

NRAO



National Radio Astronomy Observatory



Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array



Preparing for ALMA

<http://science.nrao.edu/alma>



National Radio Astronomy Observatory

North America ALMA Science Center

Charlottesville, Virginia U.S.

Atacama Large Millimeter/submillimeter Array

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ALMA from the Users' Perspective



Kelsey Johnson

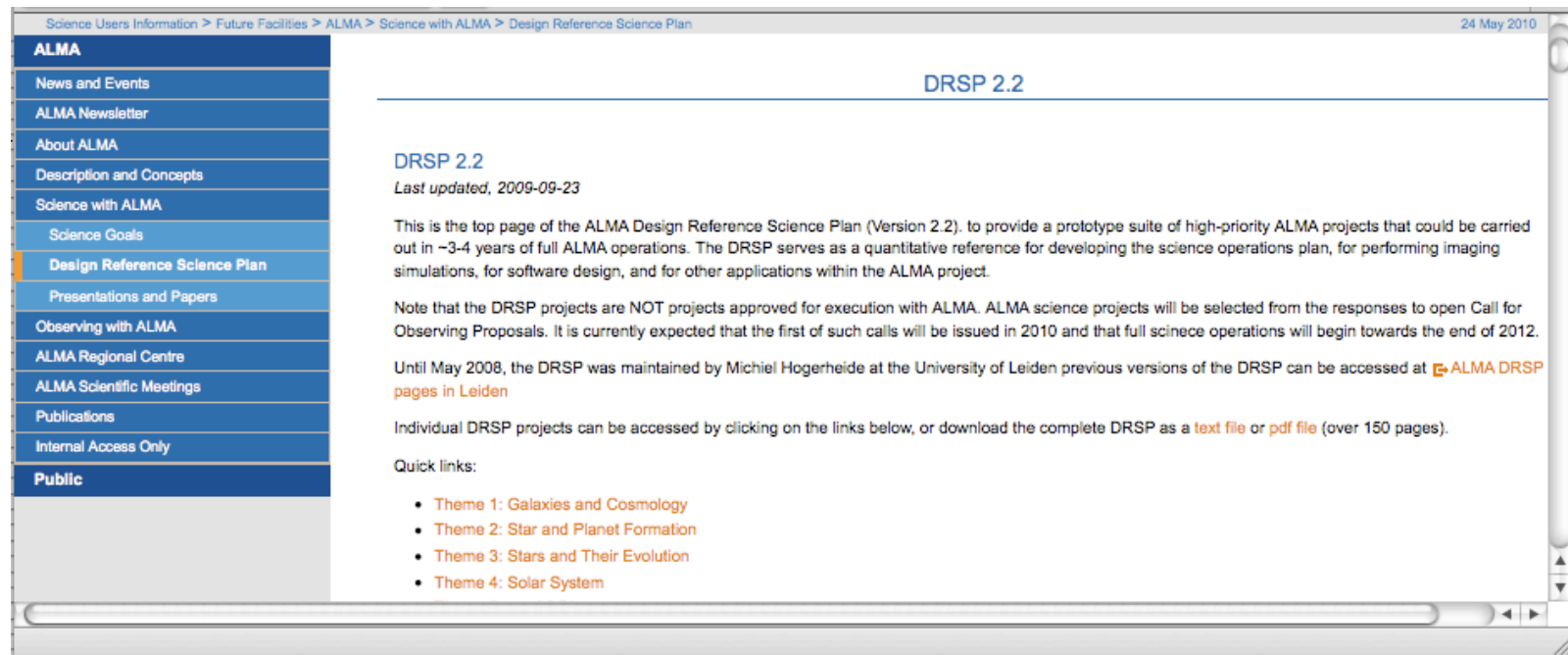
University of Virginia / NRAO

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Step 1: Thinking of Proposing

- Check out “Design Reference Science Plans” (DRSPs)
- Think outside the box
- Play with the ALMA tools!



Step I: Thinking of Proposing

⇒ tools to help refine your ideas: **Splatalogue**

- ✓ Determine which species and transitions are the best diagnostics for your sciences
- ✓ Look up line strengths & frequencies
- ✓ Think about best band(s)
- ✓ What other cool lines are there?

