JCMT Proposal Preparation

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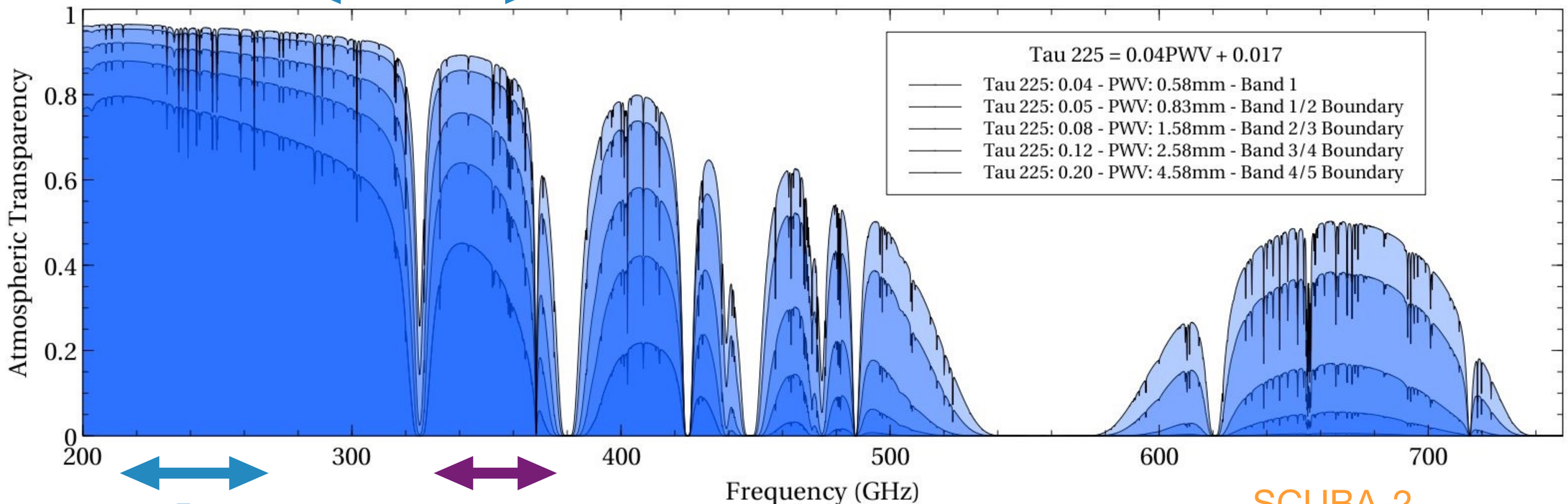
EAO Fellow

