# SOFIA Cycle 5 Selection

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SOFIA
*Stratospheric Observatory for Infrared Astronomy*

# Highlights of Selection Document

- Timeline
- Major Changes from prior Cycle
- Cycle Comparison table
- Deployment recommendation detail
- Selected Program Highlights

# Timeline for Cycle 5

- Call issued: April 29, 2016 ✔
- Call update: June 10, 2016 ✔
- US Proposal deadline: July 1, 2016 ✔
- German TAC deadline: July 8, 2016 ✔
- US TAC: 17-19 Aug 2016 ✔
- German TAC:  September 1-2, 2016 ✔

- Selections announced: October 24, 2016 ✔

- Nominal Cycle 4 observing period:
  1 Feb 2017 – 31 January 2018.

# Major Changes from Cycle 4

- HIPO not offered as a Guest Investigator Instrument. Use of HIPO available through Guaranteed Time Observations assigned to PI.
  - High-speed visual photometry still available through the Focal Plane Imager Plus (FPI+)
- FLITECAM not offered for Southern Deployment in Cycle 5
- HAWC+ offered only as a Shared-Risk instrument
- For GREAT, the H-channel operating at 4.7 THz offered as in previous Cycles. The CfP offered the possibility that H-channel observations will be done with the High Frequency Array.

# Policies Continued in Cycle 5

- Large "Impact" proposals were encouraged
  - Mechanism for dividing time 80:20 between US and Germany for large proposals maintained
- High Level of Guest Investigator funding maintained

# Important Assumptions

- HAWC+ will begin commissioning in December 2016
- Two-cryocooler system installation on aircraft will be completed during Maintenance/Upgrade #13 in April 2017.
- upGREAT, FIFI-LS, and FORCAST will be deployed to New Zealand
- upGREAT configurations available during Cycle 5 will be:
  - L1/LFA during OC5A
  - LFA/HFA during OC5G
  - LFA/HFA during OC5H Part 1 (Deployment)
  - 4GREAT/HFA during OC5H part 2 (Deployment)
- Schedule includes support for DLR Days deployment
- SOFIA will support the Triton occultation event on 5 October 2017
  - Requires mini-deployment to US East Coast

