



VLA data reduction – part I:

Post-observing, pre-calibration

Loránt Sjouwerman, NRAO



Outline

- After the observations:
 - Obtaining your data from the archive
 - Which CPU processes the data? (Home or NRAO)
 - Examine your data
 - Structure and potential issues: all expected data present, RFI, calibrators, reference antenna...
 - Prepare for calibration steps
 - Use examination to flag bad data upfront
- Better preparation eases the process!**



Outline – interactive elements

- After the observations:
 - Obtaining your data from the archive
 - Finding data sets in the (new) archive
 - Examine your data
 - Antenna locations (potential reference antenna)
 - Listing of the observations; scans, sources, setup
 - Prepare for calibration steps
 - Some bad data editing using plotms

Better preparation eases the process!



Interactive information with this talk

- Browse to <http://go.nrao.edu/vla-drw-local>
 - Select Lecture 2
(each opens in a new tab)
 - Archive web-access pages
 - Planned new archive
 - These lecture slides (pdf)
- In a terminal (for CASA typing)
 - Start CASA (version for this workshop)
 - `casa -r 5.4.2-5`

VLA DRW Lecture 2: Post-observing, pre-calibration

[SLIDE 4] Instructions for the interactive sessions

A horizontal line separates between interactive sessions!

Grey text is information only!

Blue text are questions.

In the Firefox web browser, open these links for the interactive archive sessions: (they will open in a new tab or window)

- Planned new archive :
<https://archive-new.nrao.edu/>
- The PDF for this lecture (if you want):
https://science.nrao.edu/science/meetings/2019/vla-data-reduction/L_Sjouwerman_DRW_2019.pdf

For the interactive archive sessions have your **my.nrao.edu** credentials (username/password) handy, and know what your **project code** is (for example, mine is 19A 36 and you can use that if you do not know yours).

In a terminal on the desktop, prepare for the interactive CASA sessions
Move to the local CASA working directory:

```
cd ~/Data/DRW/Lectures/L2_archive_access/  
Start our special CASA version by using " r <version ID>":  
casa -r 5.4.2-5
```

Jump to slide 4, 23, 34, 35, 37 or 59 instructions
[lectures] [main] [VLA] [NRAO]



Assumptions (for all these lectures)

This presentation assumes that you are familiar with
the basics of:

- radio interferometry
- flux density calibration, *antenna-based* calibration (complex gain, bandpass), and self-calibration
- imaging and deconvolution

For references on the above, please check:

- The lectures of the 2014-2018 synthesis imaging workshops:
<https://science.nrao.edu/science/meetings/2014/14th-synthesis-imaging-workshop/>
<https://science.nrao.edu/science/meetings/2016/15th-synthesis-imaging-workshop/>
<https://science.nrao.edu/science/meetings/2018/16th-synthesis-imaging-workshop/>
- Synthesis Imaging for Radio Astronomy II
(eds. Taylor, Carilli, and Perley).
- Interferometry and Synthesis in Radio Astronomy
(by Thompson, Moran, and Swenson).



NRAO versus Local/home computing

- Note that NRAO offers computing facilities for **demanding** projects upon request
 - Registered user (portal <https://my.nrao.edu>)
 - Limited capacity, compete with others, no guarantee
 - See computing policy page
<https://info.nrao.edu/computing/guide/cluster-processing/>
- Here assume **processing at home institute**
 - Data transfer over internet (up to couple of 100 GB)
 - Data shipped on disk (purchase, up to 1.8 TB/disk)



Observing operator logs are available

Sent by email to proposers directly after observation
Stored on web servers:

<http://www.vla.nrao.edu/cgi-bin/oplogs.cgi>

VLA Operators Logs - Mozilla Firefox

VLA Operators Logs

www.vla.nrao.edu/cgi-bin/oplogs.

National Radio Astronomy Observatory

Search NRAO

NRAO Home VLA Tools for Array Operators > Operator Logs

The array operator logs are being merged with the new e2e archive system, this lookup tool has been provided as a stopgap measure to tide us over until the work is done. The logs here are from October 2003 onwards, older logs can be found using the previous tool, [here](#).

To use this tool, select the range of dates you wish to see logs for and hit the 'Show Logs' button. By default it will display logs for the last week.

Start Year 2018 Month Oct Day 04

Stop Year 2018 Month Oct Day 04

Show Logs

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Date	Time	Code	File
2018-10-04	13:57	SOFTWARE	pdf
2018-10-04	13:21	18A-498	pdf
2018-10-04	12:03	18A-342	pdf
2018-10-04	09:32	18A-131	pdf
2018-10-04	08:32	18A-389	pdf
2018-10-04	05:41	TDRW0001	pdf
2018-10-04	04:59	18A-146	pdf
2018-10-04	03:41	18A-342	pdf
2018-10-04	03:12	STARTUP	pdf
2018-10-04	02:12	18A-354	pdf

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VLA OBSERVING LOG

2018-10-04_0541_TDRW0001

Observing Date:	04-Oct-2018	Project:	TDRW0001	# Subarrays:	1	Observation Type:	Te S
Configuration:	D	Observer(PI):	Dr Emmanuel Momjian	Band(s) Used:	C S		
Decommissioned:	27	SBD(s):	356-24-49-4				
		Source File(s):	TDRW0001_0b35624494_1_1				
		Observer E-mail:	emomjian@nrao.edu				
		Operator(s):	Kenneth Gibson				

Adobe PDF version of this log is located at: <http://www.vla.nrao.edu/operators/logs/>
 Visibility data is updated each day at 1AT/UT midnight and is available from the online archive at: <https://archive.nrao.edu>

Time (UTC)	Dew Point (C)	Temp. (C)	Wind Speed & Direction (avg)	Bar. Pressure (mbars)	API RMS Phase (deg)	Remarks
04Oct 5:44:30	6.2	17.2	SW at 6.7 m/s	789.7	4.3	Sky cover 20%. Cumuliform clouds.
04Oct 6:46:31	7.0	14.3	SW at 4.7 m/s	789.4	4.7	Sky cover 10%. Stratiform clouds.