East Asian Observatory /James Clerk Maxwell Telescope

JCMT Users Meeting 2022

Atmospheric Transparency and Instrument Coverages

`Āweoweo
277 — 370 GHz



`Ū`ū
215 – 270.6 GHz

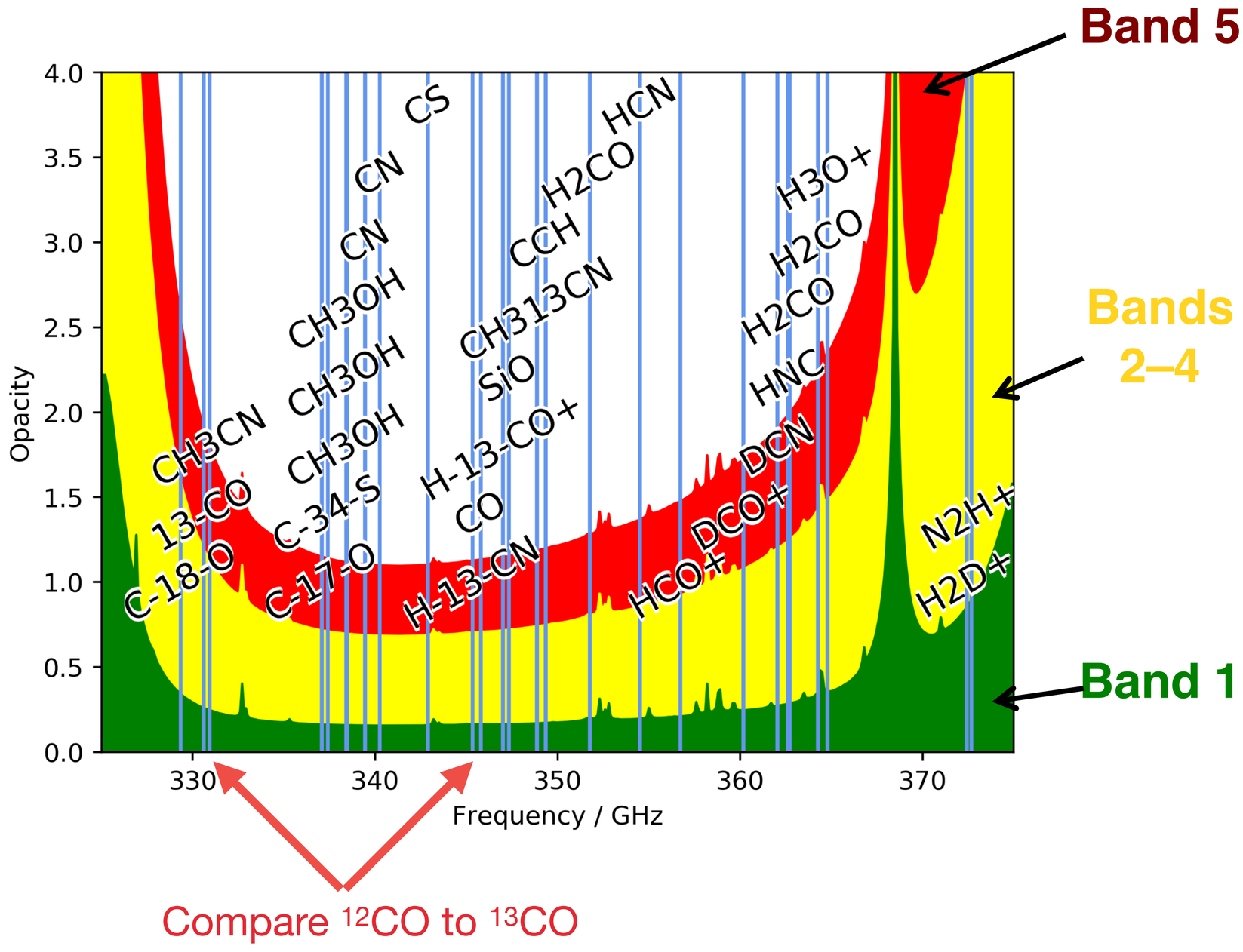
HARP
325 — 375 GHz

SCUBA-2 &
POL-2 850 μm

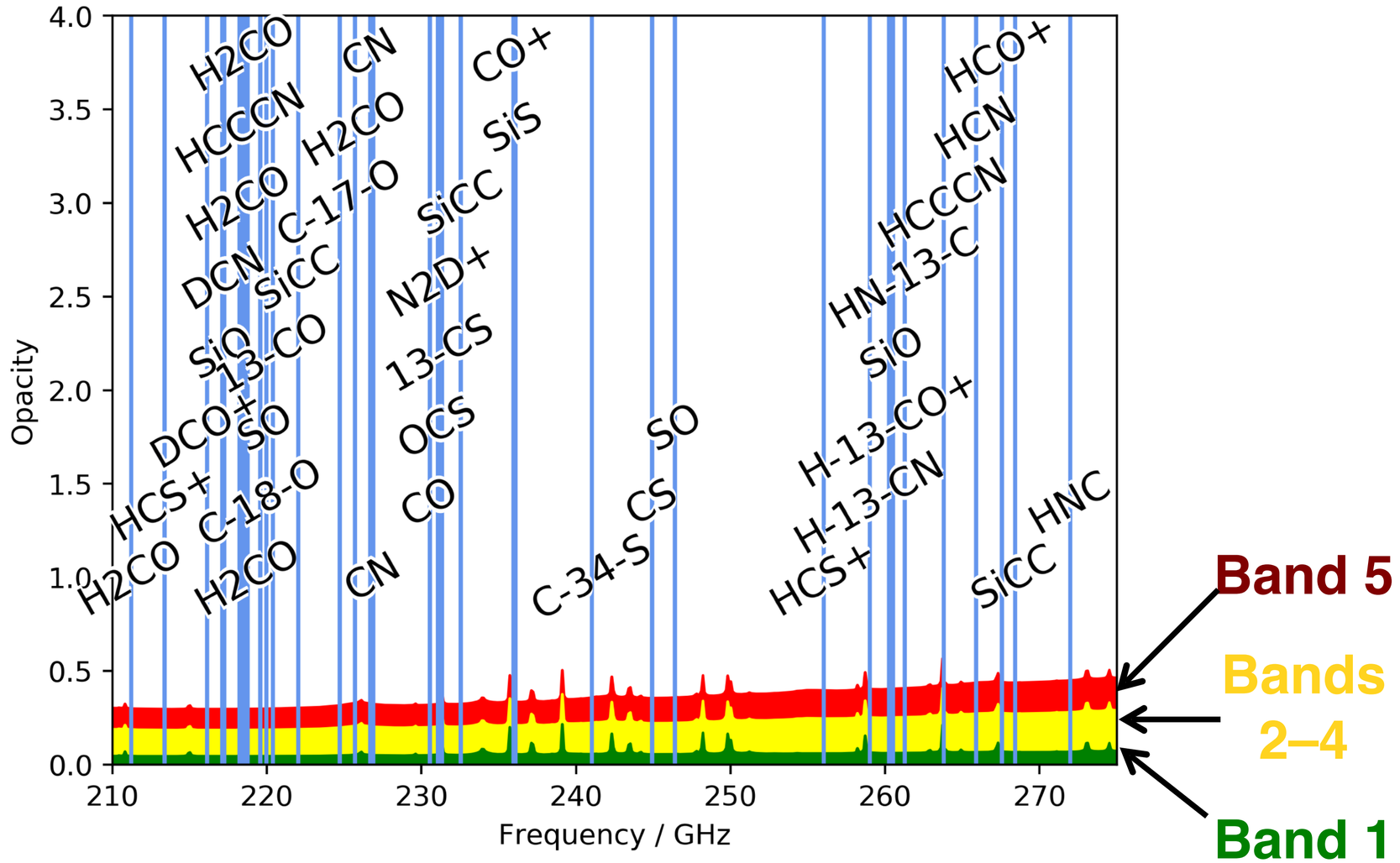
SCUBA-2
450 μm
~660GHz

http://www.submm.caltech.edu/cso/weather/atplot.shtml

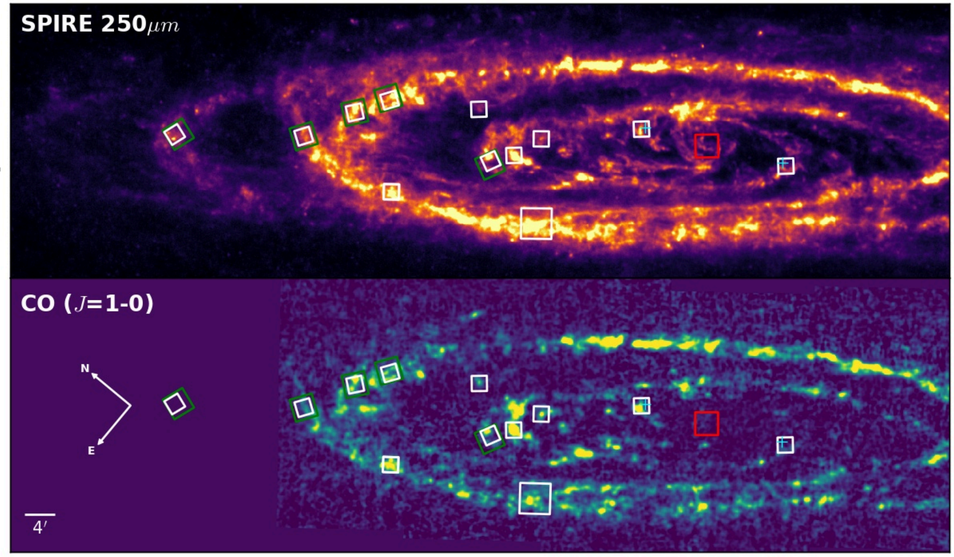
Sky Opacity (ʻĀweoweo / HARP)



Sky Opacity (ʻŪʻū)



Then, how to apply for telescope time?



Overview

- **A good proposal**:
  What to consider scientifically & technically

- **Search archives** for existing data

- proposal submission: Hedwig

- Time needed for Proposal: Integration Time Calculator (ITC)

- Target Tools: Clash Tool & Target Availability Tool

Generate an Idea…

Start early!

- Ideas may follow from **current research**, or detailed **discussions with collaborators**. This works best if one **starts early**.
- **Search archives and literature** for existing data that can address the scientific question partially or completely, or can complement the requested data. **start early.**
- Iteration between scientific goals and **telescope capabilities** will gradually improve the idea. Again, **start early!**

CADC – JCMT Archive

Canadian Astronomy Data Centre

Canada

Telescope Data Products | Advanced Data Products | Services | Documentation | AdvancedSearch | Help Desk | en | Login

Search | Results | Error | ADQL | Help

Search | Reset

Click on ? for explanations

Observation Constraints

- ▶ Observation ID
- ▶ P.I. Name
- ▼ Proposal ID (M17BL005)

project ID

- ▶ Proposal Title
- ▶ Proposal Keywords
- ▼ Data Release Date

Public only

Science data only

Spatial Constraints

- ▼ Target

Resolve with (if applicable)

