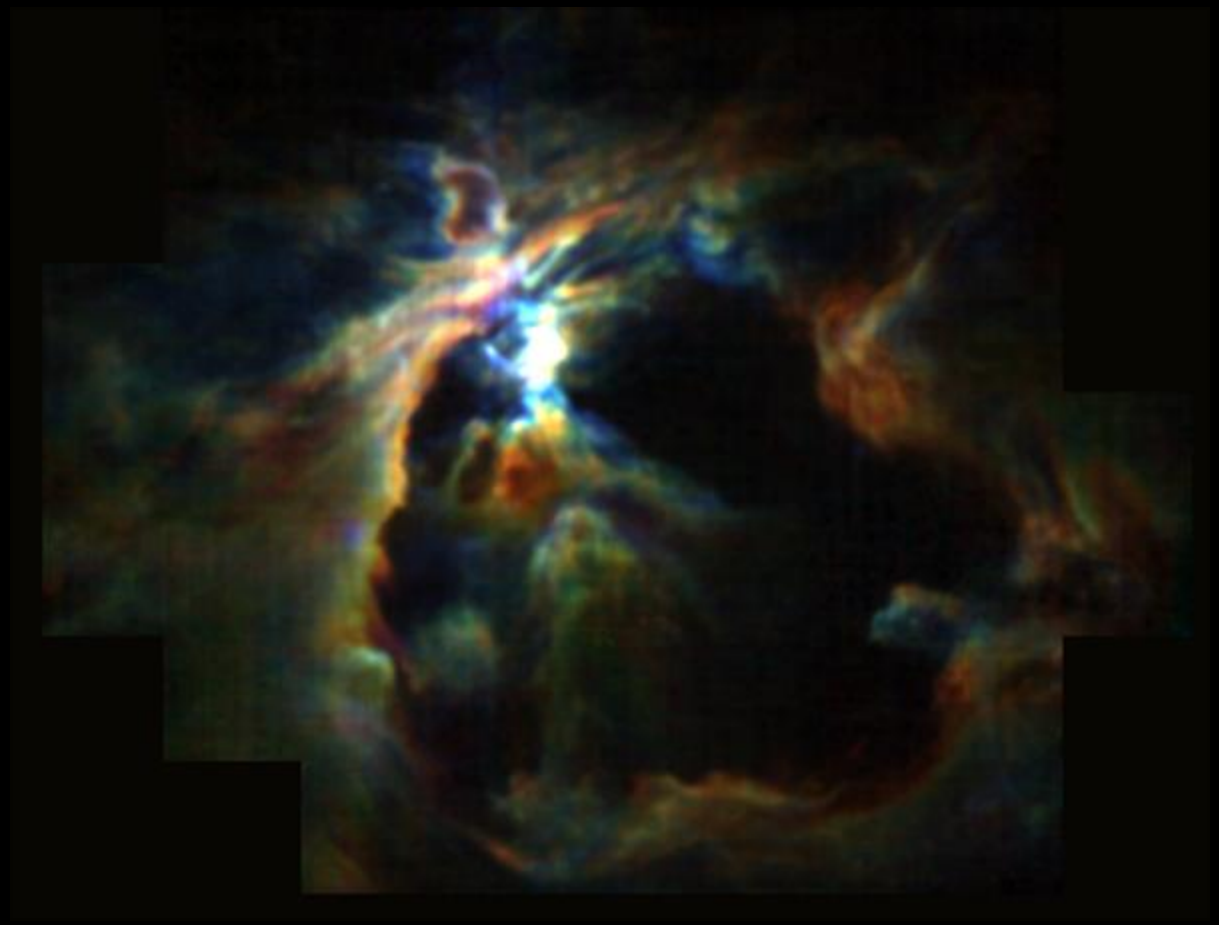


Legacy Program Status

Jim De Buizer

SOFIA Users Group Meeting
November 4, 2022

Legacy Program Completion

Proposal	Project Name	PI	Instrument	Award (hrs)	% Complete	Remaining (hrs)
07_0077	FEEDBACK	Tielens	GREAT	96	89% (DONE)	11
07_0189	Galactic Center Map	Hankins	FORCAST	33	83% (DONE)	0
08_0012	B Fields in Galaxies (SALSA)	Lopez-Rodriguez	HAWC+	156	72%	44
08_0038	HyGAL	Neufeld	GREAT	82	72%	23
08_0186	FIELDMAPS	Stephens	HAWC+	42	56%	19
09_0036	LMC+	Madden	FIFI-LS	20*	75%**	5
09_0054	B Fields in Galactic Center	Chuss	HAWC+	20*	86%**(DONE)	3
09_0171	Lunar Water Survey	Lucey	FORCAST	69***	70%***	20
09_0215	SIMPLIFI	Pillai	HAWC+	20*	210%**(DONE)	0