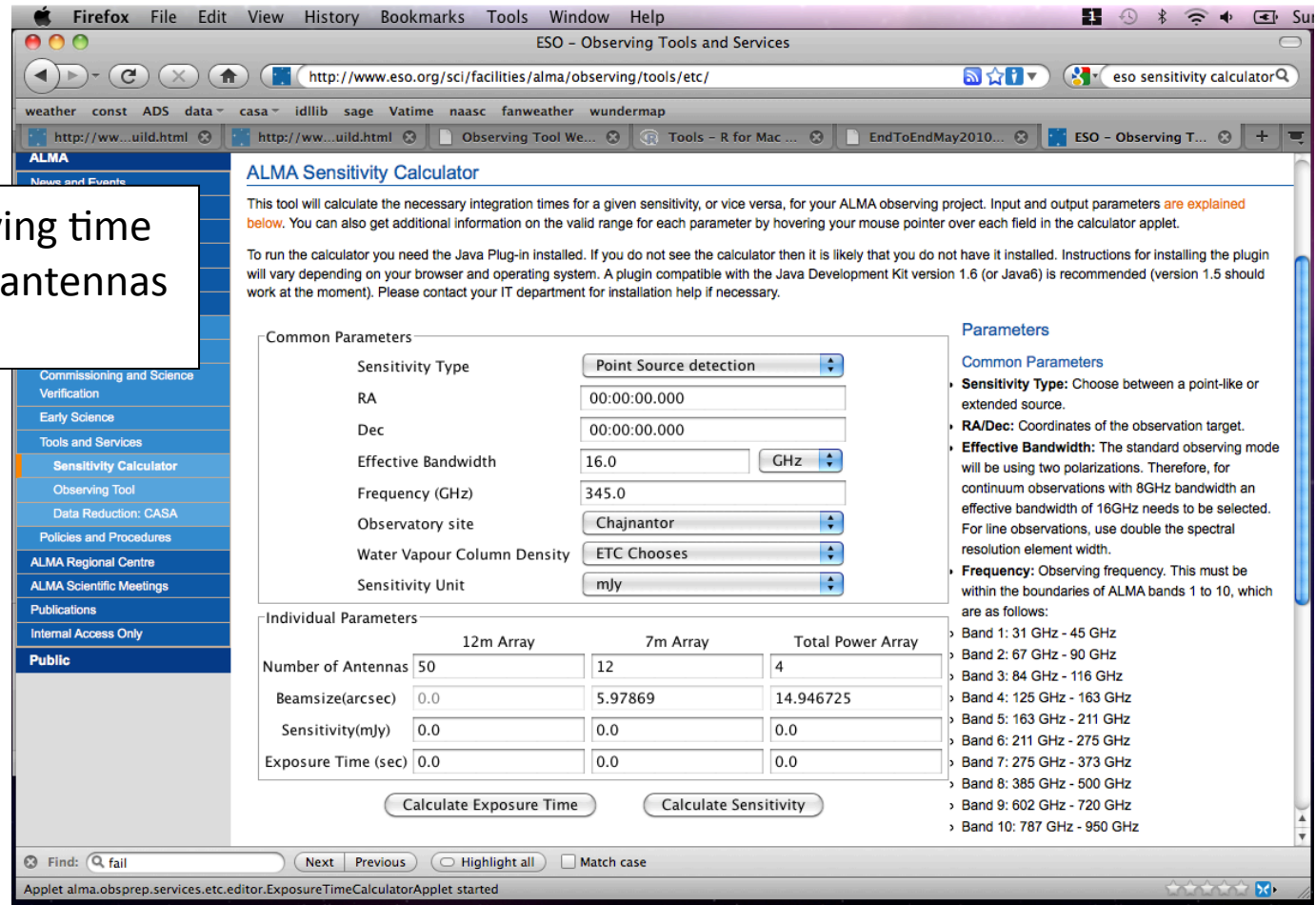
The screenshot displays the Splatalogue web application in a Mozilla Firefox browser. The interface includes a search bar at the top, a sidebar with search filters, and a main table of search results. The sidebar filters include energy range, line intensity lower limits, and search criteria. The main table lists species, chemical names, frequencies, and other spectral data.