Number of antennas used: 27

Start Time	End Time	Comments/Outages	Form #	#Ants	Down Time (in minutes)
04Oct 5:41:30		Starting project TDRW0001.			
04Oct 5:41:30		The band(s) used is(are): C S.			
04Oct 5:44:06		On source 0137+331=3C48 with all available antennas.			
04Oct 5:41:30		To access your data from the NRAO archive visit: http://science.nrao.edu/facilities/vla/archive .			
		All VLA science data are processed through the VLA calibration pipeline. Details are at: https://science.nrao.edu/facilities/vla/data-processing/pipeline .			
		For further questions please use the NRAO helpdesk at: http://science.nrao.edu/observing/helpdesk .			
04Oct 5:41:30		Note: To support our ongoing RFI monitoring efforts, any feedback from your program on RFI can be sent to: nrao-rfi@nrao.edu .			
		The key information to provide is:			
		- Observation project code			
		- Frequency and time of the observation			
		- The characteristics of the RFI signal, in particular if it is continuous or			

VLA OBSERVING LOG

2018-10-04_0541_TDRW0001

Observing Date:	04-Oct-2018	Project:	TDRW0001	# Subarrays:	1	Observation Type:	Te S
Configuration:	D	Observer(PI):	Dr Emmanuel Momjian	Band(s) Used:	C S		
Decommissioned:	27	SBD(s):	356-24-49-4				
		Source File(s):	TDRW0001_0b35624494_1_1				
		Observer E-mail:	emomjian@nrao.edu				
		Operator(s):	Kenneth Gibson				

Adobe PDF version of this log is located at: <http://www.vla.nrao.edu/operators/logs/>
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04Oct 5:41:30		To access your data from the NRAO archive visit: http://science.nrao.edu/facilities/vla/archive .			
		All VLA science data are processed through the VLA calibration pipeline. Details are at: https://science.nrao.edu/facilities/vla/data-processing/pipeline .			
		For further questions please use the NRAO helpdesk at: http://science.nrao.edu/observing/helpdesk .			
04Oct 5:41:30		Note: To support our ongoing RFI monitoring efforts, any feedback from your program on RFI can be sent to: nrao-rfi@nrao.edu .			
		The key information to provide is:			
		- Observation project code			
		- Frequency and time of the observation			
		- The characteristics of the RFI signal, in particular if it is continuous or			

Antenna 5 (& 2) potential issues

Obtaining data from the NRAO archive

The *current* archive tool and
the *new* archive tool

(still a work in progress)



The NRAO Data Archive Tool

<https://science.nrao.edu/facilities/vla/>

→ Data Archive (left menu), VLA/VLBA Archive

The screenshot shows the Mozilla Firefox browser window displaying the National Radio Astronomy Observatory (NRAO) website. The browser title is "The Karl G. Jansky Very Large Array — Science Website - Mozilla Firefox". The address bar shows the URL "https://science.nrao.edu/facilities/vla/". The website header includes the NRAO logo, the text "National Radio Astronomy Observatory" with the tagline "Enabling forefront research into the Universe at radio wavelengths", and navigation links for "my.nrao.edu", "Public Site", "Contact Us", and "Staff Login". A search bar is also present. Below the header is a navigation menu with buttons for "Home", "About NRAO", "Science", "Observing", "Opportunities", "SRDP", "VLASS", and "ngVLA". The main content area is titled "Facilities > VLA" and features a sidebar menu on the left with the following items: "Proposing", "Observing", "Data Processing", "Data Archive", "Other Info for Observers", "HelpDesk", and "Science". The "Data Archive" and "VLA/VLBA Archive" links are circled in red. The main content area displays "The Karl G. Jansky Very Large Array" by VLA SUS, last modified Jul 31, 2019 by Emmanuel Momjian. It includes a section titled "The VLA is in A configuration Antenna Positions" and a "Status of the VLA :: UP" indicator. A "News" section on the right contains two articles: "19 March 2019: Astronomers Find 'Cannonball Pulsar' Speeding Through Space" and "2 April 2019: VLA Makes First Direct Image of Key Feature of Powerful Radio Galaxies". A "VLA Events" section is also visible at the bottom right.

The Archive Tool [Also https://archive.nrao.edu/](https://archive.nrao.edu/)

Log in for **proprietary data** here →

Unlock my data : [Login to My.NRAO.edu](#) | [Logout](#)

[Archive Home](#) | [Basic Search](#) | [Advanced Search](#) | [Image Search](#) | [Description](#) | [Archive Policy](#) | [Archive Status](#) | [Archive Tools](#) | [Future Goals](#) | [VLA Images](#) | [VLBA Sources](#) | [Downloads](#) | [Hard Disks](#)

In order to unlock your proprietary data and have access to other archive tools, you must log in to your My.NRAO account.

NRAO Science Data Archive : Advanced Search Tool

Historical VLA, Jansky VLA, VLBA and GBT Data Products

Output Control Parameters :

Choose Query Return Type :

- Download Archive Data Files
- VLA Observations Summary
- List of Observation Scans
- List of Projects

[Output Tbl Format](#) [Sort Order Column 1](#)

[Max Output Tbl Rows](#) [Sort Order Column 2](#)

General Search Parameters :

[Telescopes](#) All Jansky VLA Historical VLA VLBA GBT

[Project Code](#) [Project Session](#) [Dates From](#)

[Observer Name](#) [Archive File ID](#) [To](#)

(partial strings allowed)

(2010-06-21 14:20:30)

Position Search :

[Target Name](#) [Search Type](#) [Min. Exposure](#) (secs)

[RA or Longitude](#) [DEC or Latitude](#) [Equinox](#)

[Search Radius](#) - OR - Check for automatic VLA field-of-view, freq. dependent.??