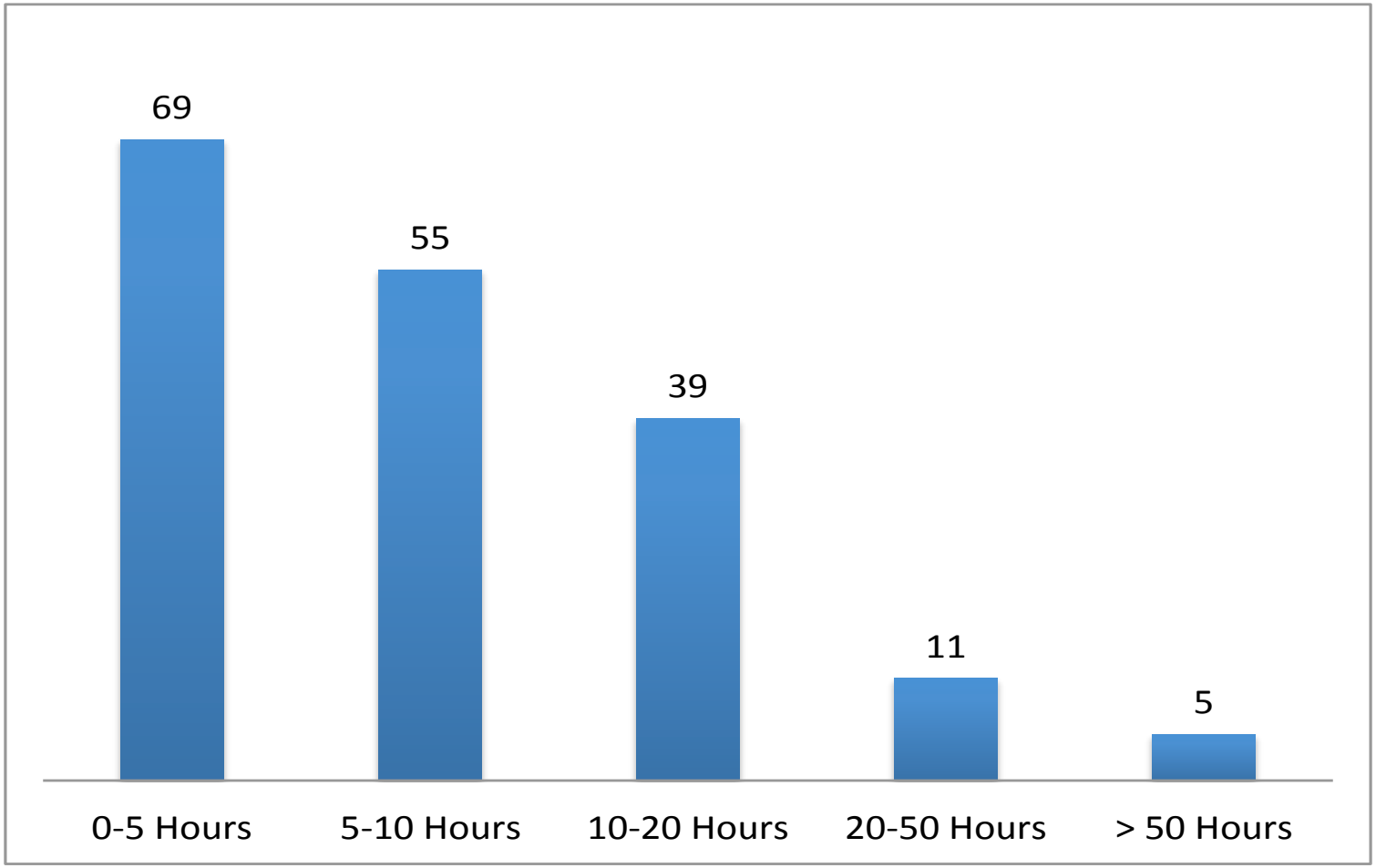
# Cycle Comparison Table

| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 |
|---|---|---|---|---|---|
| CfP Date | 14-Nov-11 | 29-Apr-13 | 29-May-14 | 1-May-15 | 29-Apr-16 |
| Cycle Execution | Jun 2013- Feb 2014 | Feb 2014- Feb 2015 | Mar 2015 - Jan 2016 | Feb 2016 - Jan 2017 | Feb 2017 - Jan 2018 |
| | | | | | |
| US Hours Offered | 200 | 175 | 450 | 500 | 475 |
| DE Hours Offered | 48 | 47 | 45 | 80 | 75 |
| | | | | | |
| US Proposals | 132 | 89 | 122 | 155 | 179 |
| DE Proposals | 39 | 27 | 31 | 30 | 26 |