Species	NRAO Recommend	Chemical Name	Freq (Err)	Meas Freq (Err)	Resolved QNs	CDMS/JPL Intensity	Loas/AST Intensity	E _L (cm ⁻¹)	LineList
CH ₃ CHO		Methyl Formate	100001.25850 (0.055)		10(9,1)-11(8,3)E	-7.28490		56.59230	JPL
CH ₃ CH ₂ ¹³ CN		Ethyl Cyanide	100005.33130 (0.1722)		65(6,59)-65(6,60)	-6.16660		667.33121	CDMS
CH ₃ CH ₂ ¹³ CN	*	Vinyl Cyanide	100006.07900 (4.1171)		59(5,54)-59(6,53)	-5.91120		594.03553	CDMS
CH ₃ CH ₂ CHO		Propanal	100013.13200 (0.076)		21(6,15)-21(5,16)	0.00000		92.38000	SLAM
HOCH ₂ CH ₂ OH	*	Ethylene Glycol	100014.70690 (0.0033)		16(1,15)-1-15(2,13)-v=0	-6.65530		43.52900	CDMS
HOCH ₂ CH ₂ OH	*	Ethylene Glycol	100014.90100 (0.0026)		18(4,15)-1-17(5,13)-v=0	-6.42350		61.01010	CDMS
CH ₃ CO ¹³ CH ₃	*	Acetone	100015.78410 (2.18681)		53(34,19)-53(33,20)AA	-6.52400		810.96749	JPL
C ₃ H ₆ O		Cyclopropanone	100021.36000 (0.165)		2(2,1)-2(0,2)	0.00000		1.40900	SLAM
CH ₃ CH ₂ OH	*	gauche-Ethanol	100023.44700 (0.05)		37(3,35)-37(2,35)-v ₁ =1-0	-5.41910		448.98780	JPL
CH ₃ CHO		Methyl Formate	100024.31300 (184.4387)		50(27,24)-51(26,26)E	-7.61910		854.47230	JPL
CH ₃ COOH v=0	*	Acetic Acid	100024.34000 (0.002)		10(8,2)-10(5,5)-v=0	0.00000		33.47000	SLAM
HOCH ₂ CHO	*	Glycolaldehyde	100025.65260 (0.012)		31(11,20)-32(9,23)	-9.81330		239.92040	JPL
CH ₃ CHO	*	Cyanoformaldehyde	100026.08410 (2.81)		65(3,63)-64(4,60)	-5.35410		706.27500	CDMS
SO ₂ v=0	*	Sulfur Monoxide	100029.56500 (29)		4(5)-4(4)	0.00000	0.38000	0.00000	Loas
SO ₂ v=0	*	Sulfur Monoxide	100029.56500 (0.029)	100029.64000 (0.015)	4(5)-4(4)	0.00000		23.47900	SLAM
SO ₂ v=0	*	Sulfur Monoxide	100029.56500 (0.029)	100029.64000 (0.15)	4(5)-4(4)	-4.23590		23.47880	CDMS
SO ₂ v=0	*	Sulfur Monoxide	100029.56500 (0.029)	100029.64000 (0.15)	4(5)-4(4)	-4.22740		23.47880	JPL
CH ₃ CHO v=2	*	Acetaldehyde	100029.82700 (0.31)		5(0,5)-4(0,4)E	0.00000		275.70500	SLAM
HC ¹³ CCN v ₂ =1	*	Cyanoacetylene	100032.51110 (0.0049)		J=11-10, l=1f	-2.63250		236.23550	CDMS
CH ₃ CH ₂ CN v=0	*	Ethyl Cyanide	100034.40700 (0.005)	100034.42500 (0.05)	18(3,15)-18(2,16)	0.00000		54.88300	SLAM
CH ₃ CH ₂ CN v=0	*	Ethyl Cyanide	100034.40700 (0.005)	100034.42500 (0.05)	18(3,15)-18(2,16)	-4.62780		54.88280	JPL
CH ₃ CH ₂ CN v=0	*	Ethyl Cyanide	100034.40700 (0.005)	100034.42500 (0.05)	18(3,15)-18(2,16)	-4.62820		54.88280	CDMS
CH ₃ CHO		Methyl Formate	100037.21900 (0.046)		10(9,2)-11(8,3)A	-7.28460		56.58190	JPL
CH ₃ CHO		Methyl Formate	100037.21900 (0.046)		10(9,1)-11(8,4)A	-7.28460		56.58190	JPL

Step I: Thinking of Proposing

⇒ tools to help refine your ideas: **Sensitivity Calculator**

- ✓ Estimate observing time
- ✓ Customize # of antennas
- ✓ Vary conditions



ALMA Sensitivity Calculator

This tool will calculate the necessary integration times for a given sensitivity, or vice versa, for your ALMA observing project. Input and output parameters are explained below. You can also get additional information on the valid range for each parameter by hovering your mouse pointer over each field in the calculator applet.

To run the calculator you need the Java Plug-in installed. If you do not see the calculator then it is likely that you do not have it installed. Instructions for installing the plugin will vary depending on your browser and operating system. A plugin compatible with the Java Development Kit version 1.6 (or Java6) is recommended (version 1.5 should work at the moment). Please contact your IT department for installation help if necessary.