(1d00'00" or 0.2d)

Observing Configurations Search :

[Telescope](#) All A AB BnA B BC CnB

[Config](#) C CD DnC D DA

[Sub_array](#) All 1 2 3 4 5

[Polarization](#)

[Data Type](#)

[Observing Bands](#) All 4 P L S C
 X U K Ka Q W

[Frequency Range](#)
(In MHz : 1665.401 - 1720.500)



Query return

- For each match, the archive query return presents per observation (i.e. per row):
 - The observing run identifier (i.e., the SB name)
 - Any data quality issues (highlighted in yellow/red)
 - The SDM-BDF set (content of the SDM directory)
 - The individual scans with their details
 - The operator log (usually, also sent by email)

Archive File	Status	Project	Seg	Obs. Data Starts	Obs. Data Stops	File Size	Telescope: config:sub"	Bands	Format	Type	Data Qual	View Scans	Logs etc.
<input type="checkbox"/> 11A-291.sb4911125.eb4924302.55782.00136674769	public	11A-291	x	11-Aug-09 00:02:01	11-Aug-09 01:01:45	42.46GB	VLA:A:0	L	SDMset	raw	OK	Scans	Logs
<input type="checkbox"/> 11A-291.sb4911125.eb4944094.55784.99251239583	public	11A-291	x	11-Aug-11 23:50:07	11-Aug-13 02:14:44	30.29GB	VLA:A:0	L	SDMset	raw	OK	Scans	Logs
<input type="checkbox"/> 11A-291.sb4910900.eb4947827.55787.6933925	public	11A-291	x	11-Aug-14 16:39:27	11-Aug-14 18:39:07	78.96GB	VLA:A:0	L	SDMset	raw	info	Scans	Logs
<input type="checkbox"/> 11A-291_sb4911125_2.55795.922649976856	public	11A-291	x	11-Aug-22 22:08:44	11-Aug-22 23:08:30	36.44GB	VLA:A:0	L	SDMset	raw	OK	Scans	Logs
<input type="checkbox"/> 11A-291_sb4911125_3_000.55804.894766516205	public	11A-291	x	11-Aug-31 21:28:29	11-Aug-31 22:28:18	39.47GB	VLA:A:0	L	SDMset	raw	OK	Scans	Logs



Scan listing:

Scan details (source, date, setup, etc)

Project	Scan :sub	Source	Cal Code	Start Time	Stop Time	Sys	TOS (sec)	Intrvl (sec)	Scan Intent	Spect Win	Obs_Freq (MHz)	Bandw (MHz)	Polar	Spect chans	Corr Mode	Tele:config :sub:nants	RA(J2000)	DEC(J2000)	Archive File
11A-291	1:1	J1120+1420		11-Aug-09 00:02:01	11-Aug-09 00:02:54	UTC	53.5	1	OBS	CD_0:SW_0 CD_0:SW_1 CD_0:SW_2 CD_0:SW_3 CD_0:SW_4 CD_0:SW_5 CD_0:SW_6 CD_0:SW_7 CD_0:SW_8 CD_0:SW_9 CD_0:SW_10 CD_0:SW_11 CD_0:SW_12 CD_0:SW_13 CD_0:SW_14 CD_0:SW_15	998.000000 1062.000000 1126.000000 1190.000000 1254.000000 1318.000000 1382.000000 1446.000000 1506.000000 1570.000000 1634.000000 1698.000000 1762.000000 1826.000000 1890.000000 1954.000000	64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000	RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL	128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128	WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR	EVLA:A:1:27	11h20m27.807s	+14d20'54.99"	11A-291_sb4911125_eb4924302.55782.00136674769 uid____evla_bdf_1312848123251.bdf
11A-291	2:1	J1120+1420		11-Aug-09 00:02:54	11-Aug-09 00:03:54	UTC	59.8	1	CAL	CD_0:SW_0 CD_0:SW_1 CD_0:SW_2 CD_0:SW_3 CD_0:SW_4 CD_0:SW_5 CD_0:SW_6 CD_0:SW_7 CD_0:SW_8 CD_0:SW_9 CD_0:SW_10 CD_0:SW_11 CD_0:SW_12 CD_0:SW_13 CD_0:SW_14 CD_0:SW_15	998.000000 1062.000000 1126.000000 1190.000000 1254.000000 1318.000000 1382.000000 1446.000000 1506.000000 1570.000000 1634.000000 1698.000000 1762.000000 1826.000000 1890.000000 1954.000000	64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000	RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL	128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128	WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR	EVLA:A:1:27	11h20m27.807s	+14d20'54.99"	11A-291_sb4911125_eb4924302.55782.00136674769 uid____evla_bdf_1312848123257.bdf
11A-291	3:1	J1120+1420		11-Aug-09 00:03:54	11-Aug-09 00:05:24	UTC	89.8	1	CAL	CD_0:SW_0 CD_0:SW_1 CD_0:SW_2 CD_0:SW_3 CD_0:SW_4 CD_0:SW_5 CD_0:SW_6 CD_0:SW_7 CD_0:SW_8 CD_0:SW_9 CD_0:SW_10 CD_0:SW_11 CD_0:SW_12 CD_0:SW_13 CD_0:SW_14 CD_0:SW_15	998.000000 1062.000000 1126.000000 1190.000000 1254.000000 1318.000000 1382.000000 1446.000000 1506.000000 1570.000000 1634.000000 1698.000000 1762.000000 1826.000000 1890.000000 1954.000000	64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000 64.000	RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL RR,LL	128 128 128 128 128 128 128 128 128 128 128 128 128 128 128 128	WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR WIDR	EVLA:A:1:27	11h20m27.807s	+14d20'54.99"	11A-291_sb4911125_eb4924302.55782.00136674769 uid____evla_bdf_1312848174961.bdf

