Two years of EAO operation of JCMT

Six proposal Calls down and half way through large programs

Bumpy year for instrument performance

SCUBA-2 has new filters

POL-2 operational

Visiting student program underway

Big year coming up…
In 18 months we have had six proposal calls (4 in first five months) 22,000 hours requested, and over 1200 astronomers involved in proposals

Average oversubscription of 3.5
P.I. TIME ALLOCATIONS

- 50% of each semester’s science time is allocated to PI science
- We have a single TAC reviewing all regional submissions
- We have a fractional allocation algorithm designed to encourage collaborations between regions with experience (but little $ therefore allocation) and less experienced regions with a lot of time to play with
- The key is to reward P.I.s who look to collaborate strongly between regions - and so we try to make that as easy as possible
- The TAC is charged with over-filling our flexible queues by 30-50%, and to maintain an eye on the relative regional allocations (which are scaled by financial contribution)
- We leave a fraction (currently 10%) open to ‘Best Science’ and this is not debited against any regional allocation
Ribbon shows collaboration
Colour = PI region
Width = # of investigators
Arc length = total # investigators
Chord diagram software:
http://mkweb.bcgsc.ca/tableviewer/
Unscheduled warm-up in July indicated that the pulse tubes needed replacing.

Pushed for planned warm-up in October to:
- Replace pulse tubes with new
- Install new filter stack designed by Cardiff

Cool-down started in mid-November - initially successful: first (preliminary) results suggest 20% improvement in throughput at 850 microns

BUT... a mixture tweak started another warm-up in early December.

We found a leak on cryostat exterior - after repair in January our cool-down was unsuccessful

Just last week we successfully cooled - and traced the issue to clogged filters in the gas handling system.
HARP

• Mostly operational until forced warm-up in January as result of failing cold-head which required repair and reinstallation
• Some issues with unstable receptors
• Tuning issues in mid-year required significant overhaul of tuning curves
• New mixer (ASIAA) installed at start of 2016 to improve low-frequency performance for better compatibility with Event Horizon Telescope VLBI

• Instabilities observed - suspected to be standing waves as result of altered mixer optics

• Uneven side-band ratios observed

• Significant and on-going work to characterize the calibration

• See Sarah Graves workshop talk on Wednesday for more details
# Future Instrument Project

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Type</th>
<th>Frequency</th>
<th>Pixels</th>
<th>Pols</th>
<th>Bandwidth</th>
<th>Tsys/NEFD</th>
<th>F.O.V. (arcmin²)</th>
<th>Map speed (x)</th>
<th>Timescale</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxA (230 - current)</td>
<td>Heterodyne</td>
<td>219 - 272 GHz</td>
<td>1</td>
<td>1</td>
<td>3 - 9 GHz</td>
<td>140</td>
<td>0.1</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>New 230 receiver</td>
<td>Heterodyne</td>
<td>210 - 275 GHz</td>
<td>1</td>
<td>2</td>
<td>4 - 10 GHz</td>
<td>100</td>
<td>0.1</td>
<td>3.9</td>
<td>2018</td>
</tr>
<tr>
<td>HARP (345 - current)</td>
<td>Heterodyne</td>
<td>325 - 375 GHz</td>
<td>16</td>
<td>1</td>
<td>3 - 5 GHz</td>
<td>250</td>
<td>2.3</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>New 345 receiver</td>
<td>Heterodyne</td>
<td>320 - 375 GHz</td>
<td>45</td>
<td>2</td>
<td>4 - 8 GHz</td>
<td>200</td>
<td>7.1</td>
<td>8.8</td>
<td>Nov. 2021</td>
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<tr>
<td>SCUBA-2</td>
<td>Continuum</td>
<td>850/450 μm</td>
<td>5120</td>
<td>-</td>
<td>-</td>
<td>93</td>
<td>30.1</td>
<td>1.0</td>
<td>Dec 2016 / Nov 2020</td>
</tr>
<tr>
<td>SCUBA-2+</td>
<td>Continuum</td>
<td>850/450 μm</td>
<td>6400</td>
<td>-</td>
<td>-</td>
<td>35</td>
<td>48.4</td>
<td>11.3</td>
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</table>
NEW 230GHZ RECEIVER