*Pilot Legacy Programs (Full Legacy requests: 09_0036 - 50h, 09_0054 – 73h, 09_0215 – 78h)
**Percentage of Pilot Program complete
*** FORCAST Cycle 9 project upgraded to full Legacy status (in part due to the loss of HAWC+)

Legacy Program and Cycle 9 Selection

Legacy programs (and Cycle 9 programs in general) were dominated by the selection of GREAT and HAWC+ programs, with many targets only visible or more feasible from the Southern Hemisphere

Original Cycle 9 plan after proposal selection:
EXES + FORCAST + FIFI-LS = 58 flight dates (30%)
GREAT + HAWC+: 136 flight dates (70%)

Executed Cycle 9 flights:
EXES + FORCAST + FIFI-LS = 80 flights (52%)
GREAT + HAWC+: 75 flights (48%)

Also note that the high priority target pool was used to drive when to schedule each instrument, but many instrument series occurred in months or seasons not originally planned.

Why did GREAT/HAWC+ Legacy programs not get completed?

- GREAT southern flights (OC9C) in August 2021 cut short due to COVID surge in Tahiti, only flew 13 of potential 20 flight opportunities
- The 12 HAWC+ southern flights (OC6D) were canceled due to COVID in Tahiti
  - Expedited a HAWC+ series out of Palmdale to replace it, with 11 successful flights, but no southern targets
- HAWC+ H series in December 2021 only flew 3 of the planned 11 flights due to instrument failure; repair also caused the loss of the HAWC+ J series (16 flights) in Jan/Feb 2022 (replaced by FORCAST)
- GREAT Summer 2022 southern deployment series (OC9S) cut short due to wind damage to aircraft, only flew 6 of 20 flights
- HAWC+ flights were inefficient most of the cycle
  - Most HAWC+ flights had to be planned for only 8.5hr of in-air time (rather than the nominal 10hr) due to cryogenic hold time issues
  - After the OC9E series (Sept 2021), the HAWC+ hold time struggled to make it through even the 8.5hr flights (averaged only 6.5 RH/flight vs 7.9 RH/flight for all other instruments)

Cycle 9 flight break-down by instrument and hemisphere

- Due to poor HAWC+/GREAT completions in early Cycle 9, Legacy program completion was prioritized
- However, HAWC+ was unavailable, GREAT scheduling was not fully in our control, and we could not add more southern flights
- Aircraft maintenance in Jul-Aug 2022 and delays in return of HAWC+ equipment from deployment led to lost galactic plane Legacy observing opportunities
- FORCAST Lunar Legacy was promoted from pilot to full

Instrument	# Flights Planned	# Flights Flown	# Diff	% Diff
EXES	11	21	+10	190%
FORCAST	19	34	+15	178%
FIFI-LS North	20	18	-2	90%
FIFI-LS South	8	7	-1	88%
GREAT North	25	18	-7	72%
GREAT South	40	19	-21	48%
HAWC+ North	47	31	-16	66%
HAWC+ South	24	7	-17	29%
TOTAL	**194**	**155* (80%)**		