Common Parameters

Sensitivity Type	Point Source detection
RA	00:00:00.000
Dec	00:00:00.000
Effective Bandwidth	16.0 GHz
Frequency (GHz)	345.0
Observatory site	Chajnantor
Water Vapour Column Density	ETC Chooses
Sensitivity Unit	mJy

Individual Parameters

	12m Array	7m Array	Total Power Array
Number of Antennas	50	12	4
Beamsize(arcsec)	0.0	5.97869	14.946725
Sensitivity(mJy)	0.0	0.0	0.0
Exposure Time (sec)	0.0	0.0	0.0

Calculate Exposure Time Calculate Sensitivity

Parameters

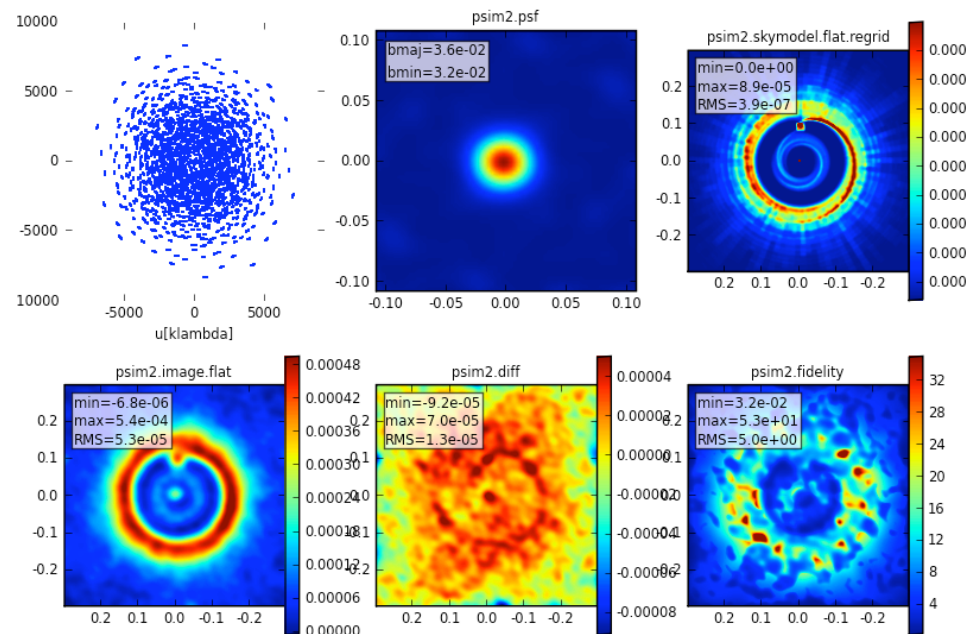
Common Parameters

- Sensitivity Type:** Choose between a point-like or extended source.
- RA/Dec:** Coordinates of the observation target.
- Effective Bandwidth:** The standard observing mode will be using two polarizations. Therefore, for continuum observations with 8GHz bandwidth an effective bandwidth of 16GHz needs to be selected. For line observations, use double the spectral resolution element width.
- Frequency:** Observing frequency. This must be within the boundaries of ALMA bands 1 to 10, which are as follows:
 - Band 1: 31 GHz - 45 GHz
 - Band 2: 67 GHz - 90 GHz
 - Band 3: 84 GHz - 116 GHz
 - Band 4: 125 GHz - 163 GHz
 - Band 5: 163 GHz - 211 GHz
 - Band 6: 211 GHz - 275 GHz
 - Band 7: 275 GHz - 373 GHz
 - Band 8: 385 GHz - 500 GHz
 - Band 9: 602 GHz - 720 GHz
 - Band 10: 787 GHz - 950 GHz