Scan listing

FYI: reference pointing and OTF have subscans

11A-258	42:1	0542+498=3C147		11-Jun-01 01:26:47	11-Jun-01 01:27:07	UTC	19.4	1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891607524.bdf
11A-258	42:2	0542+498=3C147		11-Jun-01 01:27:07	11-Jun-01 01:27:27	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891608043.bdf
11A-258	42:3	0542+498=3C147		11-Jun-01 01:27:27	11-Jun-01 01:27:47	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891627503.bdf
11A-258	42:4	0542+498=3C147		11-Jun-01 01:27:47	11-Jun-01 01:28:07	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891647507.bdf
11A-258	42:5	0542+498=3C147		11-Jun-01 01:28:07	11-Jun-01 01:28:27	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891667503.bdf
11A-258	42:6	0542+498=3C147		11-Jun-01 01:28:27	11-Jun-01 01:28:47	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891687511.bdf
11A-258	42:7	0542+498=3C147		11-Jun-01 01:28:47	11-Jun-01 01:29:07	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891707505.bdf
11A-258	42:8	0542+498=3C147		11-Jun-01 01:29:07	11-Jun-01 01:29:27	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891727505.bdf
11A-258	42:9	0542+498=3C147		11-Jun-01 01:29:27	11-Jun-01 01:29:47	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891747507.bdf
11A-258	42:10	0542+498=3C147		11-Jun-01 01:29:47	11-Jun-01 01:30:07	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891767505.bdf
11A-258	42:11	0542+498=3C147		11-Jun-01 01:30:07	11-Jun-01 01:30:27	UTC	20	1.1	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891787507.bdf
11A-258	42:12	0542+498=3C147		11-Jun-01 01:30:27	11-Jun-01 01:30:42	UTC	15.4	1.2	POINT	CD_1:SW_16 CD_1:SW_17	8332.000000 8460.000000	128.000 128.000	RR,RL,LR,LL RR,RL,LR,LL	64 64	WIDR WIDR	EVLA:BuA->A:1:25	05h42m36.138s	+49d51'07.23"	11A-258.sb4139176.eb4258095.55713.0339549537 uid___evla_bdf_1306891807506.bdf



Download options: data format

- Data formats:
 - SDM-BDF ← raw, best
 - CASA measurement set, i.e., CASA MS (default)
 - SDM tables only
- Flagging and averaging options only apply to CASA MS format
- If CASA MS is requested, the native SDM-BDF is converted to MS using (old) *importevla* task (casa 4.7 - allows flagging, averaging)

Jansky VLA datasets

Choose download data format :

CASA MS
 SDM-BDF dataset (all files)
 SDM tables only (no visibilities)

Create tar file : Create MS or SDM tar file

Apply telescope flags : Apply flags generated during observing

Choose online averaging for CASA MS or AIPS FITS : Spectral Averaging (chans)
 Time Averaging (secs)

Select scans for MS or AIPS FITS :



Download options: flagging

Jansky VLA datasets

‘Telescope flags’

- Online flags, e.g., antenna not on source, sub-reflector error
- Shadowing flags, and
- Zero flags (pure zero’s)
- If the “apply flags” option is not checked, the flags are written to a FLAG_CMD MS table. They can later be applied by using the CASA task *flagcmd*
- If checked, flags are applied to the data in the MS conversion

Choose download data format :

CASA MS
 SDM-BDF dataset (all files)
 SDM tables only (no visibilities)

Create tar file : Create MS or SDM tar file

Apply telescope flags : Apply flags generated during observing

Choose online averaging for CASA MS : Spectral Averaging (chans)
 Time Averaging (secs)

Select scans for MS :



Download options: averaging

Jansky VLA datasets

Choose download data format : CASA MS
 SDM-BDF dataset (all files)
 SDM tables only (no visibilities)

Create tar file : Create MS or SDM tar file

Apply telescope flags : Apply flags generated during observing

Choose online averaging for CASA MS Spectral Averaging (chans)
 Time Averaging (secs)

Select scans for MS

- Possible to average MS data in time and/or in frequency
- Selection of scan numbers (use scan listing mentioned before)
- For these, the archive tool uses the CASA task *split*



Notes on averaging

Averaging decreases data size

which helps in the transfer
and data reduction speed

When averaging:

- Apply the flags!
- Frequency averaging may cause coherence loss

Check that delays are small
before frequency averaging

- Amount of allowable time averaging depends on the science goal

The VLA Observational Status
Summary discusses amplitude
loss due to time averaging.

Jansky VLA datasets

Choose download data
format :

- CASA MS
- SDM-BDF dataset (all files)
- SDM tables only (no visibilities)

Create tar file : Create MS or SDM tar file

Apply telescope flags :

- Apply flags generated during observing

Choose online averaging for CASA (chans) Spectral Averaging

MS or AIPS FITS : Time Averaging (secs)

Select scans for MS or
AIPS FITS :



Transfer of SDM and MS directories:

- The SDM-BDF and MS are data directories!
 - For downloading over internet, “tar” is recommended (but requires twice the disk space)
 - Alternatively, use “wget”

Jansky VLA datasets

Choose download data format :

CASA MS
 SDM-BDF dataset (all files)
 SDM tables only (no visibilities)

Create tar file : Create MS or SDM tar file

Apply telescope flags : Apply flags generated during observing

Choose online averaging for CASA (chans) : Spectral Averaging

MS or AIPS FITS : Time Averaging (secs)

Select scans for MS or AIPS FITS :



National Radio Astronomy Observatory

Enabling forefront research into the Universe at radio wavelengths

Archive Access Tool [Back](#)

[Log In](#)

[Legacy Archive](#)

[About](#)



Show Search Inputs

[View Projects](#)

[View Observations](#)

[View Images](#)