- Identical 3-cartridge dewar design as for the GLT
- Much better compatibility for EHT - first 230GHz cartridge with dual-polarization
- 345GHz cartridge following (HARP is ill-suited for VLBI)
- Remaining cartridge space for new ALMA technology testing, GLT testing, low-frequency East-Asian VLBI
• JCMT is part of EHT
• D ~ 9000 km
• Resolution ~ 10μas
• Goal: Resolve Black Hole shadow; measure spin and mass
• Fringes with ALMA in Sept 2015
VLBI PLANS AT JCMT

• Intent is to move to stand-alone VLBI station
• This reduces impact on SMA and allows full use of all antennas
• Current RxA receiver has new mixer for better compatibility with EHT frequencies
• Next EHT VLBI run in April to be using current receiver,
• Stand-alone VLBI capabilities at JCMT by end of 2017
• Obvious synergies with SMA offer further opportunities
1. 2015 - 2016:
   - EAO incorporated
   - JCMT operations assumed
   - JCMT Instrument upgrades begin
   - JCMT joins EHT

2. 2017
   - Access to 17A/17B Subaru time
   - Access to 17A/17B SMA time
   - EHT and standalone VLBI

3. 2018...
   - UKIRT operational partner?
   - Full Partnership with Subaru?
LARGE PROGRAM CALL (I)

- Large program call opened July 1st 2015
- Up to 3,676 hours available over three years
  - 50% of telescope time from December 2015 - January 2019 (end of 18B)
- Requirements:
  - self contained & answering number of important scientific questions
  - >200 hours
  - demonstrate legacy value
  - include members from multiple EAO partner regions
- Large Program call closed July 31st 2015
- seven approved programs

Available Survey hours

<table>
<thead>
<tr>
<th>Semester</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
<th>Total Hours</th>
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<tr>
<td>15B</td>
<td>36</td>
<td>51</td>
<td>38</td>
<td>36</td>
<td>35</td>
<td>197</td>
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<tr>
<td>16A</td>
<td>95</td>
<td>154</td>
<td>131</td>
<td>104</td>
<td>92</td>
<td>576</td>
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<tr>
<td>16B</td>
<td>70</td>
<td>148</td>
<td>121</td>
<td>122</td>
<td>122</td>
<td>584</td>
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<tr>
<td>17A</td>
<td>95</td>
<td>154</td>
<td>131</td>
<td>104</td>
<td>92</td>
<td>576</td>
</tr>
<tr>
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<td>148</td>
<td>121</td>
<td>122</td>
<td>122</td>
<td>584</td>
</tr>
<tr>
<td>Total</td>
<td>532</td>
<td>955</td>
<td>795</td>
<td>715</td>
<td>679</td>
<td>3676</td>
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</table>

Survey Hours Available

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5

Semester

- 15B
- 16A
- 16B
- 17A
- 17B
- 18A
- 18B
LARGE PROGRAM ALLOCATIONS

- 2,397 hours allocated to seven programs
- Programs ranked on scientific merit
- Under-allocation of time will allow programs to be completed faster than predicted - faster science return
- Mid-Term review March 2017
  - review current programs
  - accept new programs
  - return unallocated hours to PI queue
- Only members from EAO partners and regions can have access to raw and initial data products

### Large Program Allocations

<table>
<thead>
<tr>
<th>Large Program</th>
<th>Instrument</th>
<th>Hours awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Transient Search for Variable Protostars</td>
<td>Sc-2</td>
<td>150</td>
</tr>
<tr>
<td>S2-COSMOS: An EAO SCUBA-2 survey of 1,000 SMGs in the COSMOS field</td>
<td>Sc-2</td>
<td>223</td>
</tr>
<tr>
<td>SCOPE: SCUBA-2 Continuum Observations of Pre-protostellar Evolution</td>
<td>Sc-2</td>
<td>300</td>
</tr>
<tr>
<td>BISTRO: B-fields In STar forming RegiOns</td>
<td>Pol-2</td>
<td>224</td>
</tr>
<tr>
<td>JINGLE: the JCMT dust and gas In Nearby Galaxies Legacy Exploration</td>
<td>Sc-2/RxA</td>
<td>780</td>
</tr>
<tr>
<td>STUDIES: SCUBA-2 Ultra Deep Imaging EAO Survey</td>
<td>Sc-2</td>
<td>330</td>
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<tr>
<td>MALATANG: Mapping the Dense Molecular Gas in the Strongest Star-forming Galaxies</td>
<td>HARP</td>
<td>930</td>
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<tr>
<td>Total</td>
<td></td>
<td>2397</td>
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</table>