Step I: Thinking of Proposing

⇒ tools to help refine your ideas: **Simulator**

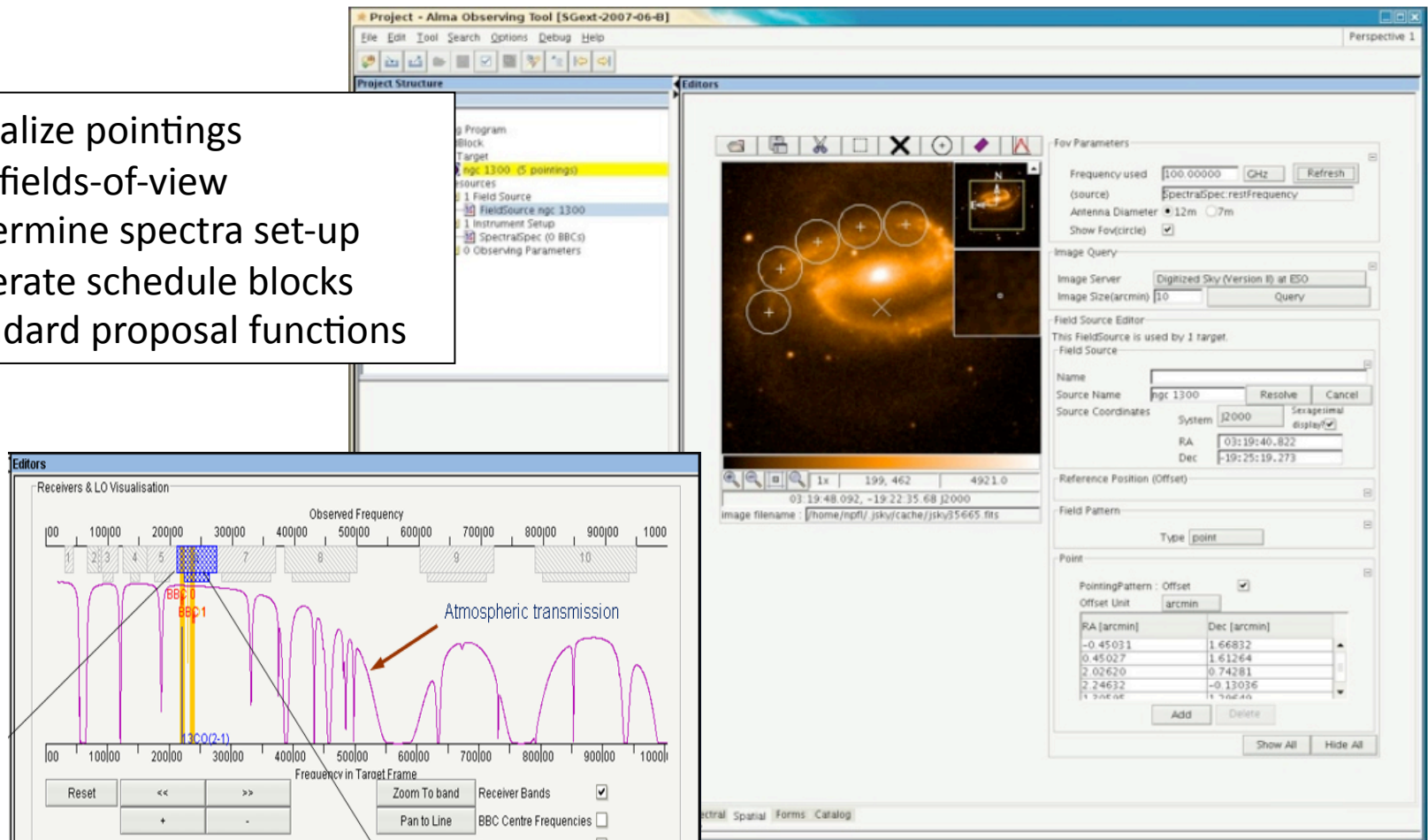
- ✓ Calculate visibilities
- ✓ Calculate total power observation
- ✓ Add noise
- ✓ Re-image the data
- ✓ Analyze the difference between output and input images



Step 2: Proposal Preparation:

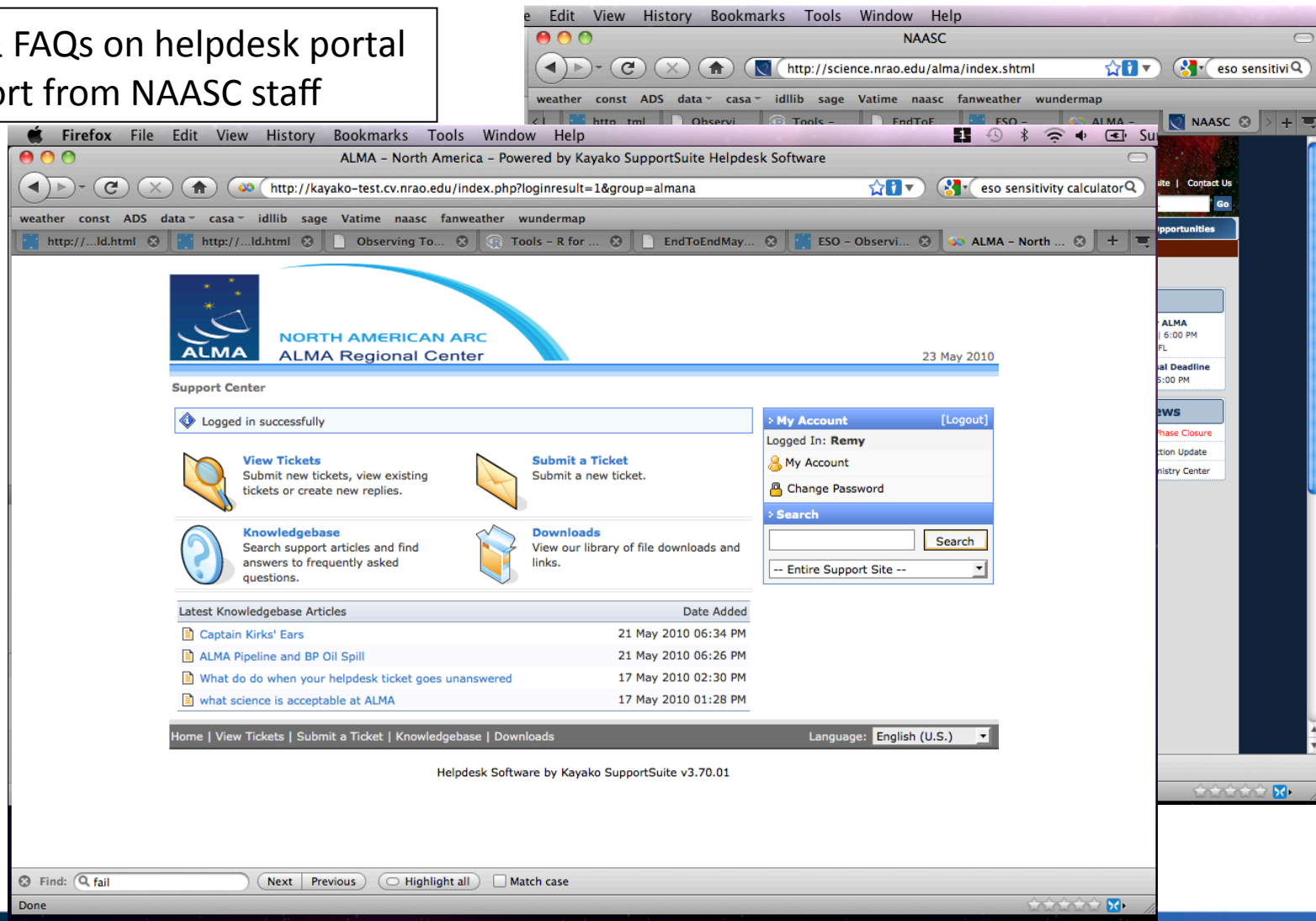
⇒ The Observing Tool (OT)