Page 1

Show

25

of 8251 Projects

Project	Instrument	Title	First Obs	Last Obs	Execution Blocks
+ BF119	VLBA	An Optimal Search Strategy For FRBs	2016-08-18 20:51	2017-06-05 16:34	274 execution blocks
+ UF001	VLBA	No title found	2017-01-16 23:28	2017-10-22 13:48	20 execution blocks
+ BD192	VLBA	MSPSRPI: VLBI astrometry of millisecond pulsars	2016-08-03 00:09	2018-01-09 01:07	419 execution blocks
+ DQ718	VLBA	No title found	2017-05-04 07:45	2017-05-04 09:11	1 execution blocks
+ BT139	VLBA	Magnetic Fields and Exoplanets in AGB Environments: Deep Observations with HSA	2017-05-21 20:15	2017-07-09 02:05	4 execution blocks
+ BB379	VLBA	SN 2016ool: A Rare Chance to Resolve a Nearby Supernova	2017-05-22 06:30	2017-05-22 14:29	1 execution blocks
+ UD001	VLBA	No title found	2017-01-08 23:57	2018-07-23 10:35	24 execution blocks
+ TR031	VLBA	No title found	2017-04-26 18:00	2017-09-27 20:35	5 execution blocks
+ TC026	VLBA	No title found	2017-05-25 13:00	2017-05-25 13:39	1 execution blocks
+ DQ720	VLBA	No title found	2017-05-18 06:30	2017-05-18 07:55	1 execution blocks
+ BP221	VLBA	Mrk1018: Binary black hole interaction of transient jet ejection?	2017-05-12 16:19	2018-03-02 00:03	12 execution blocks



<https://archive-new.nrao.edu>

Project Code:

Archive Filename:

PI Name:

Title Text:

tdrw0001

Abstract Text:

Search

Clear

▲ Hide Search Inputs ▲

View Projects

View Observations

View Images

Project

Instrument

Title

First Obs

Last Obs

TDRW0001

VLA

No title found

2018 10 03 05:22

2018 11 07 13:43

3 execution blocks

Title: No title found

Abstract: No abstract found

PI: Emmanuel Momjian

Co-Authors: Frank Schinzel, Emmanuel Momjian

Observations

Images

0/10: selected (0/10.0 TB)

View Selection(s)

Clear All

Download

Archive File

Project

Instrument

Observation Start

Observation Stop

File Size

Array Config

Bands

Type

Cals

Scans

TDRW0001.sb35770743.eb35774735.58429.44719293981

TDRW0001

VLA

18-11-07 10:44:06

18-11-07 13:43:32

15.927 GB

D

Ka, X

visibility

59

TDRW0001.sb35624494.eb35628826.58395.23719237269

TDRW0001

VLA

18-10-04 05:41:34

18-10-04 08:32:43

12.446 GB

D

C, S

visibility

25

TDRW0001.sb35624494.eb35625702.58394.22234046296

TDRW0001

VLA

18-10-03 05:22:58

18-10-03 05:54:22

567.555 MB

D

C, S

visibility

8



<https://archive-new.nrao.edu>

Project Code:

Archive Filename:

PI Name:

Title Text:

tdrw0001

Abstract Text:

Launch Workflow Task on: TDRW0001

User Email (required):

Isjouwer@nrao.edu

Request Description:

VLA Processing Request

Destination Directory:

Specify directory (must be logged in & staff)

/lustre/

Create tar file:

Return results as a tar file

Choose download data format:

- SDM tables only (metadata only)
- SDM-BDF dataset (metadata + visibilities)
- Basic Measurement Set (uncalibrated)
- Calibrated Measurement Set

Apply telescope flags:

Apply flags generated during observing

Scan Intents:

Click to Select

CASA Version:

5.4.2-8 (recommended) ▾

Cancel

Submit Request

View Projects View Observations View Images

Project	Instrument
TDRW0001	VLA

Title: No title found
 Abstract: No abstract found
 PI: Emmanuel Momjian
 Co-Authors: Frank Schinzel, Emmanuel Momjian

Observations Images

0/10: selected (0/10.0 TB)

View Selection(s) Clear All Download

Archive File

TDRW0001.sb35770743.eb35774735.58429.4471929
TDRW0001.sb35624494.eb35628826.58395.2371923
TDRW0001.sb35624494.eb35625702.58394.2223404



Cals	Scans
59	
25	
8	

Finding data in the “new” archive tool

- **Interactive archive:**

- Browse to/find tab <http://archive-new.nrao.edu/>

- Open search parameter dialog (or use magnifying glass)
- In project code type “tdrw0001” and “search”/return
- Hide inputs or scroll down to click the “+”-sign
- Add second data set to clipboard and click “download”
- Enter your email and select a download product

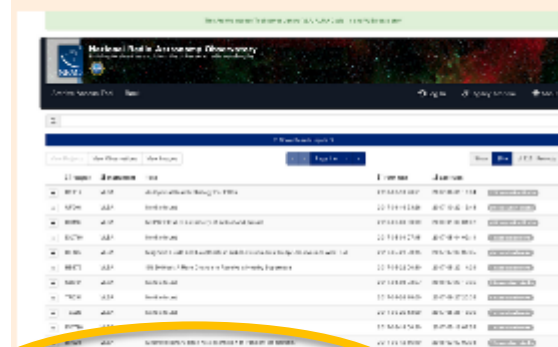
- *Please don't download!* - press **“cancel”**

- Find your own project

- A padlock in front of the data set?
- What if you log in and do the same?

[SLIDE 24] Interactive Archive Tool session

In the Firefox web browser, find the tab for the new archive (or start a new)



follow the instructions from the presentation!

Can you find your own data with this tool?
What happens when you log in (at the top right of the page)?