Automatic (recommended)

target

- Or -

Upload targets

Choose File | No file chosen

- Or -

SSOIS Moving object search

- ▶ Pixel Scale

Do Spatial Cutout

Temporal Constraints

- ▼ Observation Date

- Or -

Data obtained within the past:

- ▶ Integration Time
- ▶ Time Span

Spectral Constraints

- ▼ Spectral Coverage

frequency

- ▶ Spectral Sampling
- ▶ Resolving Power
- ▶ Bandpass Width
- ▶ Rest-frame Energy

Do Spectral Cutout

Additional Constraints

Band	Collection	Instrument	Filter	Cal. Lev.	Data Type	Obs. Type
All (15)	All (31)	All (34)	All (3)	All (3)	All (4)	All (10)
EUV|X-ray|Gamma-ray	CFHT	AWEOWEO-ACSIS	SCUBA-2-450um	(3) Product	catalog	dream
Gamma-ray	CFHTMEGAPIPE	FTS2-SCUBA-2	SCUBA-2-850um	(2) Calibrated	image	flatfield
Infrared	CFHTTERAPIX	HARP-ACSIS	null	(0) Raw Instrumental	Other	focus
Infrared|Optical	CFHTWIRWOLF	POL2-SCUBA-2			spectrum	noise
Infrared|Optical|UV	HST	RXA3-ACSIS				null
Infrared|Optical|UV|EUV|X-ray	HSTHLA	RXA3M-ACSIS				pointing
Millimeter	GEMINI	SCUBA-2				scan
Optical	JCMT	UU-ACSIS				setup
Optical|UV|EUV|X-ray|Gamma	JCMTLS	WVM				skydip
Radio	DAO	AOSC				stare
UV	DAOPLATES					

Search | Reset

http://www.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/en/jcmt/

Date modified: 2021-01-11

Canadian Astronomy Data Centre

Canada

Telescope Data Products | Advanced Data Products | Services | Documentation | AdvancedSearch | Help Desk | en | Login

Search | Results | Error | ADQL | Help

FREE data!

1 year after the end of the semester data are taken in, they become publicly available at CADC. (e.g., *20B* data are available as of ~ Feb 2022)

Download complete query results: VOTable CSV TSV

Bookmark URL

Download | Showing 70 rows (557 before filtering). | Change Columns | View in sky