- ✓ Visualize pointings
- ✓ See fields-of-view
- ✓ Determine spectra set-up
- ✓ Generate schedule blocks
- ✓ Standard proposal functions



Step 2: Proposal Preparation

- ✓ Info & FAQs on helpdesk portal
- ✓ Support from NAASC staff



ALMA - North America - Powered by Kayako SupportSuite Helpdesk Software

23 May 2010

Support Center

Logged in successfully

View Tickets
Submit new tickets, view existing tickets or create new replies.

Submit a Ticket
Submit a new ticket.

Knowledgebase
Search support articles and find answers to frequently asked questions.

Downloads
View our library of file downloads and links.

My Account [Logout]
Logged In: **Remy**
My Account
Change Password

Search
[Search]
-- Entire Support Site --

Latest Knowledgebase Articles

Article Title	Date Added
Captain Kirks' Ears	21 May 2010 06:34 PM
ALMA Pipeline and BP Oil Spill	21 May 2010 06:26 PM
What do do when your helpdesk ticket goes unanswered	17 May 2010 02:30 PM
what science is acceptable at ALMA	17 May 2010 01:28 PM

Home | View Tickets | Submit a Ticket | Knowledgebase | Downloads

Language: English (U.S.)

Helpdesk Software by Kayako SupportSuite v3.70.01

Find: fail [Next] [Previous] [Highlight all] [Match case]