| | | | | | |
| US Hours Requested | 1293 | 545 | 1075 | 1582 | 1749 |
| DE Hours Requested | 186 | 67 | 104 | 150 | 221 |
| | | | | | |
| | | | | | |
| US Approved Proposals | 42 | 62 | 63 | 80 | 72 |
| DE Approved Proposals | 18 | 19 | 24 | 18 | 23 |
| | | | | | |
| US Hours Awarded* | 178 | 165 | 420 | 478 | 455 |
| DE Hours Awarded* | 52.5 | 43.8 | 46 | 80 | 80 |
| Carryover Observed | | | 18 | 27 | 36 est |
| | | | | | |
| Hours Executed | 149 | 173 | 327 | 275 | |

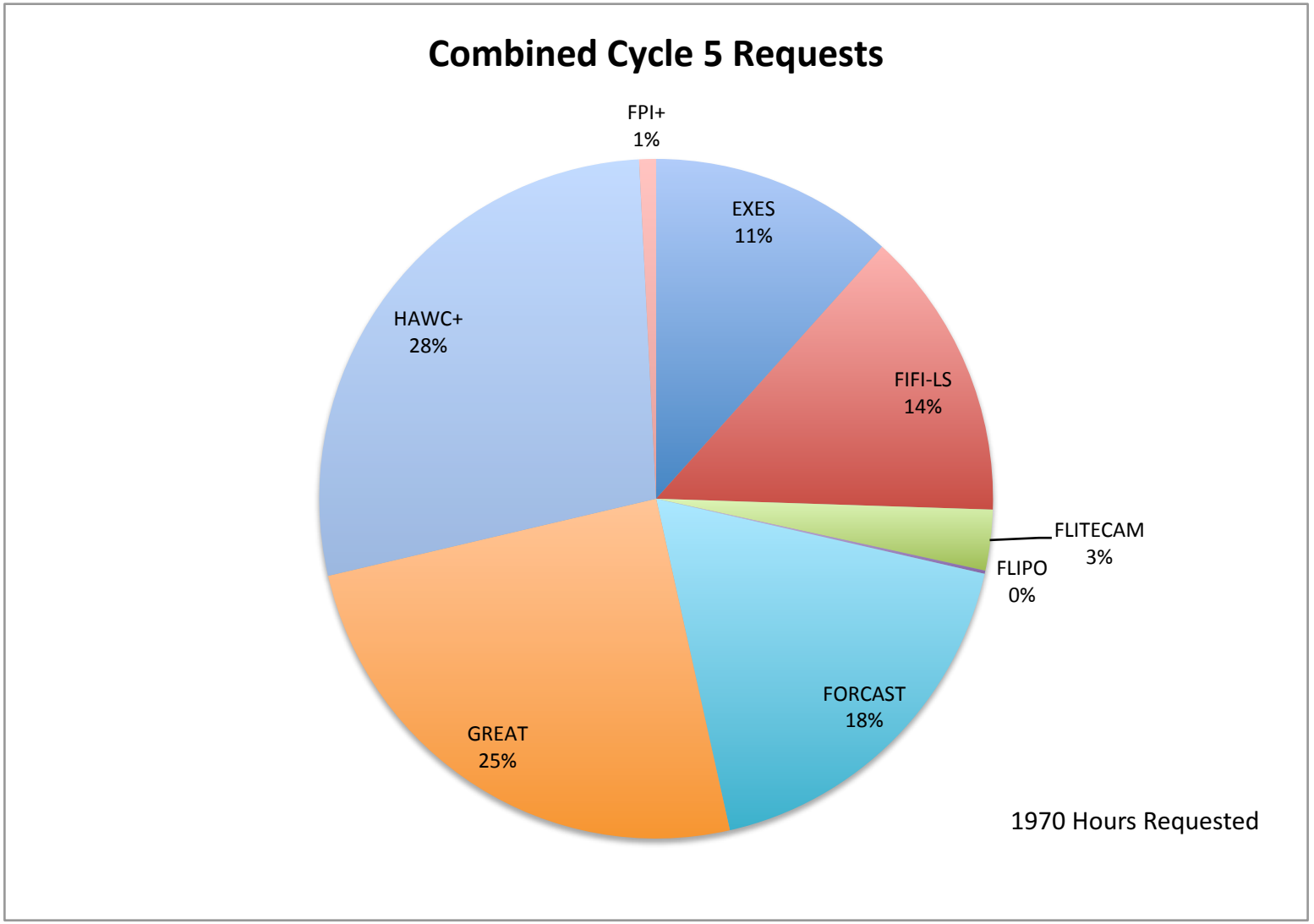
* Does not include "Do If Time"

