SOFIA Update

Erick Young

28 April 2014
Topics

• What’s been happening on the Mission
  – Full Operational Capability
  – FIFI-LS First Light
  – EXES First Light
  – Cycle 2 Observations

• Recent Events
  – President’s FY 2015 Budget Proposal
  – Congressional hearings
  – Science Advisory Committees
    • Astrophysics Subcommittee
    • Space Studies Board

• Upcoming Activities
  – SOFIA Working Group
  – Cycle 3 Call for Proposals
## Cycle 2 Detailed Planning Overview

### Observing Cycle 2

<table>
<thead>
<tr>
<th>OC</th>
<th>Flights</th>
<th>R. Hrs.</th>
<th>CfP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>38</td>
<td>265.9</td>
<td>151.3</td>
</tr>
</tbody>
</table>

- **Bold Outline**: Actual Flight / Line Ops
- **Red Outline**: Platform Integration Opportunity
- **H**: Holiday  **SD**: Safety Day  **GH**: German Holiday

Science hour estimates were calculated based on maximum possible flights at 89% reliability.

3/06/2014

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**Note:**
- **FOC 2/21/14**
- **KDP E**
- **Cycle 1 End**
- **Cycle 2 Start**
- **Cycle 1 End**
- **Call for Cycle 3 Proposals**

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**Still Being Developed**

Rev. B
### Cycle 2 Detailed Planning Overview

#### Aircraft & TA Heavy Maintenance

| June  | 6 | 7 | 8 | 9 | 10| 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|
| July   | 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 31| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|
| August | 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 31| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|

#### Observatory Project

| June  | 6 | 7 | 8 | 9 | 10| 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|
| July   | 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 31| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|
| August | 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10|

#### Science hour estimates were calculated based on maximum possible flights at 89% reliability.

Pre-decisional. For Internal Program Use Only. Do not distribute.
SOFIA Reaches Full Operational Capability

• Full Operational Capability (FOC) is a milestone set by NASA HQ to demonstrate readiness to conduct regular science by satisfying key Level 1 requirements
  – 2.5-m Telescope with specified wavelength coverage, elevation range, and image quality
  – 6 hours of operation at 41,000 ft
  – Global Operations
  – Capable of changing instruments between flights
  – Capable of 20 years of operations
  – Capable of supporting 40 investigator teams per year
  – 4 instruments commissioned
  – Promote educational activities and public outreach

• All the FOC criteria were satisfied with the commissioning of FLITECAM in February
FIFI-LS and EXES First Light

FIFI-LS on the telescope
First Light Flight 150
Details in Randolf Klein’s presentation

EXES Team after installation
First Light Flight 158
Details in Matt Richter’s presentation
Cycle 2

• The team has been doing an amazing job of executing the mission of SOFIA
  – FLITECAM commissioned
  – FIFI-LS and EXES saw first light
  – Successful FORCAST flight series
  – New systems or new versions brought on line
    • TA Sim, DCS, Pipeline, Short Term Scheduler, Vacuum Pump System
  – Preparations for upcoming flights

  – Only a net of 6 lost hours since the start of Cycle 2
Cycle 2 Cumulative Research Hours

As of 28 April 2014
# Guest Investigator Time

As of 25 April 2014

<table>
<thead>
<tr>
<th></th>
<th>Cycle 1 US (hours)</th>
<th>Cycle 1 German (hours)</th>
<th>Cycle 1 Total (hours)</th>
<th>Cycle 2 US (hours)</th>
<th>Cycle 2 German (hours)</th>
<th>Cycle 2 Total (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORCAST</td>
<td>25.8</td>
<td>2.0</td>
<td>27.8</td>
<td>26.1</td>
<td>0.0</td>
<td>26.1</td>
</tr>
<tr>
<td>GREAT</td>
<td>39.3</td>
<td>35.6</td>
<td>74.9</td>
<td>1.6</td>
<td>1.0</td>
<td>2.6</td>
</tr>
<tr>
<td>FLITECAM</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>4.5</td>
<td>0.0</td>
<td>4.5</td>
</tr>
<tr>
<td>FLIPPO</td>
<td>2.9</td>
<td>0.0</td>
<td>2.9</td>
<td>1.8</td>
<td>1.8</td>
<td>3.6</td>
</tr>
<tr>
<td>FIFI-LS</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>2.2</td>
<td>4.7</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>68.0</strong></td>
<td><strong>37.6</strong></td>
<td><strong>105.6</strong></td>
<td><strong>36.2</strong></td>
<td><strong>7.5</strong></td>
<td><strong>43.7</strong></td>
</tr>
</tbody>
</table>

Note: FIFI-LS includes flight scheduled 4/25/2014
# US Guaranteed Time Usage

As of 24 April 2014

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Original Allocation (hrs)*</th>
<th>Observing Time Used (hrs)</th>
<th>Remaining Guaranteed Time (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORCAST</td>
<td>50</td>
<td>12.3</td>
<td>37.7</td>
</tr>
<tr>
<td>FLITECAM</td>
<td>25</td>
<td>1.9</td>
<td>23.1</td>
</tr>
<tr>
<td>HIPO</td>
<td>15</td>
<td>5.5</td>
<td>9.5</td>
</tr>
<tr>
<td>FLITECAM+HIPO</td>
<td>25</td>
<td>0.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Budget Situation
Federal Budget Process