Done

Step 3: Proposal Review

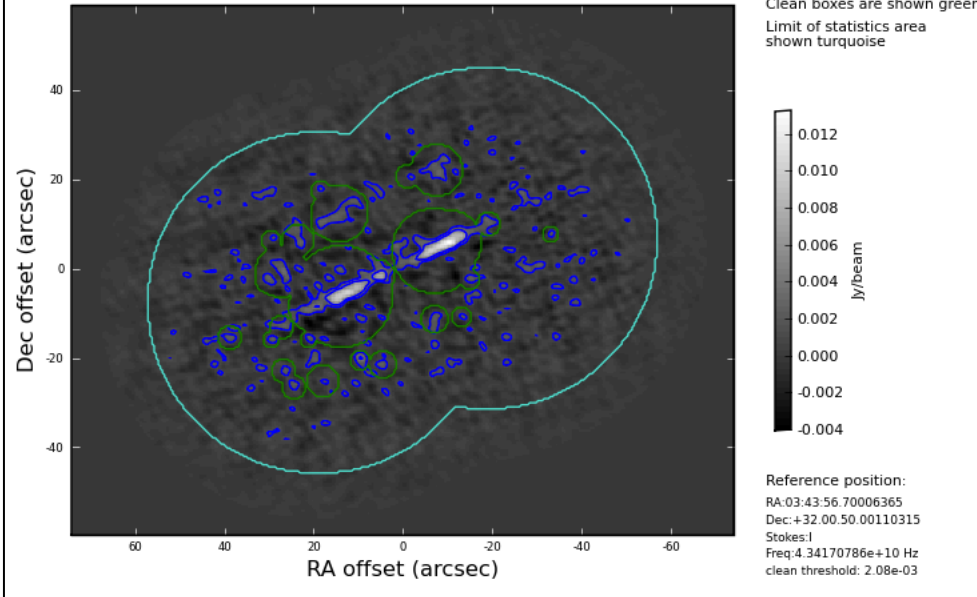
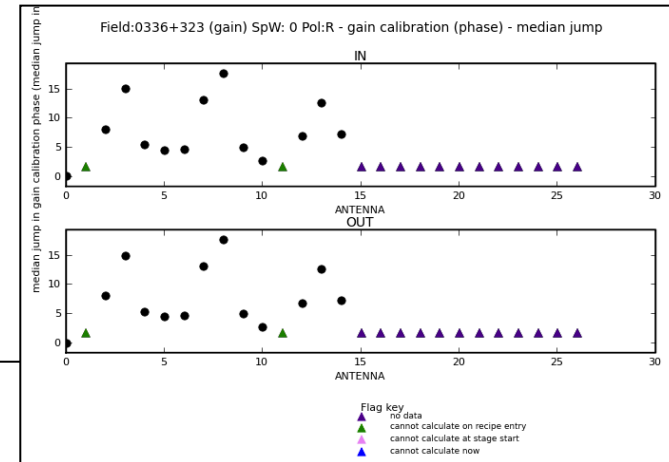
- International TAC
(North America, East Asia, Europe; Chile TBD)
- Face-to-face meetings
Twice per year (at least initially)
- Proposals ranked, then merged
programs drained from queue w.r.t. weather, R.A., etc
- Some DD time
~ 5%
- “Open Skies” time distributed up to 5%
- Phase 1 & Phase 2



Step 4: Download “pipeline” data from the archive

- ✓ Default flagging
- ✓ Basic calibration
- ✓ Cleaned image
- ✓ diagnostics

Group:source (b) Stokes:I - Flat noise clean image
rs at [3, 10] * 2d residual rms (3.817e-04)



Step 5: Analyze data - CASA

- ✓ Visualize data cubes
- ✓ Overlay multi-wavelength data
- ✓ Measure flux densities
- ✓ Fit sources
- ✓ Generate publication images