### Hours awarded per weather band

<table>
<thead>
<tr>
<th>Large Program</th>
<th>Band 1</th>
<th>Band 2</th>
<th>Band 3</th>
<th>Band 4</th>
<th>Band 5</th>
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</thead>
<tbody>
<tr>
<td>Transient</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2-COSMOS</td>
<td></td>
<td>111</td>
<td>112</td>
<td></td>
<td></td>
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<tr>
<td>SCOPE</td>
<td></td>
<td></td>
<td>150</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>BISTRO</td>
<td></td>
<td></td>
<td></td>
<td>224</td>
<td></td>
</tr>
<tr>
<td>JINGLE</td>
<td></td>
<td>57</td>
<td>123</td>
<td>200</td>
<td>400</td>
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<tr>
<td>STUDIES</td>
<td></td>
<td></td>
<td></td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>MALATANG</td>
<td></td>
<td>40</td>
<td>100</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>
LARGE PROGRAM PROGRESS

Completion as of 2017-02-08 00:47

Percentage completion

LARGE PROGRAM PROGRESS

Data observed before February 2016 are now publicly available via CADC
LARGE PROGRAM MID TERM REVIEW AND OPEN CALL

Hedwig is now open to accept proposals
**LARGE PROGRAM CALL (II)**

- Large Program call opens Feb 13th 2015 - TODAY
- Up to 3,000 hours available over 2.5 years
  - 50% of telescope time from August 2017 - January 2020 (end of 19B)
- Requirements:
  - self contained & answering number of important scientific questions
  - > 200 hours
  - demonstrate legacy value
  - include members from multiple EAO partner regions
- Large Program call closes March 15th 2017

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**Table: Available Hours**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
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<tr>
<td>17B</td>
<td>65</td>
<td>155</td>
<td>130</td>
<td>130</td>
<td>130</td>
<td>610</td>
</tr>
<tr>
<td>18A</td>
<td>90</td>
<td>160</td>
<td>135</td>
<td>100</td>
<td>100</td>
<td>585</td>
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<td>130</td>
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<td>160</td>
<td>135</td>
<td>100</td>
<td>100</td>
<td>585</td>
</tr>
<tr>
<td>19B</td>
<td>65</td>
<td>155</td>
<td>130</td>
<td>130</td>
<td>130</td>
<td>610</td>
</tr>
<tr>
<td>Total avail</td>
<td>375</td>
<td>785</td>
<td>660</td>
<td>590</td>
<td>590</td>
<td>3000</td>
</tr>
</tbody>
</table>

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Watch this space and get involved now!
Regular Call for Semester 17B

Semester Information

<table>
<thead>
<tr>
<th>Queue</th>
<th>Large Program</th>
<th>PI Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call for proposals date</td>
<td>2017-03-16 01:00 UT</td>
<td>2017-05-16 01:00 UT</td>
</tr>
</tbody>
</table>

The East Asian Observatory invites observing proposals of two types at this time:

1. 17B PI Proposals

Proposals with Principal Investigators (PIs) from its partner regions (China, Japan, South Korea, Taiwan) or from eligible PIs in the UK and Canada. Please check the eligibility requirements to see if you are eligible to submit a 17B PI proposal.

PI requests are limited to a maximum of 200 hours; each PI proposal should aim to be

- The Time Allocation Committee (TAC) for JCMT will assess each PI proposal on an equal basis and allocate observing time accordingly.
- We encourage multi-national collaboration — time will be distributed following the rules for collaborative projects.
- We also encourage projects which request the heterodyne instruments and/or weather bands 4 and 5.
- Anyone who submits a proposal to the JCMT should expect to be called upon to review one or two of the other proposals received in the same round. Your co-operation in the review process is appreciated.