Some final archive notes

- The native SDM-BDF data is always good:
 - May take a while to convert to MS at home
 - Should be usable for any CASA version available
 - Can also be used for AIPS
- Archive processed (averaged/flagged MS) data may need the same CASA version to proceed; currently uses 4.7! [ask SDM]
 - Version used should be listed in a file in the download directory in `*__asdm2MS.log` or `*__casalog.log`
- Pipeline processed (MS) data and/or products must use the same CASA version to proceed
 - Calibration tables specific to CASA version



Requesting data on a hard disk

- NRAO can ship data on hard disks upon request, e.g.:
 - when the size of the data is large (over a few 100 GB)
 - when the internet connection cannot handle the request
- This disk-ordering process is done through the archive tool.
- Data is shipped on a 2 TB disk (which holds 1.8 TB of data)
- Cost: USD **125** per disk, potentially plus shipping cost
- Disk shipment information and policies are posted at <https://science.nrao.edu/facilities/vla/archive/shipment>



Getting CASA Pipeline Calibrated Data

- Upcoming VLA CASA pipeline talks...
- Note that VLA CASA calibration pipeline products are not yet available through the current archive (work is in progress using the new archive tool)
- Request pipelined data products through the *VLA Pipeline department* of the NRAO help desk (<https://help.nrao.edu/>)
Download through the internet or ask for a hard disk (purchase)



Loading data into AIPS

- Conversion from the native SDM into UV FITS format is no longer supported through the archive
 - Download the native SDM-BDF from the archive.
 - Use OBIT to load into AIPS using task '*bdf2aips*'.
<http://www.cv.nrao.edu/~bcotton/Obit.html>
 - For more details on the VLA data archive, see <https://science.nrao.edu/facilities/vla/archive/index>



Examine the visibility data (in CASA)



CASA



- See previous lecture..
- Documentation is available at <http://casa.nrao.edu/> → ‘Using CASA’
- Training material is available at <http://casaguides.nrao.edu>
- For help, use the NRAO help desk at: <http://help.nrao.edu>

CASA 5.4.2-5 will be used at this workshop



Loading The Data: *importasdm*

If one chooses to download the SDM-BDF (not CASA MS)

- Task *importasdm* converts the SDM-BDF to MS
- *importasdm* only understands VLA online flags:
 - It converts the data into a MS while applying flags.

```
> default importasdm
> inp
> asdm           = 'archive_sdm_directory_name'
> vis           = 'output MS name'
> occur_mode    = 'co'      (or load ca, ao)
> applyflags    = True
> inp
> go
```



Loading The Data: *flagdata*

Additional flags for VLA data:

- Note that if `applyflags = False` (the default in *importasdm*), the flags are written to a `FLAG_CMD` MS table. They can be examined (listed, plotted) and applied by using the task *flagcmd*
- VLA data needs additional flags for shadowing and pure zero data; these flags are applied using the *flagdata* task:

```
> default flagdata
> mode                =          'shadow'
> inp
> go
> mode                =          'clip'
> correlation         =          'ABS_ALL'
> clipzeros           =          True
> inp
> go
```



Refreshing The Data: *mstransform* (*split*)

For these workshop lectures we use modified data sets:

- In this lecture, after *importasdm*, additional flags for shadowing and pure zero data were added, and removed from the drw-temp measurement set using *mstransform* (a front-end to *split*), retaining only the scientific interesting spw and scans:

```
> default mstransform
> vis                =      'drw-temp.ms '
> outputvis          =      'drw.ms '
> spw                 =      '2~9:3~60 '
> scan               =      '5~25 '
> datacolumn         =      'data '
> keepflags          =      False
> hanning            =      True
> go
```



Examining Your Data

- Operator observing log (email, posted on web)
- Plotting the antenna positions: *plotants*
(potential reference antennas)
- Observing summary: *listobs*
(sources, scans, spectral windows, antennas, etc...)
- Plotting/displaying/editing data: *plotms*

Examine your data carefully before flagging:
That is, know your data content



Plotting the antennas: *plotants*

- **Interactive CASA:**
 - Move to the terminal with CASA running and type the commands as shown in the web page for Lecture 2:

```
> default plotants
> inp
> ...
> vis = 'drw-temp.ms'
> antindex = true
> inp
> ..
```

[SLIDE 34] Interactive CASA sessions

If not done so earlier, start CASA in a terminal by typing:
cd ~/data/DMW/lectures/casa -r 5.4.2.5
Find the terminal running CASA as well as the Jupyter-GUI

The CASA command line terminal

```
lsj@pariscand/lectures: casa -r 5.4.2.5

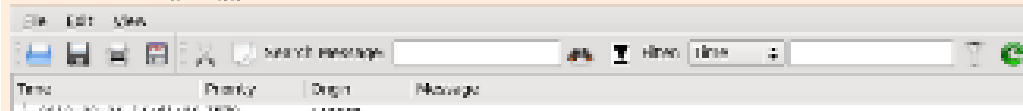
You are running CASA in a terminal window.

The starting line of CASA may vary
depending on whether the shared libraries
are cached or not.

Python 3.4.5 -- an enhanced interactive python.
CASA 5.4.2.5 -- Domain Astronomy Software Applications
--- Configuration installed.
Setenv doc/inst/1 for help getting started with CASA.
Using matplotlib backend: TkAgg

casa> inp ..
```

The CASA message logger



Time	Priority	Origin	Message
11:00:00.000000	INFO	main	...

Plotting the antennas: *plotants*

- **Interactive CASA:**
 - On “inp” you will see the parameters set for the task:
 - Black: default value
 - Blue: changed (non-default)
 - Red: invalid value!
 - Typo
 - Does not exist