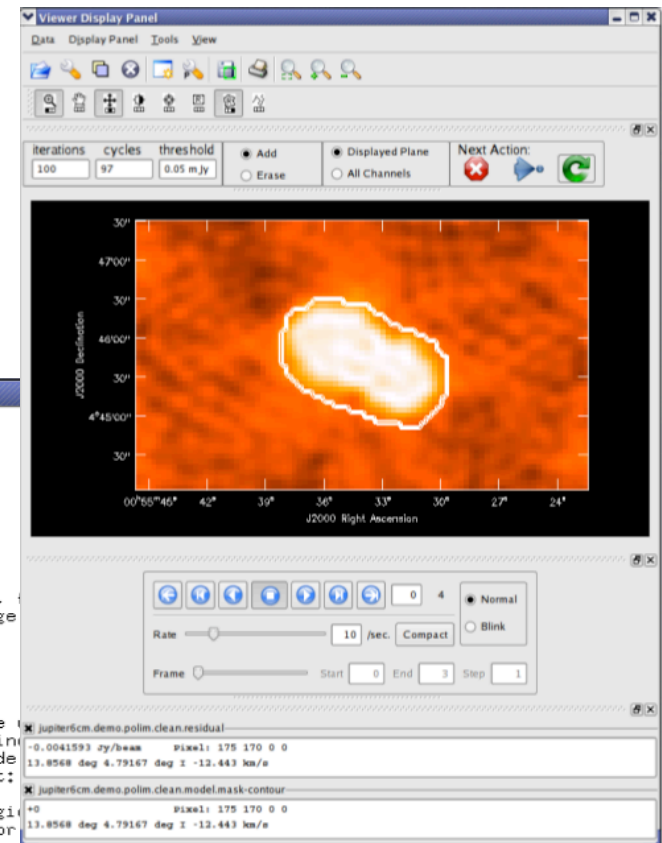
```

IPy:Jupiter
CASA <3>: tget('clean')
Restored parameters from file clean.last

CASA <4>: inp()
# clean :: Deconvolve an image with selected algorithm
vis = 'ngc5921.usecase.ms.contsub' # name of input visibility file
imagename = 'ngc5921.usecase.clean' # Pre-name of output images
field = '0' # Field Name
spw = '' # Spectral windows:channels: '' is all
selectdata = False # Other data selection parameters
mode = 'channel' # Type of selection (mfs, channel, velocity, ...
# Number of channels (planes) in output image
nchan = 46 # first input channel to use
start = 5 # Number of input channels to average
width = 1

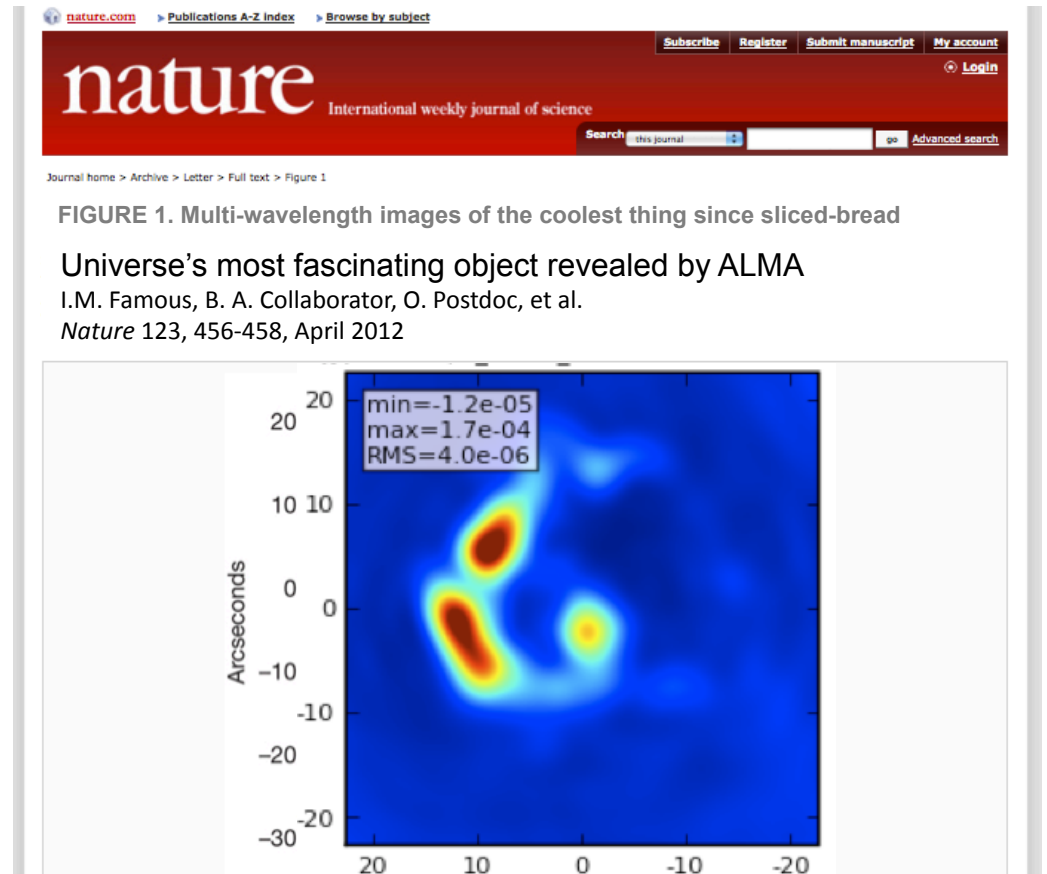
niter = 6000 # Maximum number of iterations
gain = 0.1 # Loop gain for cleaning
threshold = 8.0 # Flux level to stop cleaning. Must include
psfmode = 'clark' # method of PSF calculation to use during min
# Use csclean or mosaic. If '', use psfmode
imagermode = '' # set deconvolution scales (pixels), default:
multiscale = [] # use interactive clean (with GUI viewer)
interactive = False # cleanbox(es), mask image(s), and/or regi
mask = [108, 108, 148, 148] # x and y image size in pixels, symmetric for
imsize = [256, 256] # x and y cell size, default unit arcsec
cell = [15.0, 15.0] # Image phase center: position or field index
phasecenter = '' # rest frequency to assign to image (see help)
restfreq = '' # Stokes params to image (eg I, IV, QU, IQUV)
stokes = 'I' # Weighting to apply to visibilities
weighting = 'briggs' # Briggs robustness parameter
robust = 0.5 # number of pixels to determine uv-cell size 0=> field of view
npixels = 0

uvtaper = False # Apply additional uv tapering of visibilities.
modelimage = '' # Name of model image(s) to initialize cleaning
  
```



Step 6: Write cutting edge paper!

- ✓ Cutting edge capabilities
= amazing science
- ✓ best ideas yet to come



Take home points

- This is your observatory
- NAASC is here to help you
- To get started:
 - NAASC tutorials
 - On-line tutorials
 - Science workshops
- Call for proposals end of 2010
- Be EXCITED!



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