Mark	Preview	Target Name	RA (J2000.0)	Dec. (J2000.0)	Proposal ID	Quality	*Start Date*	Sequence N...	Instru...	Rest-frame...	Molecule	Transition	Product ID	Filter
Filter:				H:M:S	D:M:S		Calendar			GHz	CS		raw	
	Preview	I17589-23122	18:01:57.87	-23:12:32.4	M20BP045		2020-10-14 04:53:01	18	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17589-23122	18:01:57.87	-23:12:32.4	M20BP045		2020-10-14 04:53:01	18	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17589-23122	18:01:57.91	-23:12:32.4	M20BP045		2020-10-14 04:46:50	17	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17589-23122	18:01:57.91	-23:12:32.4	M20BP045		2020-10-14 04:46:50	17	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17545-23572	17:57:34.53	-23:58:03.8	M20BP045		2020-10-14 04:40:39	16	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17545-23572	17:57:34.53	-23:58:03.8	M20BP045		2020-10-14 04:40:39	16	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17441-28222	17:47:19.83	-28:23:05.2	M20BP045		2020-10-14 04:29:37	14	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17441-28222	17:47:19.83	-28:23:05.2	M20BP045		2020-10-14 04:29:37	14	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17455-28002	17:48:41.67	-28:01:44.6	M20BP045		2020-10-14 04:22:45	13	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17455-28002	17:48:41.67	-28:01:44.6	M20BP045		2020-10-14 04:22:45	13	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17439-28452	17:47:09.24	-28:46:13.4	M20BP045		2020-10-14 04:16:40	12	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17439-28452	17:47:09.24	-28:46:13.4	M20BP045		2020-10-14 04:16:40	12	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I17439-28452	17:47:09.24	-28:46:13.4	M20BP045		2020-10-14 04:10:30	11	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I17439-28452	17:47:09.24	-28:46:13.4	M20BP045		2020-10-14 04:10:30	11	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I18314-07202	18:34:10.28	-07:17:59.6	M20BP045		2020-09-19 07:56:39	52	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I18314-07202	18:34:10.28	-07:17:59.6	M20BP045		2020-09-19 07:56:39	52	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I18314-07202	18:34:10.25	-07:17:59.6	M20BP045		2020-09-19 07:50:29	51	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-250MHzx8192-1	
	Preview	I18314-07202	18:34:10.25	-07:17:59.6	M20BP045		2020-09-19 07:50:29	51	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	
	Preview	I18314-07202	18:34:10.28	-07:18:00.6	M20BP045		2020-09-19 07:44:21	50	UU-ACSIS	244.9356435(	CS	5 - 4	raw-244936MHz-1000MHzx2048-2	

Date modified: 2022-01-25

(see Sarah's talk on archive)

A Quick Query and Data Reduction Are Helpful for Your Proposal

Links:

- A guide to the JCMT Science Archive
- Full list of columns

Tips:

- **Search**: filter *utdate & sequence_no.* to find unique data scans
- **Download**: get raw data (to get more accurate info)
- **Reduce**: Use script to quickly reduce data (see Tutorials)

A script example:

```
#!/bin/bash
ls a*0001.sdf >> list.lis
mkdir reduced
oracdr_acsis
export ORAC_DATA_IN=$(pwd)
export ORAC_DATA_OUT=$(pwd)/reduced
oracdr -loop file -file $ORAC_DATA_IN/list.lis -nodisplay -log sf -verbose
```

Outline of a Proposal

A straightforward title

abstract

Scientific Justification

1. **Context** – why is this subject important or interesting
2. **Question** – The specific problem you are addressing
3. **Research** – How will you address the problem with these observations
4. **Details** – Sources, observing plan, data reduction plan etc.

Technical Justification – simple and concise

TIPS (1)

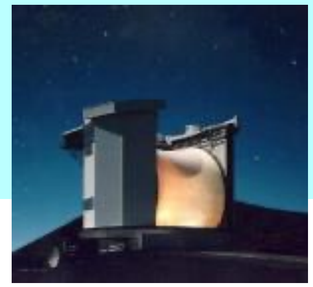
- **TAC** (Time Allocation Committee)**:**
  (1) not all experts in all fi elds
  (2) **~15 minutes** for each proposal
  (3) they are looking for reasons to reject your proposal
- Get an colleague/friend to read your draft
- 1 publication for every ~15 hours of observing time

TIPS (2)

- **Be specific** (use numbers instead of vague statements)
- Avoid to much information
- **Figures** that clearly reveal the underlying concepts
- Use Itemized lists and **boldface** to emphasize your key statements

focus on your **SCIENCE** & avoid small mistakes!

JCMT (reapplication)



TECHNICAL DETAILS & REFERENCES

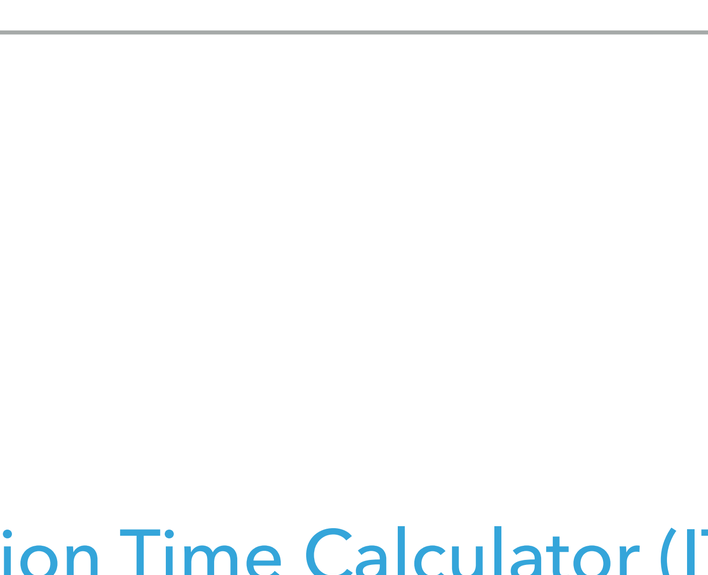
We request the same observational setup as for our previous data, namely jiggle mapping of a source less than 2.3′ in diameter (see Fig. 1) at 450 μm and 850μm simultaneously. This requires a 64-point jiggle pattern. Based on extrapolations of thermal flux to these two wavelengths (see Gear 1988), we were granted 3 hours of observing time during semester 96B in order to detect the thermal continuum emission in NGC 1275. Note that by thermal, we mean the emission which is spatially extended beyond the central pixel in which the variable AGN supplies a contribution to the total flux. Although we were awarded 3 hours, only 0.7 hours were actually carried out. Nevertheless we clearly detected emission at both wavelengths, as Figures 2 and 3 show (*note that the data in Figures 2 and 3 have been calibrated to Jy/beam, although the headers say 'Volts'!*). As we are particularly interested in the extended emission and spatial correlations of the extended emission with other tracers, the S/N away from the central peak is relevant. Here we see structure at the 3 - 4 σ level, where $\sigma_{850\mu} \sim 8$ mJy/beam and $\sigma_{450\mu} \sim 100$ mJy/beam. These may be real detections, but the SCUBA beam itself may have structure at this level. Thus, longer integrations with higher S/N are required to determine structure in the extended emission. Independent observations will also help, since non-real structure should rotate with respect to the sky and real structure should remain.