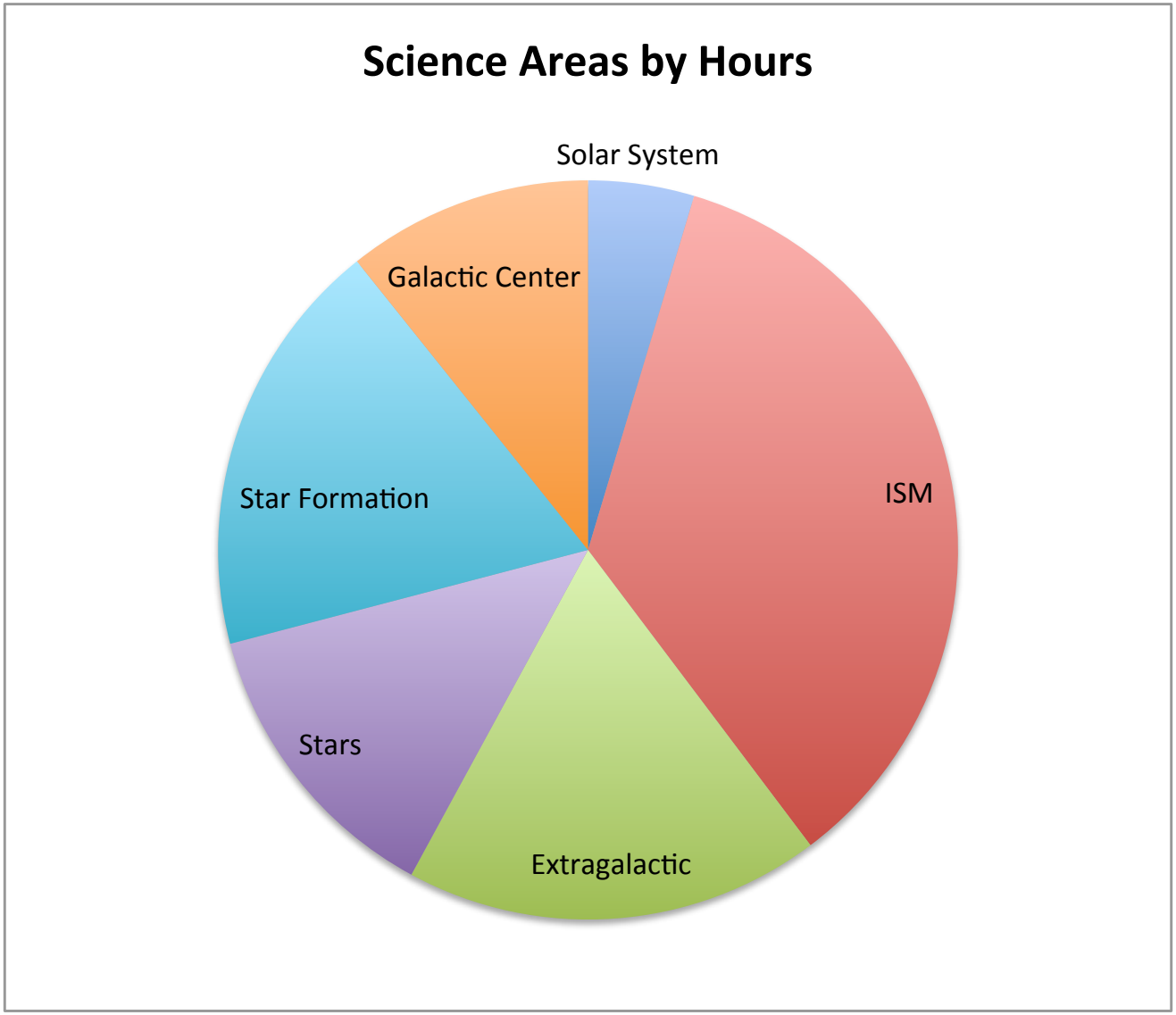
As of 10/1/16

# US Queue Proposal Size Distribution



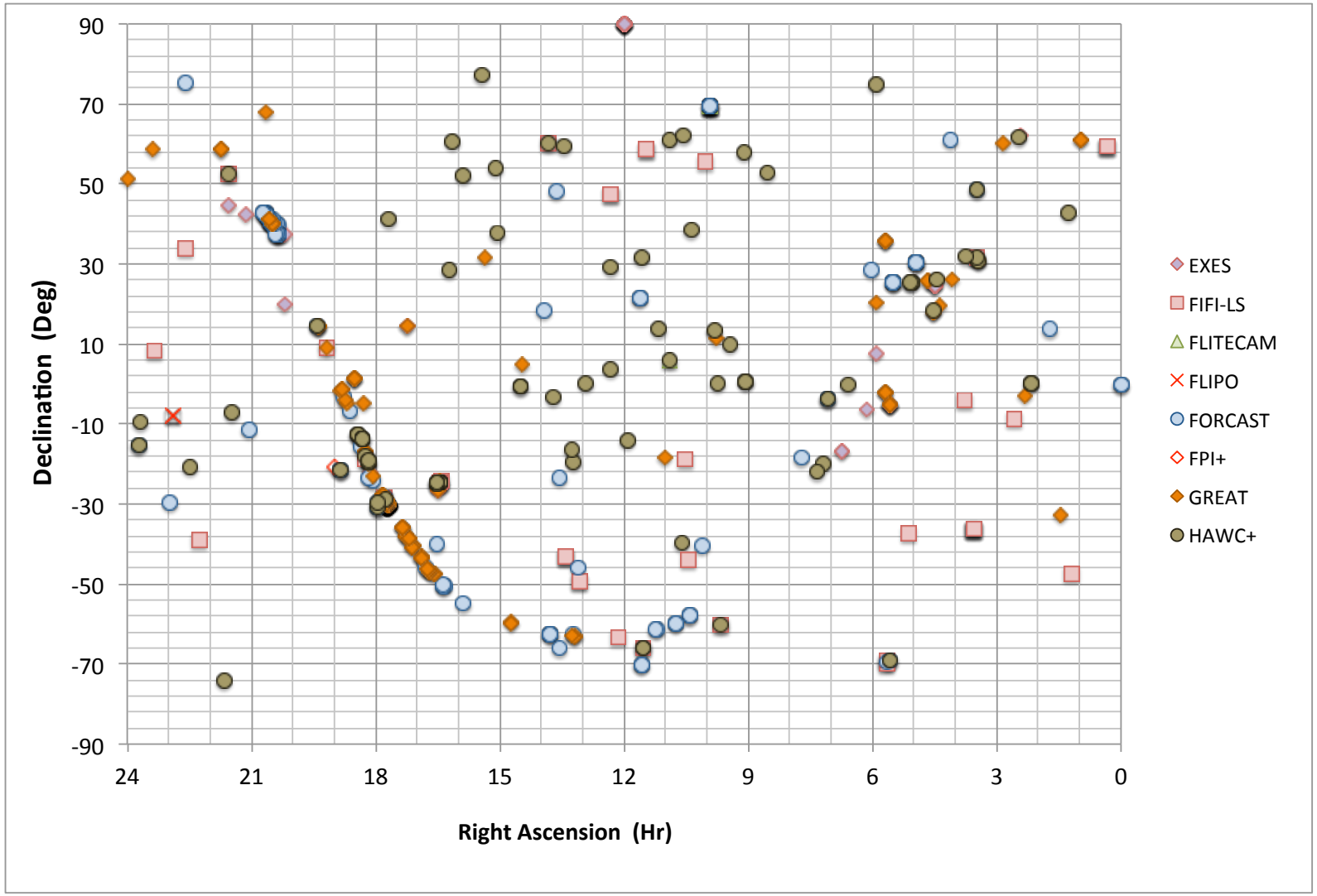
# SOFIA Cycle 5




Science Areas by Hours
Solar System
Galactic Center
ISM
Star Formation
Stars
Extragalactic