*28 flights in FY21, 127 flights in FY22

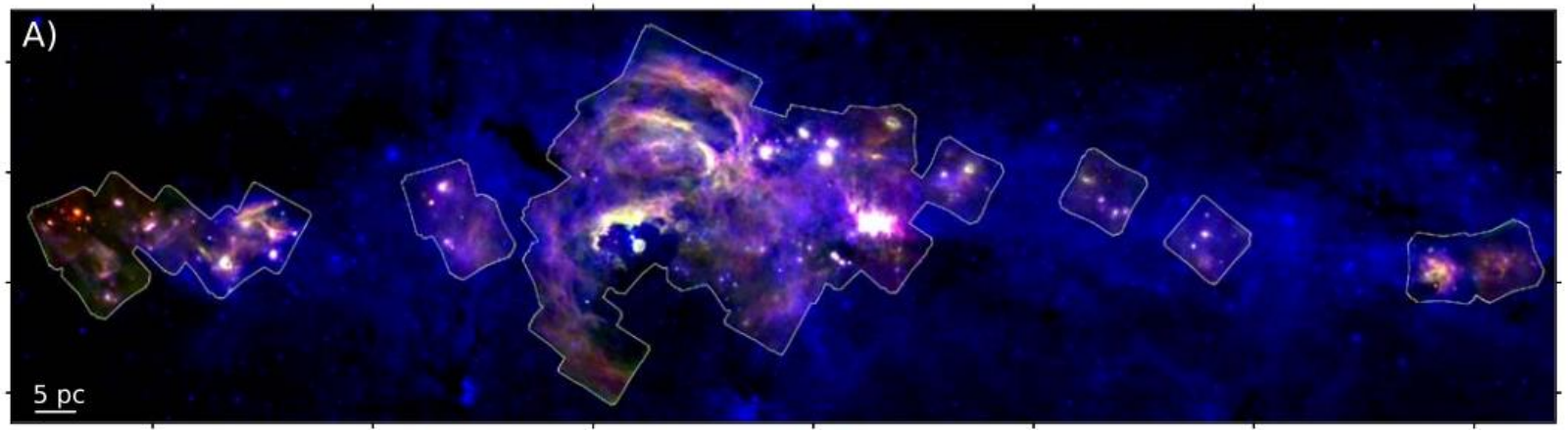
Cycle 7 Legacy Program Publications

FEEDBACK 07_0077 – 7 papers

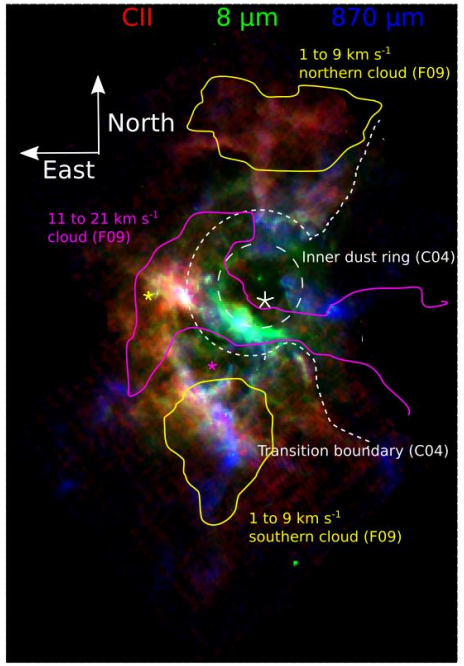
Beuther, H.+ 2022, "FEEDBACK from the NGC 7538 H II region"
Bonne, L.+ 2022, "The SOFIA FEEDBACK Legacy Survey Dynamics and Mass Ejection in the Bipolar H II Region RCW 36"
Kabanovic, S.+ 2022, "Self-absorption in [C II], 12CO, and HI in RCW120: Building up a geometrical and physical model of the region"
Roshi, D.+ 2022, "Arecibo-Green Bank-LOFAR Carbon Radio Recombination Line Observations toward Cold H I Clouds"
Luisi, M.+ 2021, "Stellar feedback and triggered star formation in the prototypical bubble RCW 120"
Schneider, N.+ 2020, "FEEDBACK: a SOFIA Legacy Program to Study Stellar Feedback in Regions of Massive Star Formation"
Tiwari, M.+ 2021, "SOFIA FEEDBACK Survey: Exploring the Dynamics of the Stellar Wind Driven Shell of RCW 49"

FORCAST GC Map 07_0189 – 2 papers

Bryant, A.+ 2021, "The episodic and multiscale Galactic Centre"
Hankins, M+ 2020, "SOFIA/FORCAST Galactic Center Legacy Survey: Overview"



Hankins, M+ 2020



Tiwari, M.+ 2021

Cycle 8 Legacy Program Publications

SALSA 08_0012 – 4 papers

Lopez-Rodriguez, E.+ 2022, "Extragalactic Magnetism with SOFIA (Legacy Program). IV. Program Overview and First Results on the Polarization Fraction"

Lopez-Rodriguez, E.+, 2022, "Extragalactic Magnetism with SOFIA (Legacy Program) - III: First data release and on-the-fly polarization mapping characterization"

Lopez-Rodriguez, E.+ 2021, "Extragalactic Magnetism with SOFIA (Legacy Program) - II: A Magnetically Driven Flow in the Starburst Ring of NGC 1097"

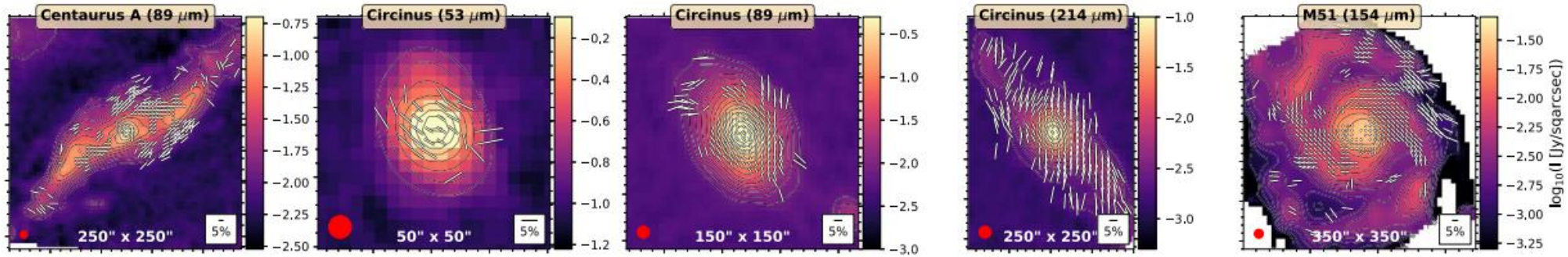
Borlaff, A.+ 2021, "Extragalactic Magnetism with SOFIA (Legacy Program). I. The Magnetic Field in the Multiphase Interstellar Medium of M51"