We would like to obtain a minimum S/N of $\sim 7/1$. Based on our existing data of 0.7 hour integration, this would require a total on-source integration of 2.8 hours. A similar integration time is given by the SCUBA WWW-based Integration Time Calculator, to reach an rms of 20 mJy at 450 μm. With overheads of 80% (30% for mapping overheads, and 50% for calibration overheads, as suggested on the SCUBA WWW page), our total time request is 5 hours. This is longer than the 3 hours which we were originally allotted, but is now based on real data at the observing frequencies, rather than extrapolations.

A sample proposal, Slide from: Judith Irwin – How to Write a Convincing Technical Justification

TOOLS

- Proposal submission: Hedwig
- Time needed for Proposal: Integration Time Calculator (ITC)
- Target Tools: Clash Tool & Target Availability Tool



The Hedwig Proposal Management System was created by Dr. Graham Bell, EAO / JCMT.

https://proposals.eaobservatory.org/

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JCMT

Calls for Proposals

The following regular calls for proposals are open:

- 22B
- 22A
  - Independently Funded Programs

Other calls for proposals

Previous calls for proposals

} Access Open Calls for Proposals here

Calculators

- SCUBA-2 ITC
  - Time required for target RMS
  - RMS expected in given time
- Heterodyne ITC
  - Time required for target RMS
  - RMS expected in elapsed time
  - RMS for integration time per point

} Access ITCs for SCUBA-2 & heterodyne instruments

Target Tools

- Clash Tool
- Target Availability

} Access Clash & Target Availability Tools

Every page has a manual!

Help on this page | Contact us

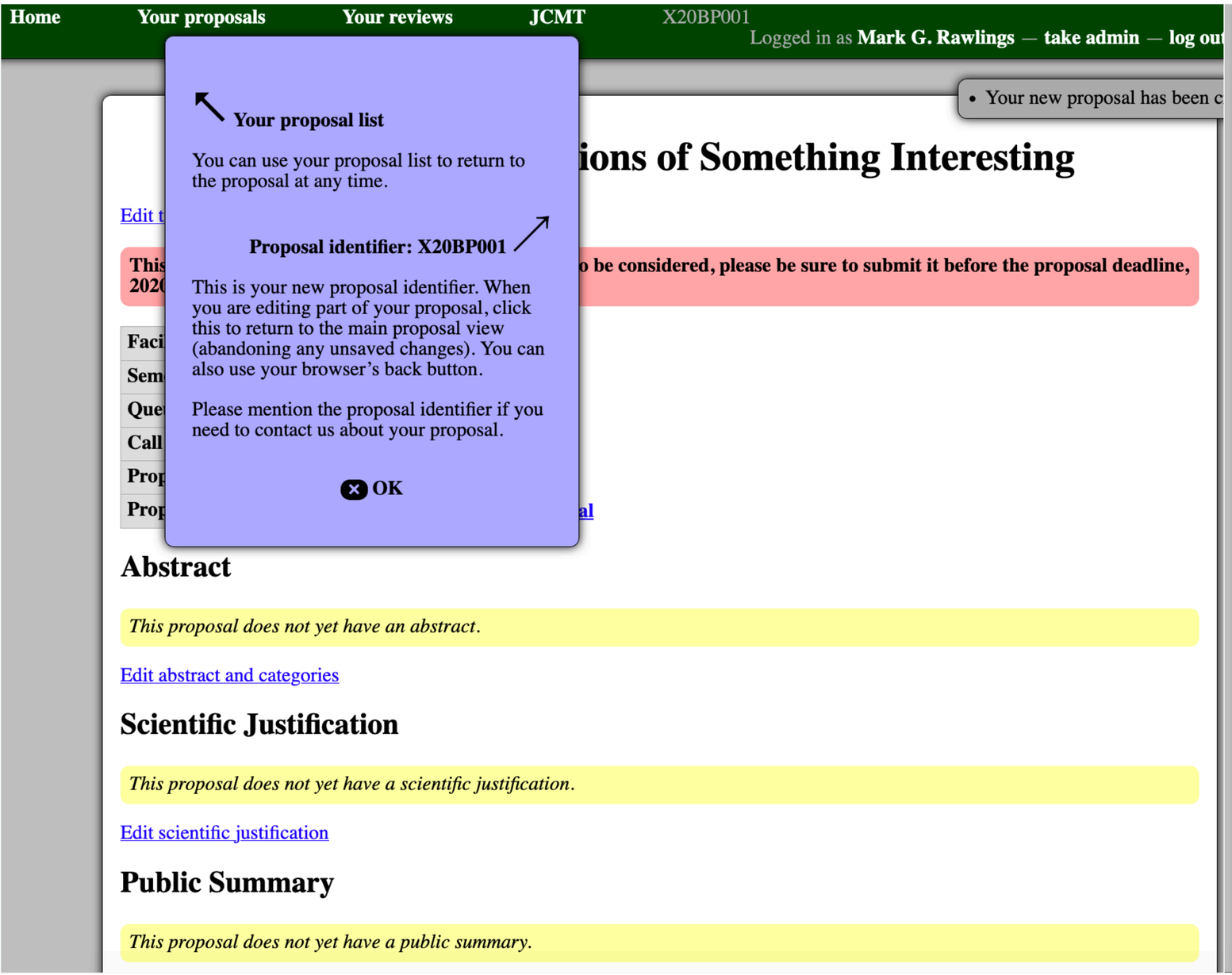
JCMT Proposal Queues

- **PI queue**
  every 6 months for “normal sized” projects
  ≤ 200 h, but typically ~ 3 - 50 hours
  deadline of **A** semester: mid-Sep; (observing 02/03 – 08/01)
  deadline of **B** semester: mid-Mar; (observing 08/02 – 02/02)