# Target Distribution

## Cycle 5 Selected Targets



# Deployment Recommendation Detail

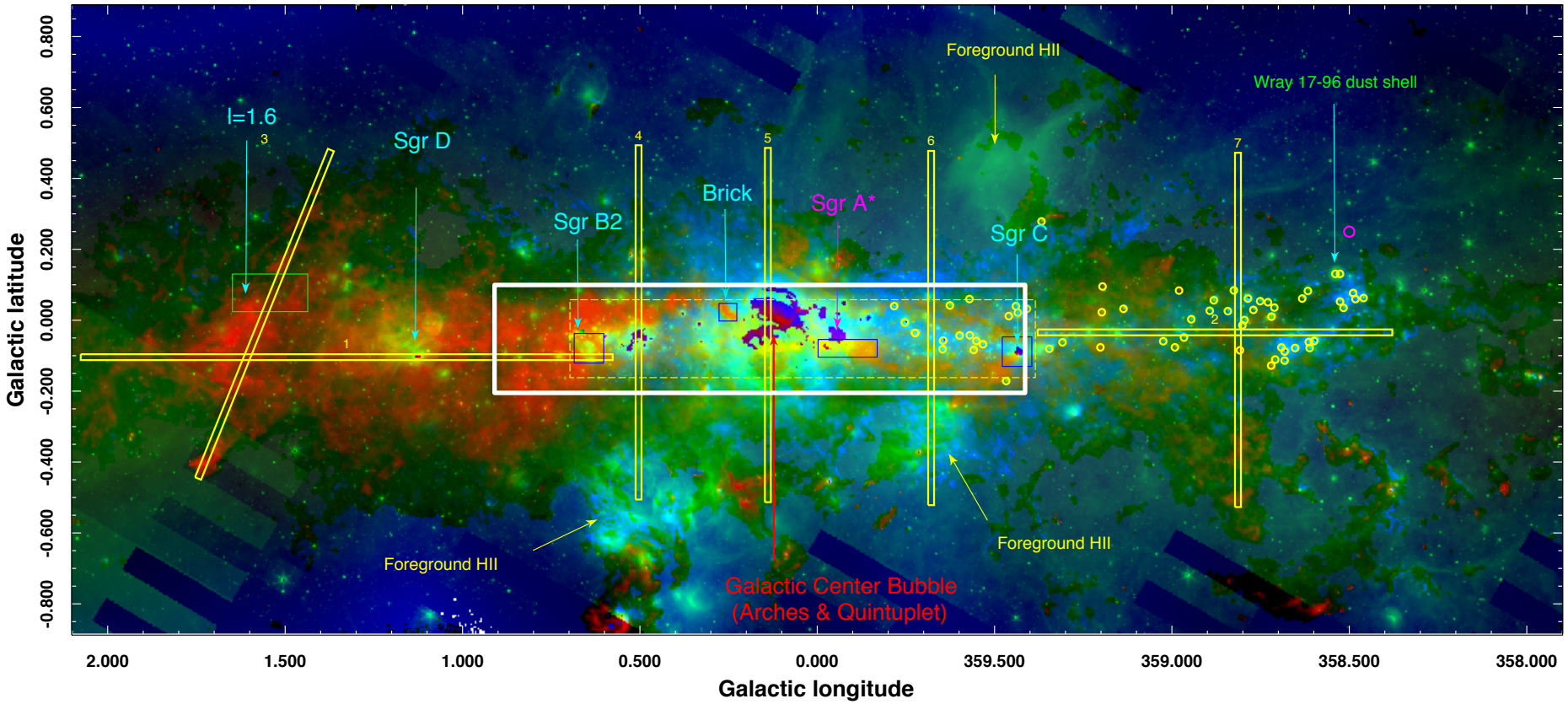
- Eight week total duration
- Three instrument complement
- Assume 4GREAT commissioning will be conducted during Consortium Time on deployment
- Schedule is consistent with one hard down day per 7-day period
- Exact distribution of flights will be worked in the next two months

| 28-May | 29-May | 30-May | 31-May | 1-Jun | 2-Jun | 3-Jun |
|---|---|---|---|---|---|---|
| | Memorial Day | SI Remove | SI Install | SI Install | | |
| 4-Jun | 5-Jun | 6-Jun | 7-Jun | 8-Jun | 9-Jun | 10-Jun |
| | upGREAT LFA/HFA Commissioning | upGREAT LFA/HFA Commissioning | OC5G upGREAT LFA/HFA | OC5G upGREAT LFA/HFA | | |
| 11-Jun | 12-Jun | 13-Jun | 14-Jun | 15-Jun | 16-Jun | 17-Jun |
| | OC5G upGREAT LFA/HFA | OC5G upGREAT LFA/HFA | OC5G upGREAT LFA/HFA | | | |
| 18-Jun | 19-Jun | 20-Jun | 21-Jun | 22-Jun | 23-Jun | 24-Jun |
| | | | | Ferry Flight | Ferry Flight | Ferry Flight |
| 25-Jun | 26-Jun | 27-Jun | 28-Jun | 29-Jun | 30-Jun | 1-Jul |
| Media Day | Orientation | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | Post Flight |
| 2-Jul | 3-Jul | 4-Jul | 5-Jul | 6-Jul | 7-Jul | 8-Jul |
| Down | Prep | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | OC5H upGREAT LFA/HFA | Channel Swap |
| 9-Jul | 10-Jul | 11-Jul | 12-Jul | 13-Jul | 14-Jul | 15-Jul |
| Down | Optical Alignment | OC5H upGREAT 4G/HFA | OC5H upGREAT 4G/HFA | OC5H upGREAT 4G/HFA | OC5H upGREAT 4G/HFA | Post Flight |
| 16-Jul | 17-Jul | 18-Jul | 19-Jul | 20-Jul | 21-Jul | 22-Jul |
| Down | Prep | OC5H upGREAT 4G/HFA | OC5H upGREAT 4G/HFA | SI Remove | SI Install | SI Install |
| 23-Jul | 24-Jul | 25-Jul | 26-Jul | 27-Jul | 28-Jul | 29-Jul |
| Down | OC5I FIFI-LS | OC5I FIFI-LS | OC5I FIFI-LS | OC5I FIFI-LS | SI Remove | SI Install |
| 30-Jul | 31-Jul | 1-Aug | 2-Aug | 3-Aug | 4-Aug | 5-Aug |
| SI Install | Down | OC5J FORCAST | OC5J FORCAST | OC5J FORCAST | OC5J FORCAST | Post Flight |
| 6-Aug | 7-Aug | 8-Aug | 9-Aug | 10-Aug | 11-Aug | 12-Aug |
| Down | OC5J FORCAST | OC5J FORCAST | | | | Ferry Flight |
| 13-Aug | 14-Aug | 15-Aug | 16-Aug | 17-Aug | 18-Aug | 19-Aug |
| Ferry Flight | SI Remove | Crew Rest | Crew Rest | Crew Rest | Crew Rest | |