2. JCMT Large Programs II (to encompass all semesters from 17B up to and including 19B)
The East Asian Observatory is pleased to partner with the Subaru Telescope to enable astronomers from an East Asian participant region to have access to Subaru time. The East Asian Observatory proposals are considered by the Subaru scientific panel alongside regular Subaru proposals, with a guaranteed award of time of a total of 3 nights of observing in the semester.

*The 17B semester Call at the Subaru Telescope is now open, click here for more details.*

If you have any questions related to the EAO/Subaru partnership, future proposals or past programs please email:

EAO_subaru @ eaobservatory.org

**Open Enrollment for successful proposals**

The following link provides details of past successful EAO/Subaru proposals. Details of these projects ad how to get involved with there programs.
Reporting back

Summit Report Form
Summit observers should fill in the following form on completion of their observing run. It is important for JCMT’s records and to ensure that any problems encountered during the run are dealt with. Your feedback will also help inform our future planning for improvements to our level of service and support. Completion of the form should take no more than 5-10 minutes:

PI Semester Report Form
If you have any problems, questions or concerns with your project before, during or after your data has been collected you should feel free to contact your Friend of Project or support scientist. You can contact your Friend of Project by sending an email to flex@eaobservatory.org, and by putting the project ID in square-parentheses [] in the Subject line, i.e. [m15a72].

http://www.eaobservatory.org/jcmt/observing/support/reporting-back/
OBSERVATORY SUPPORT - COME JOIN US!

http://www.eaobservatory.org/east-asia-observatory/employment/jcmtjobs/
**JCMT SOFTWARE UPDATES**

- **Starlink 2016A** was released: this must be used for any data taken in 2017 onwards (leap second support).

**POL-2 reduction software** included in Starlink 2016A: see tutorial in DR workshop.

David Berry is developing improved DR software that won't require a separate SCUBA-2 map for POL-2 DR.

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**Starlink**

The Starlink Project was a long running UK Project supporting astronomical data processing. It was shut down in 2005 but the software continued to be developed at the Joint Astronomy Centre until March 2015, and is now maintained by the East Asian Observatory. The code is open source.

**Starlink News** was last updated November 15th 2016.

**Getting the Software**

The Joint Astronomy Centre and East Asian Observatory have made a number of Releases. The most recent is **2016A** which can be downloaded from [here](http://starlink.eao.hawaii.edu/starlink) where installation instructions are also provided.

Please note that there will be a leap second at the end of December 2016; data taken since then will be gridded wrongly by all releases prior to **2016A**. Please use **2016A** (or a development rsync version) to reduce JCMT data taken from this point onwards.

For a cutting edge version, you can rsync from the East Asian Observatory.

**Citing the software**

If you have used Starlink software in your research, please cite the software in your papers.

For the Starlink software package please use:

- Starlink citation: Currie et al 2014. [2014ASPC..485..391C](http://starlink.eao.hawaii.edu/starlink)
- Starlink acknowledgement: “The Starlink software (Currie et al 2014) is currently supported by the East Asian Observatory.”
JCMT SOFTWARE UPDATES

- Starlink 2016A was released: this must be used for any data taken in 2017 onwards (leap second support)
  - POL-2 reduction software included in Starlink 2016A: see tutorial in DR workshop
  - David Berry is developing improved DR software that won’t require a separate SCUBA-2 map for POL-2 DR.

- Observing Tool: improved auto-update capabilities.

http://www.eaobservatory.org/jcmt/observing/software-installation/#observing-tool
USER MEETING WORKSHOP - 15TH FEBRUARY

BISTRO meeting 15th

Transient workshop 15th & 16th

www.eaobservatory.org/jcmt/help/workshops/

Workshops

It is noted that prior to all workshops participants must ensure their Starlink software is up to date and use the Starlink support mailing list for questions/concerns (also you can email helpdesk@eaobservatory.org).

February 2019

On February 15th JCMT will provide a JCMT Users workshop covering a range of topics for interested astronomers in Nanjing, China. This workshop will be given as part of the JCMT Users Meeting. The topics covered will include:

- JCMT Observing Tool tips and tricks