HyGal 08_0038 – 1 paper

Jacob, A.+ 2022, "HyGAL: Characterizing the Galactic Interstellar Medium with Observations of Hydrides and Other Small Molecules. I. Survey Description and a First Look Toward W3(OH), W3 IRS5, and NGC 7538 IRS1"

FIELDMAPS 08_0186 – 1 paper

Stephens, I.+ 2022, "The Magnetic Field in the Milky Way Filamentary Bone G47"



SALSA Galaxy Polarization Survey

Lopez-Rodriguez, E.+, 2022

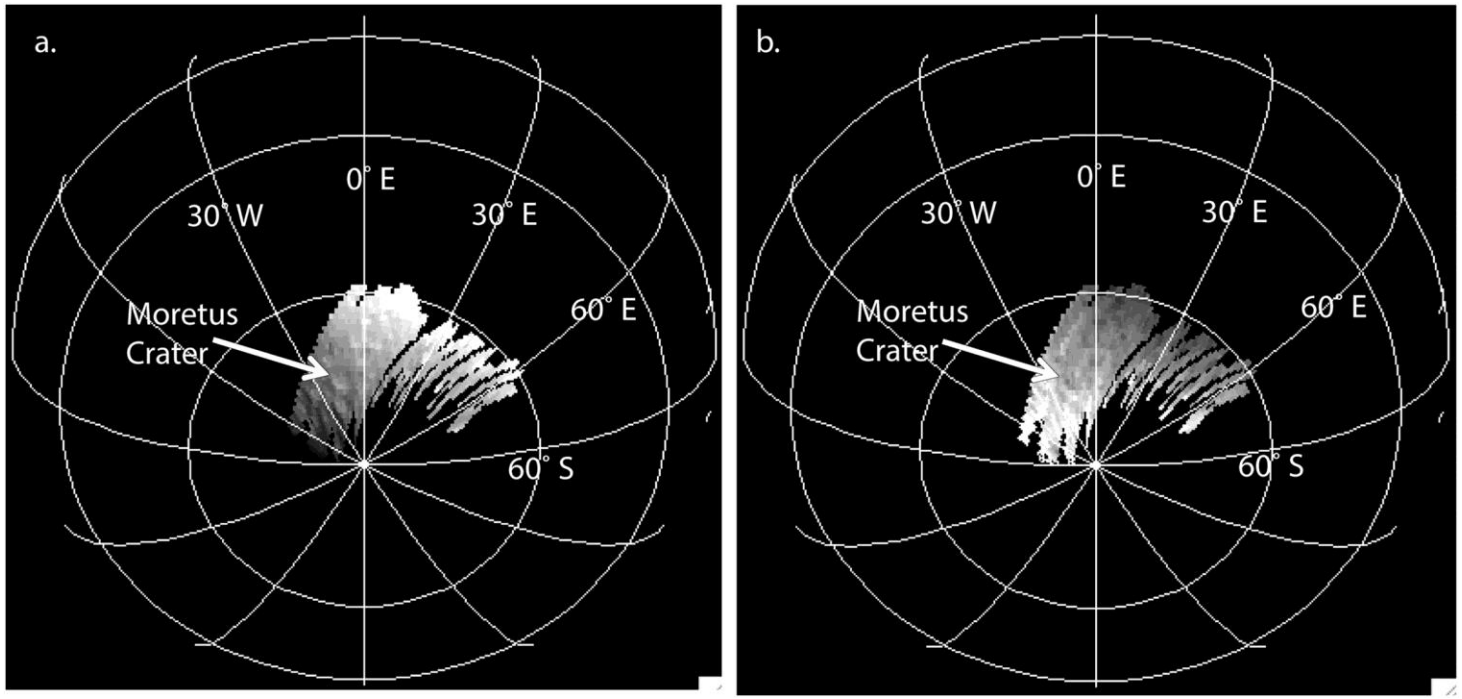
Cycle 9 Legacy Program Publications

Lunar Water Survey 09_0171 – 1 paper
Honniball, C.+ 2022, "Regional Map of Molecular Water at High Southern Latitudes on the Moon Using 6 µm Data From the Stratospheric Observatory for Infrared Astronomy"

LMC+ 09_0036 – 0 papers

B Fields in Galactic Center 09_0054 – 0 papers

SIMPLIFI 09_0215 – 0 papers



Lunar Water Survey

Honniball, C.+ 2022