# Science Highlight - Galactic Center

- Four very highly rated proposals were selected to investigate the Galactic Center with upGREAT
- C+ Mapping
  - 05_0076 Bally – "Impact Program: The Outer CMZ C+ Survey"
  - 05_0022 Harris & 05_0033 Guesten – "Joint Impact Proposal: Mapping C+ Across the Galaxy's Central Molecular Zone"
- [O I] Mapping
  - 05_0021 Ragan – "Cooling and kinematics in the Central Molecular Zone"
  - 05_0102 Morris – "Characterizing Neutral Gas in the Central Parsec of the Galaxy"

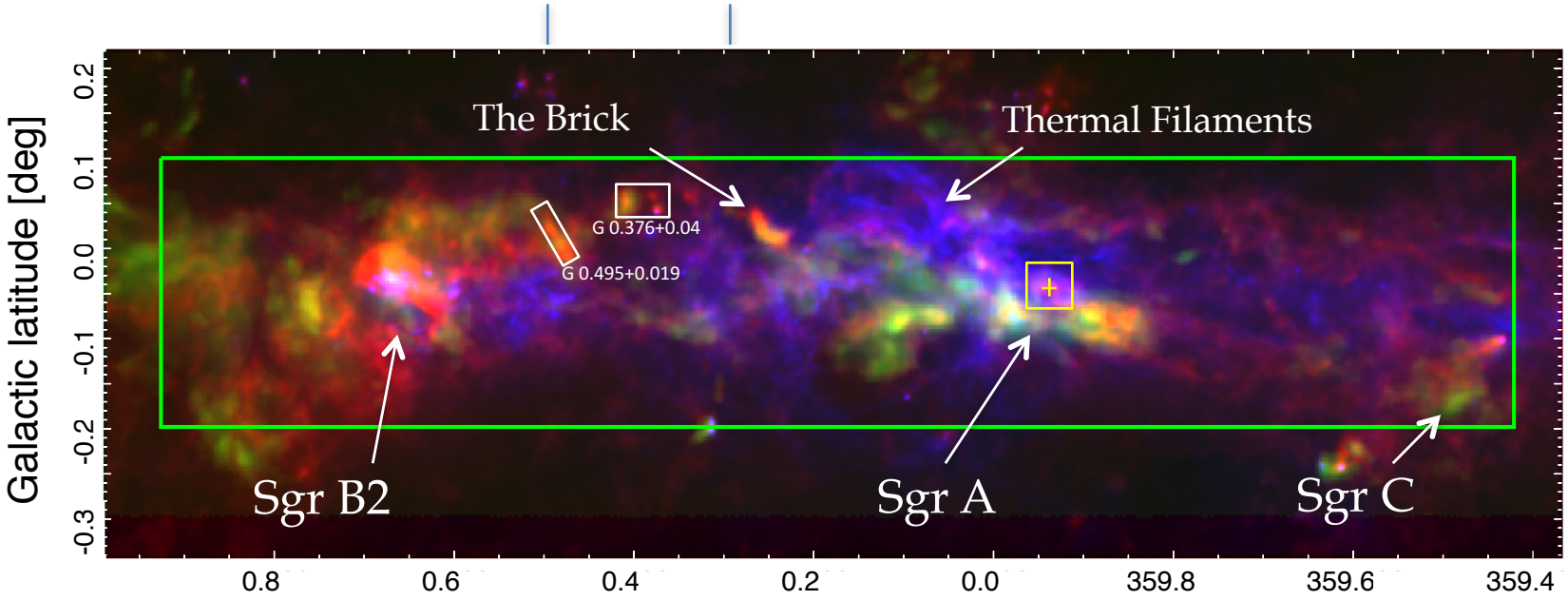
# Comparison of Mapped Regions




Yellow: Bally