• The President's Budget Request
  – FY 2015 Request was released on March 4, 2014
• The Congressional Budget Resolution
• House Authorization
• Senate Authorization
• House Appropriation
• Senate Appropriation
• Conference Committee
• Signing by President
NASA FY2015 Budget Proposal

<table>
<thead>
<tr>
<th>Category</th>
<th>FY2013 Plan</th>
<th>FY2014 Enacted</th>
<th>FY2015</th>
<th>FY15-FY14</th>
<th>Delta</th>
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<tbody>
<tr>
<td>Science</td>
<td>4,781.60</td>
<td>5,151.20</td>
<td>4,972.00</td>
<td>-179.20</td>
<td>-3.5%</td>
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<tr>
<td>Earth Science</td>
<td>1,659.20</td>
<td>1,826.00</td>
<td>1,770.30</td>
<td>-55.70</td>
<td>-3.1%</td>
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<tr>
<td>Planetary Science</td>
<td>1,274.60</td>
<td>1,345.00</td>
<td>1,280.30</td>
<td>-64.70</td>
<td>-4.8%</td>
</tr>
<tr>
<td>Astrophysics</td>
<td>617</td>
<td>668</td>
<td>607.3</td>
<td>-60.70</td>
<td>-9.1%</td>
</tr>
<tr>
<td>JWST</td>
<td>627.6</td>
<td>658.2</td>
<td>645.4</td>
<td>-12.80</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Heliophysics</td>
<td>603.2</td>
<td>654</td>
<td>668.9</td>
<td>14.90</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
SOFIA Impacts of FY15 Proposal

- SOFIA was put on a path to termination in the FY 2015 budget request

<table>
<thead>
<tr>
<th></th>
<th>FY 2014</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>FY 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2014 Budget</td>
<td>87.4 M</td>
<td>87.3 M</td>
<td>85.2 M</td>
<td>85.1 M</td>
</tr>
<tr>
<td>FY 2015 Budget</td>
<td>87.4 M</td>
<td>12.3 M</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

- Unless partners were found to support the U.S. portion of SOFIA costs, NASA would place the aircraft into storage by FY 2015.
Recent Events
Congress

• Hearings
  – 3/26 House Science, Space, & Technology Committee
  – 3/27 House Space Subcommittee
    • Charlie Bolden questioned about SOFIA.
  – 4/8 House Appropriations Commerce-Justice-Science Committee
    • Rep. Mike Honda (CA) challenged Charlie Bolden about the decision to mothball SOFIA. Bolden said that the President’s budget was “only a proposal.”
  – 4/9 Space Subcommittee
    • Markup of FY 2014 NASA Authorization Bill – Nothing about SOFIA (but none expected since SOFIA was fully funded in FY 2014)

• Letters
  – Letter from Rep. Eshoo (CA) to House Appropriations Committee to restore funding to SOFIA
  – Letter from Rep. Smith (TX) & Palazzo (MS) to Charlie Bolden supportive of SOFIA
  – Letter from Sen. Feinstein & Boxer to Charlie Bolden supportive of SOFIA
Science Advisory Groups

• Astrophysics Subcommittee
  – Part of the NASA Advisory Committee
    • Strong questioning of Paul Hertz and John Grunsfeld regarding SOFIA decision
  – Letter to full Committee
    • “The decision to greatly reduce funding for the Stratospheric Observatory for Infrared Astronomy (SOFIA) in FY15, and discontinue funding in FY16 and beyond, is of deep concern to the APS…”

• Space Studies Board
  – Chartered by National Academy of Sciences
  – Responsible for the Decadal Reviews
  – Bolden and Hertz questioned about SOFIA decision making process

• American Astronomical Society
  – “We are particularly concerned by the 9 percent cut to the Astrophysics Division and the unanticipated decision to mothball a major mission outside the well-established senior review process.”
SOFIA Working Group

• NASA and DLR chartered a SOFIA Working Group to work out a path forward for the rest of 2014 and beyond
  – Basic premise is that the FY 2015 budget proposal is valid
  – HMV (Proceed, delay, or drop?)
  – Partners?

• NASA issued a Request for Information for potential partners
  – Held an “Industry Day” at Palmdale to show off SOFIA to potential partners on April 11

• Recommendations will be presented to NASA and DLR on Tuesday April 29.
Other Activities

• USRA is using company resources to inform Congress about SOFIA
  – Effort to line up support from key members

• We’ll be making our case to the scientific community
  – Goddard Far-Infrared Missions meeting
  – AAS

• Many steps to go, but so far so good.
Cycle 3 Call for Proposals
Cycle 3 Call for Proposals

• After the March 4 budget was released, the SMO was given direction to put the Cycle 3 CfP “on hold”

• Work continued internally to be prepared to issue the call if the landscape changed
  – Data Cycle System software
  – Draft Call for Proposals
  – Agreements with PI Instrument teams

• Last week we were given the go-ahead to proceed with the CfP
  – Includes language that covers the uncertainties in the current situation
  – CfP will need to be reviewed by NASA HQ
  – Goal is a release date ~ May 9
  – Details will be given in presentation by Ravi Sankrit

• Number of hours is a major uncertainty, but could be as high as 450 hours for the US Call
Near Term Calendar

- The team has been executing the planned Cycle 2 program excellently.
- Longer term schedule is highly fluid because of the budget uncertainties:
  - Likely short delay in executing the HMV to give NASA and Congress additional time to resolve the budget.
  - Content of Post-HMV observing program is not well defined.
  - Cycle 3 Call for Proposals will be issued in May 2014.