- **Large Program Queue**
  > 200 h, multiple semesters
  Open Enrollment - any JCMT astronomer may join any *new* program

- **Urgent queue**
  always open for submissions
  Typically ~ 2 – 12 hours

General Proposal Preparation



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Target Tools

- Clash Tool
- Target Availability

https://proposals.eaobservatory.org/

JCMT Integration Time Calculator (ITC)

Heterodyne ITC

Input

RECEIVER

Receiver ‘Ū‘ū

Spectral resolution Other 0.5 km/s ?

Intermediate frequency Receiver default 5.0 GHz best sideband

Sideband mode Single sideband Dual sideband

Separate polarizations ?

Continuum mode ?

SOURCE AND CONDITIONS

Transition line CO 3 - 2

Rest frequency 230.538 GHz *(325 — 375 GHz)*

Radial velocity 0.0 redshift

Source position 40.0 ° declination

225 GHz opacity Band 3: 0.08 < τ ≤ 0.12 0.100 ?

OBSERVATION

Mapping mode Jiggle ?

Switching mode Beam Position Frequency ?

Number of points 9 3 x 3 HARP 4

Separate offs

Raster map size 180 × 180 "

Raster pixel size 7.27 × 7.27 "

Raster scan spacing Full array (116.4")

Basket weave ?

REQUIREMENT

Target sensitivity 0.01 K TA*

Calculate

Calculator Mode

Mode Time required for target RMS

Change mode

Help on this calculator Contact us

SCUBA-2 ITC

Input

SOURCE AND CONDITIONS

Source position 40.0 ° declination

225 GHz opacity Band 2: 0.05 < τ ≤ 0.08 0.065 ?

OBSERVATION

Map typ ?

Map samplin tion ?

850 μm pixel siz

450 μm pixel siz

- ✓ Daisy: ~3 arcmin map
- Pong 900: 15 arcmin map
- Pong 1800: 30 arcmin map
- Pong 2700: 45 arcmin map
- Pong 3600: 1 degree map
- Pong 7200: 2 degree map
- POL-2 daisy (~3 arcmin)

REQUIREMENT

Wavelength 850 μm

Target sensitivity 2.000 mJy/beam

Calculate

Calculator Mode

Mode Time required for target RMS

Change mode

Help on this calculato Contact us

ITC has built-in weather / instrument information

Heterodyne ITC

Results

Elapsed time	2.423 hours (2:25:21)
Integration time	565.737 seconds per point
Receiver temperature	59.959 K
System temperature	141.208 K
Opacity	0.101
Zenith angle	32.353 degrees
IF frequency	6.000 GHz
LO frequency	236.538 GHz (LSB)
Rest frequency	230.538 GHz
Rest frequency resolution	0.384 MHz

CO 2-1

	Band 1	Band 2	Band 3	Band 4	Band 5
Representative	1.648 hours	1.907 hours	2.423 hours	3.520 hours	5.772 hours
Range	… 1.710	1.710 – 2.118	2.118 – 2.757	2.757 – 4.422	4.422 …

Link to this calculation

same sensitivity!

SCUBA-2 ITC

Results

Observing time	1.265 hours (1:15:54)
Time on source	1.215 hours (1:12:54)
Sensitivity at 450 μm	25.757 mJy/beam

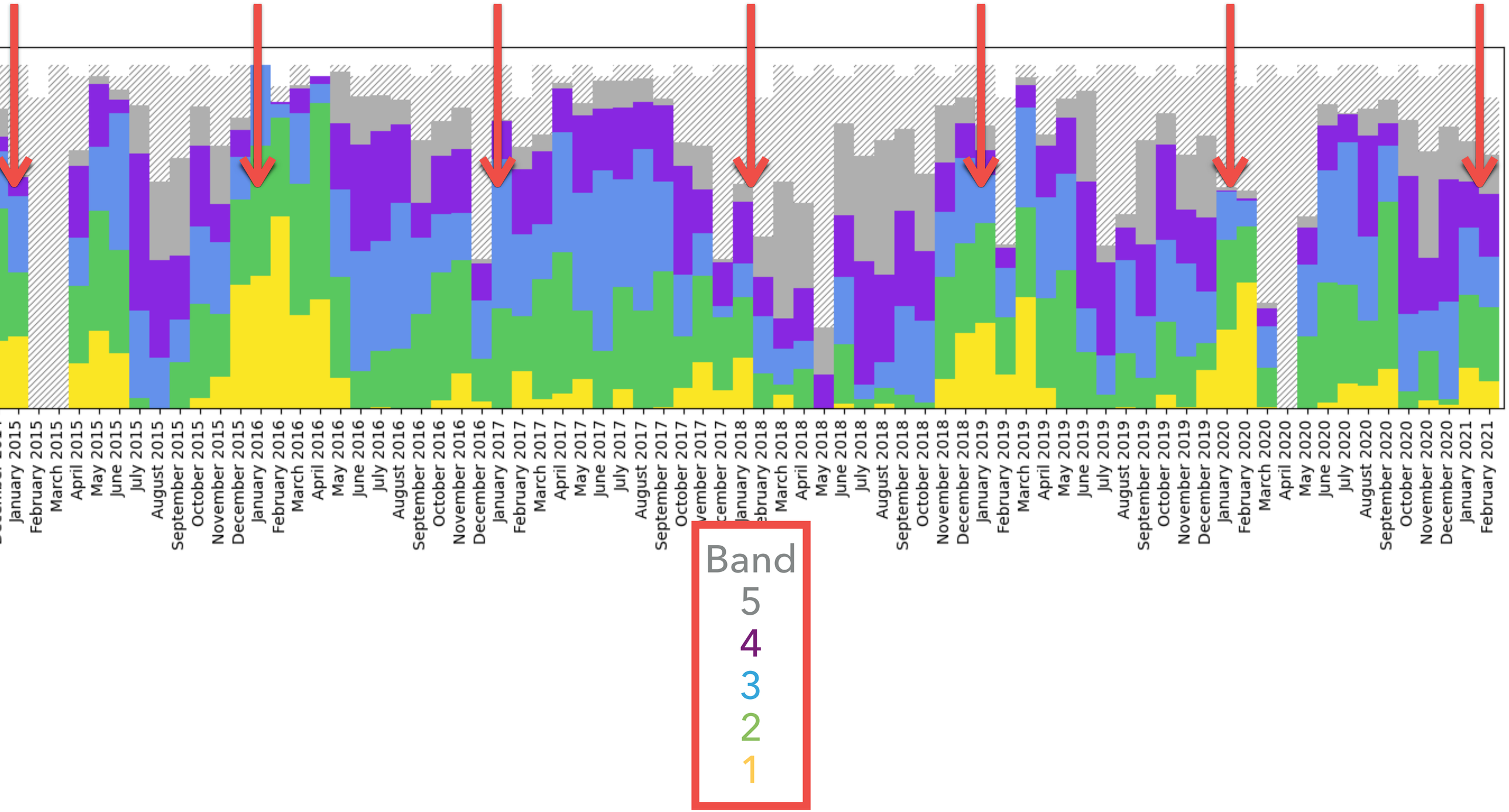
Parameter	850 μm	450 μm
Sampling factor	2.640625	4.0
Opacity	0.279	1.379
Transmission	0.719	0.195
Airmass	1.184	