White: Harris-Güsten

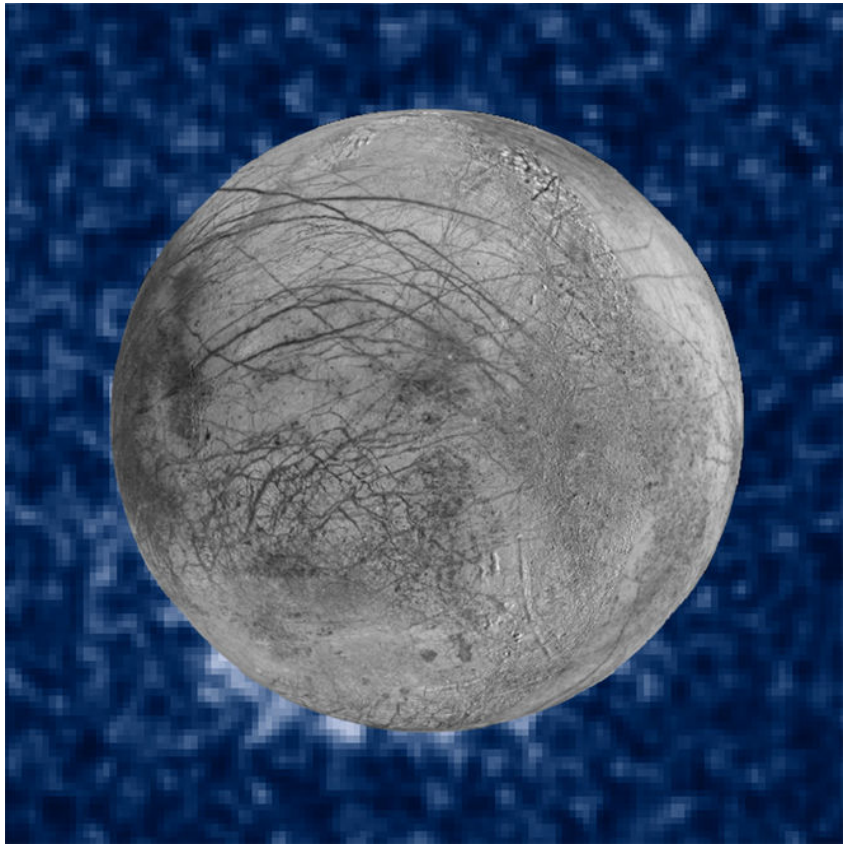
# Ragan and Morris Fields




White Boxes: 05_0022 Ragan
Yellow Box: 05_0102 Morris

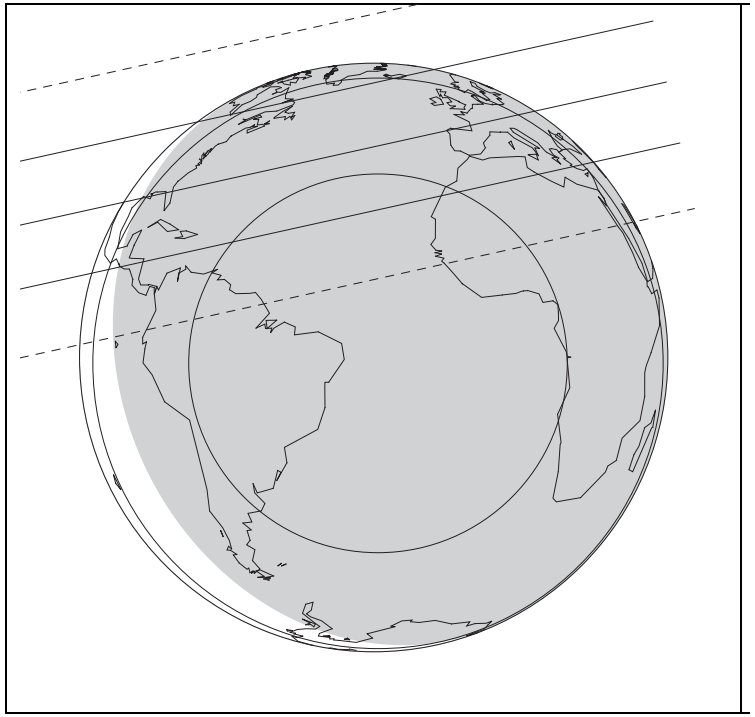
# Science Highlight – Water on Europa

- 05_0153 Sparks "Confirmation of Water Plumes on Europa"
- Observations with EXES at 6.27 μm to confirm HST observations of water plumes on the moon of Jupiter
  - Vibrational band of $H_2O$
- These observations would provide input to planning for mission in development to send a probe to Europa



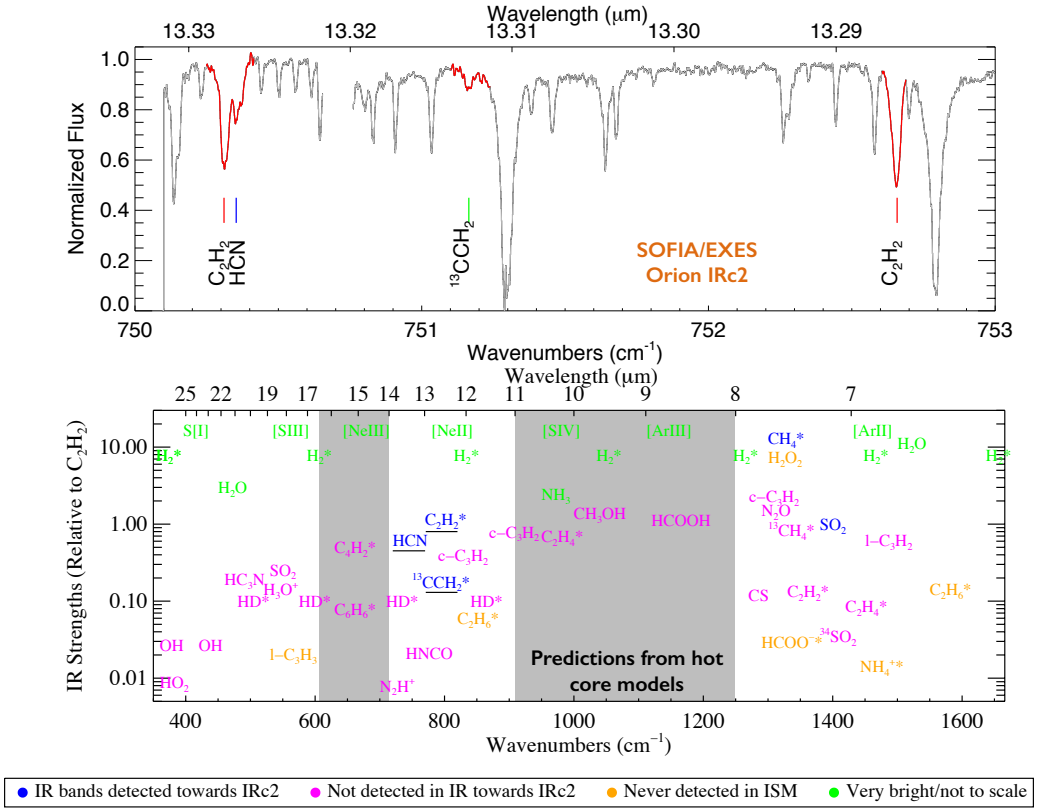
# Science Highlight - Occultation of Triton

- GTO observation of occultation of star by moon of Neptune on 2016-Oct-06
- 05_0125 Person – “A New Look at Triton's Atmosphere”
  - Proposal was evaluated by TAC and rated Excellent/Very Good
  - Will be conducted using GTO time
- Requires a mini-deployment to the US East Coast



# Science Highlight – High Resolution Spectral Survey

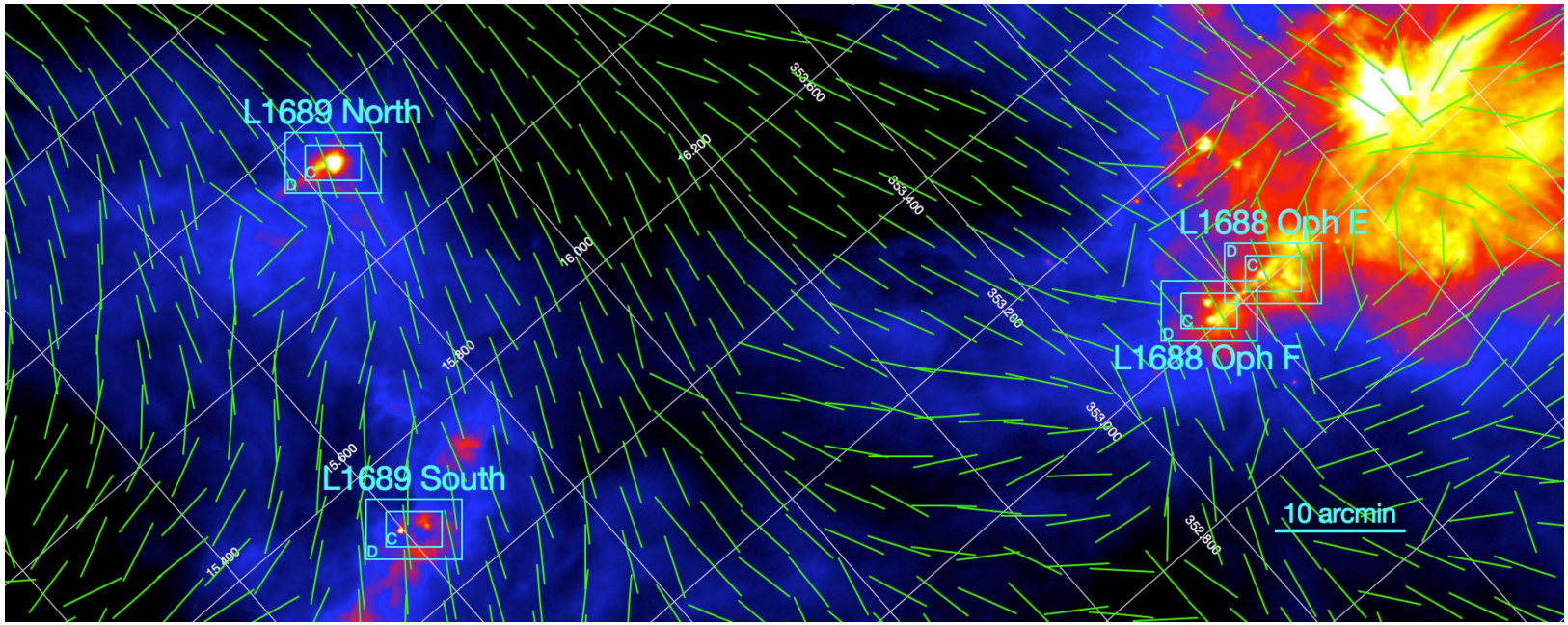
- 05_0043 Naseem Rangwala
  An EXES High-Resolution Molecular Line Survey towards Orion IRc2
- Mid-infrared survey of the spectrum of gas towards Orion IRc2, a prototypical hot-core source.
- Unprecedented resolving power (R = 50,000) will be 5 to 50 times more powerful than ISO in identifying narrow lines
- Study will provide a wealth of information on hot core chemistry




a) Spectrum from Cycle 3 pilot program toward IRc2
b) Likely molecules from hot core models

# Science Highlight: Studying Magnetic Fields

- 05_0133 Novak - "Joint HAWC+/ALMA study of magnetic fields in Ophiuchus"
- HAWC+ will have 35x better angular resolution than the Planck polarimeter and provides a bridge to the very much higher resolution observations of ALMA




Large scale B-field directions from Planck 850 mm polarimetry superposed on Herschel 160 mm dust emission
Individual targets are being studied using ALMA