850 um

	Band 1	Band 2	Band 3	Band 4	Band 5
Representative	0.978 hours	1.265 hours	1.995 hours	4.239 hours	12.329 hours
Range	… 1.043	1.043 – 1.556	1.556 – 2.575	2.575 – 6.837	6.837 …

Link to this calculation

Weather is varying year-to-year!



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Target Tools

- Clash Tool
- Target Availability

} Access Clash & Target Availability Tools

https://proposals.eaobservatory.org/

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Logged in

Clash Tool

Input

Target name: Optional — Resolve name

RA / Longitude: 00:00:00

Dec / Latitude: 00:00:00

System: ICRS ?

Search radius: 30 "

Search

Upload a target list

View all defined areas of sky coverage

Help on this page Contact us

Output

Matches

Matches were found for the following targets.

Please investigate each match and add a note to your proposal to explain why you still wish to ob
name of a match for more information on how the corresponding coverage area is defined.

- m31

  Matches were found in the following defined areas of sky coverage:

  - Existing HARP observations
  - Existing SCUBA-2 observations
  - Large Program M17BL005: HASHTAG

Search archive at 00:42:44.35 +41:16:08.6

Jump to CADC

Link to this query

Input

Target name: m31 — Resolve name

RA / Longitude: 00:42:44.35

Dec / Latitude: 41:16:08.6

System: ICRS ?

Search radius: 30 "

Search

Upload a target list

View all defined areas of sky coverage

https://proposals.eaobservatory.org/jcmt/tool/clash

Target Availability

Input

Target Information

Target name: m31 [Resolve name]
RA / Longitude: 00:42:44.35
Dec / Latitude: 41:16:08.6
System: ICRS [?]

Observing Information

Start date: 08/02/2022
End date: 02/02/2023
[Check]

Upload a target list

Output

Availability by Date

Observable for “B” Semesters!

The following table shows how many target[illegible] available as a function of date and (UT) time.

Targets are considered to be available [illegible]ey are above an elevation of 30.0 degrees.

Date (UT)	04:00	05:00	[illegible]	07:00	08:00	09:00	10:00	11:00	12:00	13:00	[illegible]4:00	15:00	16:00
2022-08-02	0	[illegible]	0	0	0	0	1	1	1	1	1	1	1
2022-08-16	0	0	0	0	0	1	1	1	1	1	1	1	1
2022-08-30	[illegible]	0	0	0	0	1	1	1	1	1	1	1	1
2022-09-13	0	0	0	0	1	1	1	1	1	1	1	1	1
2022-09-27	0	0	0	1	1	1	1	1	1	1	1	1	0
2022-10-11	0	0	1	1	1	1	1	1	1	1	1	0	0
2022-10-25	0	1	1	1	1	1	1	1	1	1	0	0	0
2022-11-08	1	1	1	1	1	1	1	1	1	0	0	0	0
2022-11-22	1	1	1	1	1	1	1	1	0	0	0	0	0
2022-12-06	1	1	1	1	1	1	1	0	0	0	0	0	0
2022-12-20	1	1	1	1	1	1	0	0	0	0	0	0	0
2023-01-03	1	1	1	1	1	0	0	0	0	0	0	0	0
2023-01-17	1	1	1	1	0	0	0	0	0	0	0	0	0
2023-01-31	1	1	1	0	0	0	0	0	0	0	0	0	0

Link to this query

Maunakea night time

PI proposals

A semester: 02/01 – 07/31
proposal deadline: mid September

B semester: 08/02 – 01/31
proposal deadline: mid March

Tips on using Hedwig

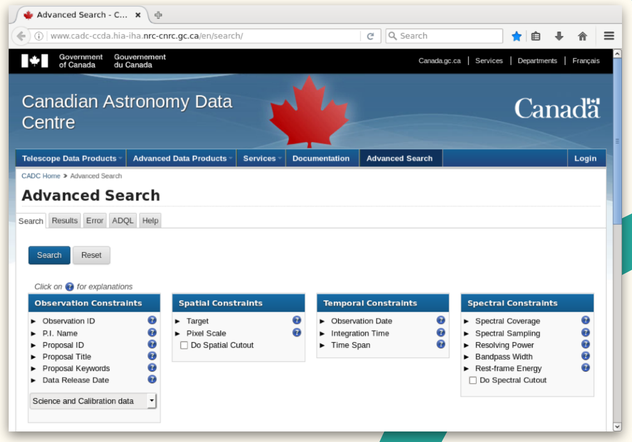
- Prepare in advance!
- Follow proposal format rules
- Proposals can be **repeatedly submitted** up to the deadline
  – No need to leave proposal submission until last few minutes!
- Read the manuals
  Questions are welcome on Helpdesk or Slack!
  (helpdesk@eaobservatory.org)

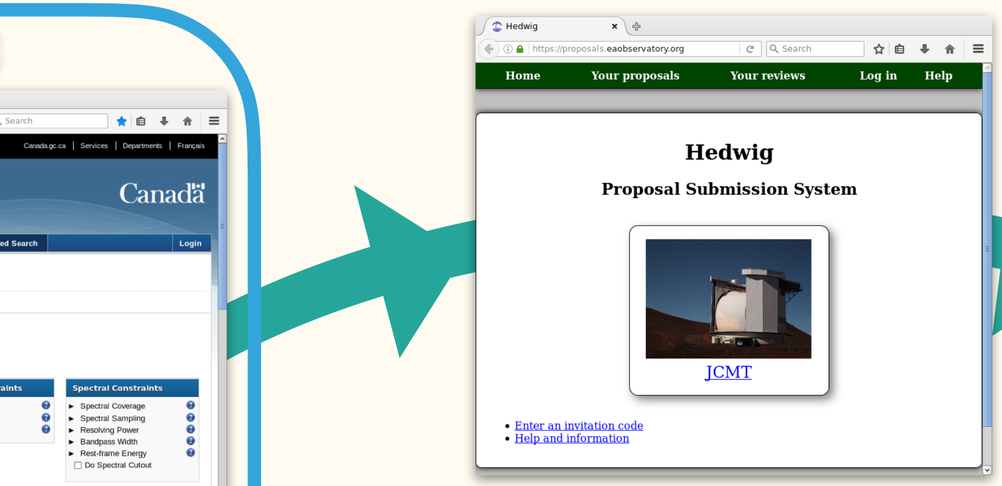
Preparation

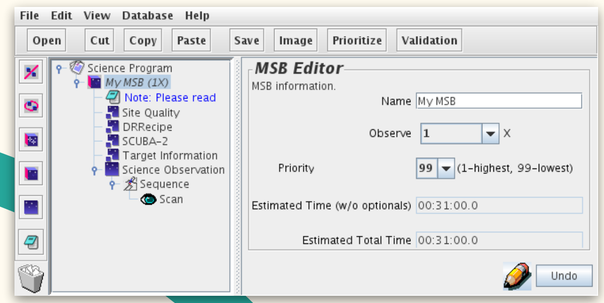
Hedwig Proposal

Observations

CADC

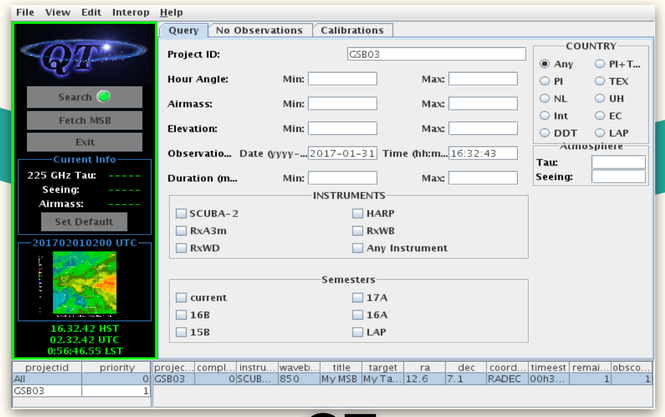




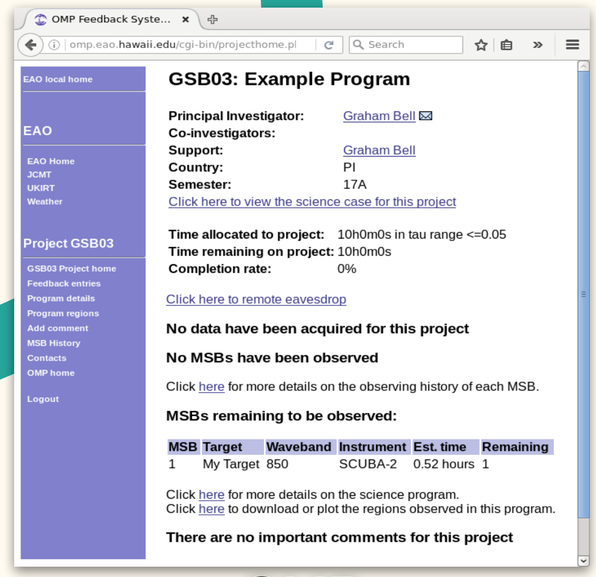


JCMT-OT

ORAC-DR



QT



OMP

Data Reduction

Further Reading

- The Beginners Guide To JCMT Projects
- Writing a Good Proposal (Ciska Kemper)
- How to Write a Good Proposal (Geoffrey Bower)
- “Do’s & Don’ts” for JCMT Users

Questions are welcome on Helpdesk or Slack!

helpdesk@eaobservatory.org

James Clerk Maxwell Telescope
East Asian Observatory