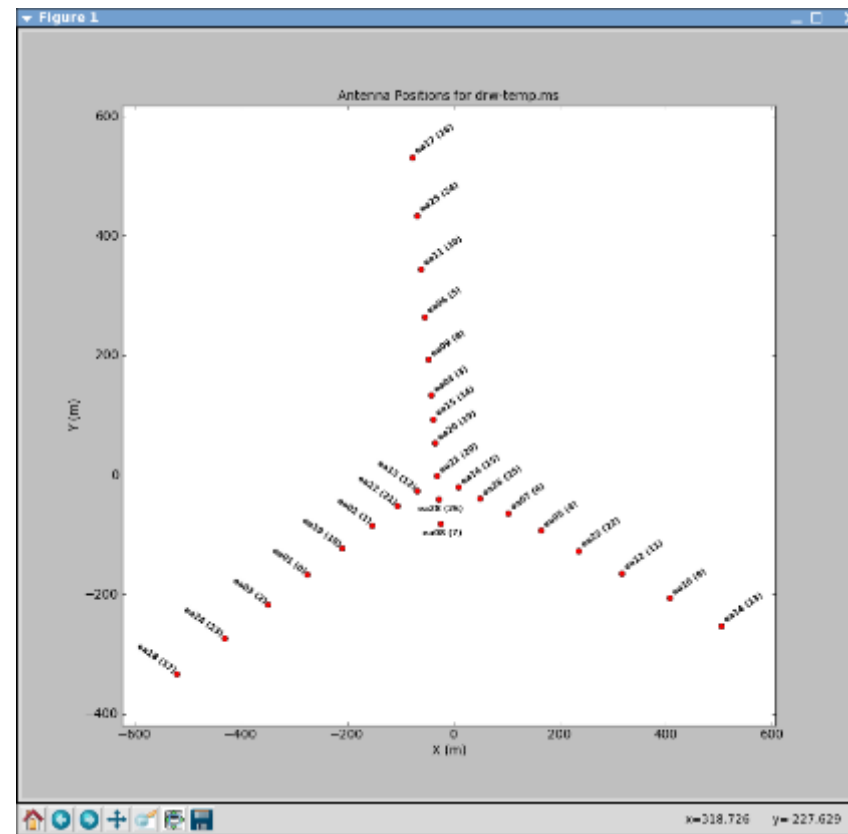
```
> antindex = True
```

```
> inp
```

```
> ..
```

```
> go
```

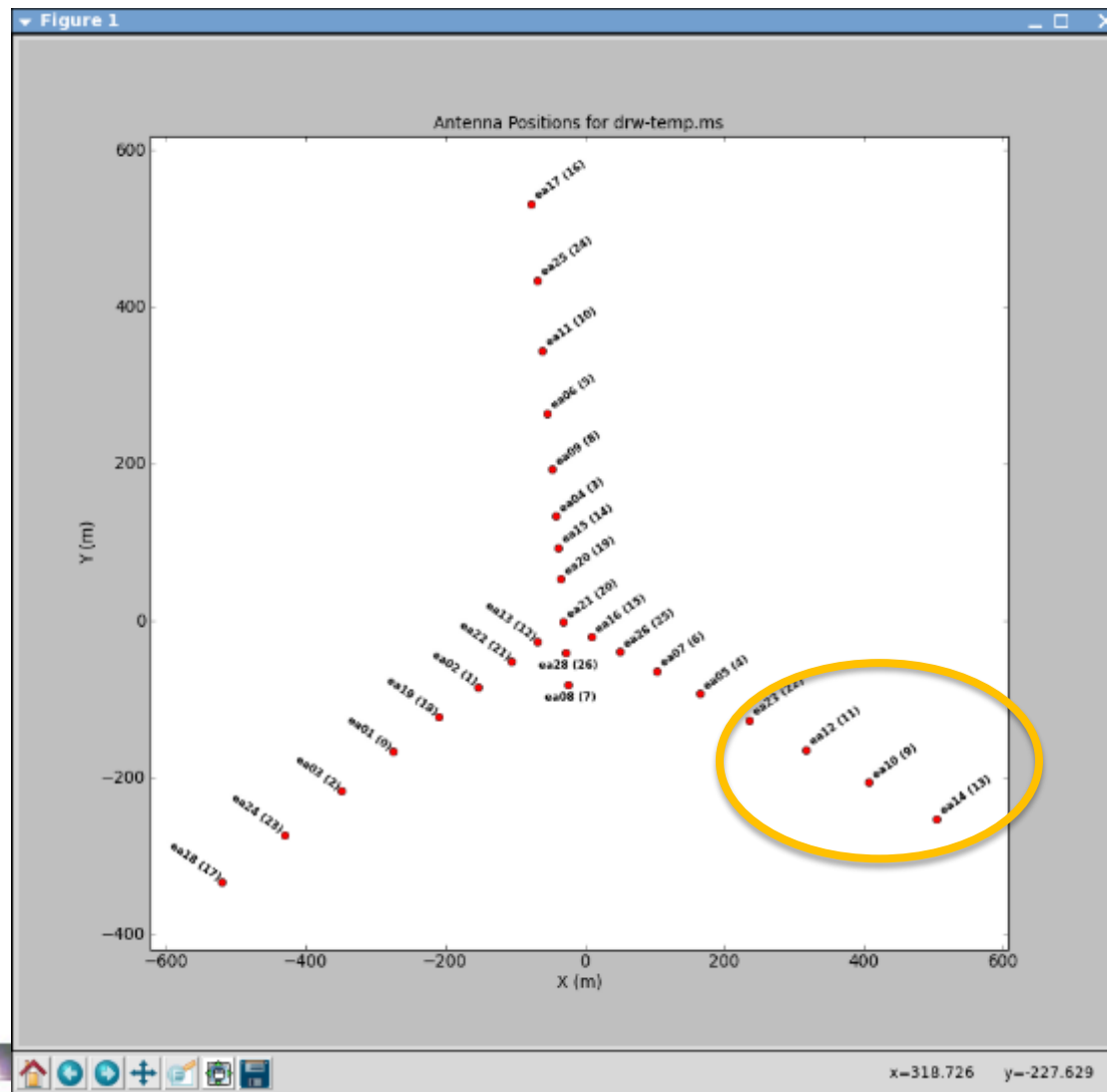
- On “go” this plot will show up on your screen



Choosing the reference antenna

Hints:

- Must have good data on **all calibrator** sources (target scans irrelevant)
 - No antenna “issues”
 - Clean from RFI
- Baselines not too long
 - **Near** center of array (use *listobs/vishead*)
 - e.g. 08-pad [WNE]
A: inner antennas
D: no shadowing
Also don't move..
- Here: **ea10**
(D array, E08, #=9)



Observing summary: *listobs*

Summary:

- Four sources:
 - 0137+331=3C48
 - 5 scans of which 4 are setup, i.e. 1 scan on Flux calibrator
 - J2355+4950, 1 scan, some calibrator
 - J0259+0747, 10 scans, Gain/phase calibrator
 - **3C75**, 9 scans, source with the most time on source, has the most visibilities so this would be the **target source**
- 8 spectral windows (spw), full polarization products (RR,RL,LR,LL)
 - Ranging 2488 to $(3384+128=)$ 3512 MHz, centered at 3000 MHz
 - 64 channels per spw/pol, each 2 MHz wide
- Using 27 antennas (ea27 is not used)
 - Highest numbered antenna pad is E09/N09/W09: D-array
 - Here, use ea10 on pad E08 with ID number 9 as reference



Data Review: *plotms*

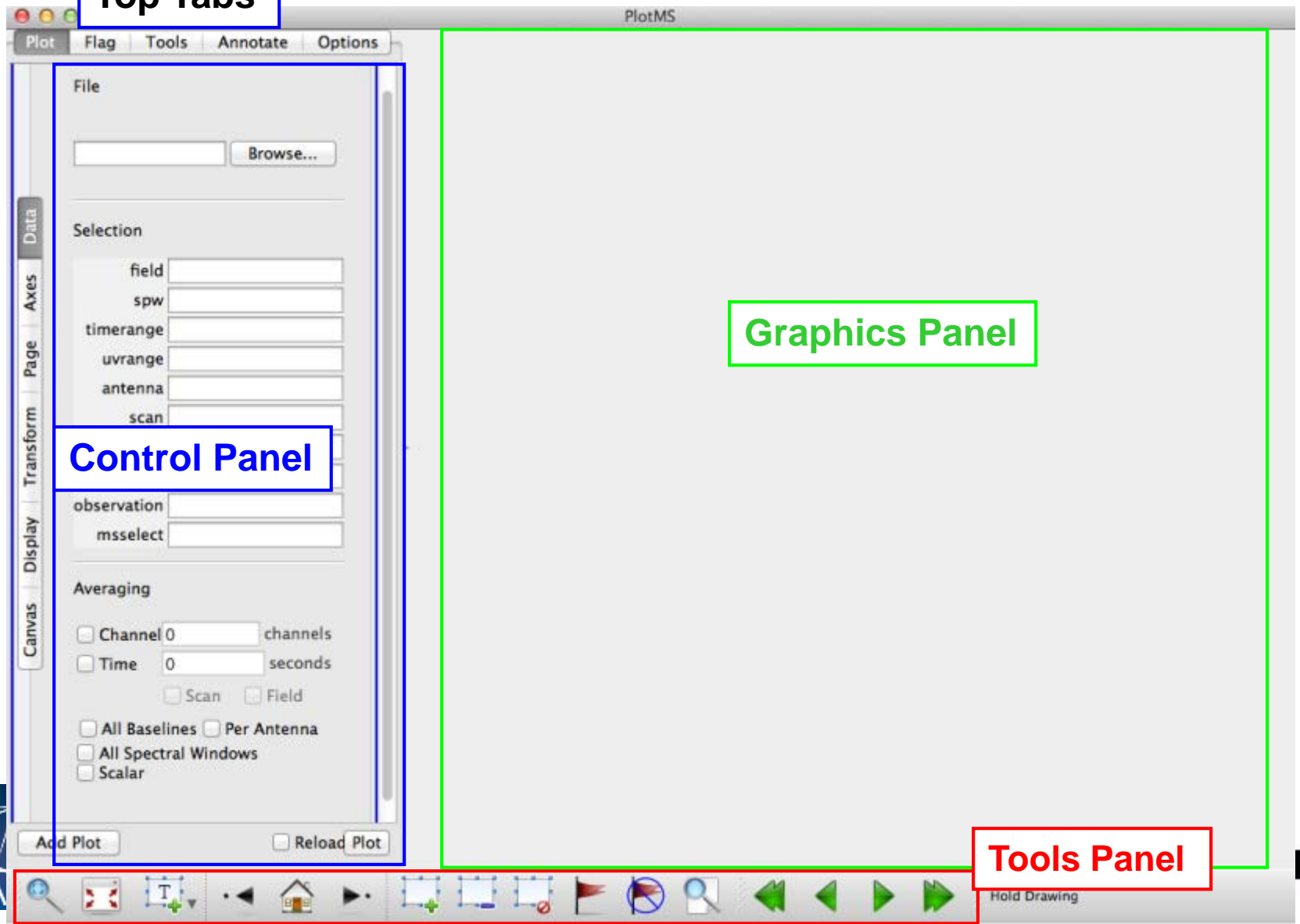
Top Tabs

Side Tabs

Control Panel

Graphics Panel

Tools Panel



Data Review: *plotms*

MS Ids and other meta info:

- 'scan' (number)
- 'field' (index)
- 'time',
- 'interval'='timeint'='timeinterval'='time_interval'
- 'spw' (index)
- 'chan'='channel' (index)
- 'freq'='frequency' (GHz)
- 'vel'='velocity' (km/s)
- 'corr'='correlation' (index)
- 'ant1'='antenna1' (index)
- 'ant2'='antenna2' (index)
- 'baseline' (a baseline index)
- 'row' (absolute row Id from the MS)

Visibility values, flags:

- 'amp'='amplitude'
- 'phase' (deg)
- 'real'
- 'imag'='imaginary'
- 'wt'='weight'
- 'flag'
- 'flagrow'

Axes

The screenshot shows the 'plotms' software interface with a sidebar on the left containing buttons for 'Canvas', 'Display', 'Transform', 'Page', 'Axes', 'Data', and 'Flag'. The 'Axes' button is highlighted with a red circle. The main window has a menu bar with 'Plot', 'Flag', 'Tools', 'Annotate', and 'Options'. The 'X Axis' dropdown is set to 'Time' and is circled in red. Below it, 'Cached' is checked, 'Attach' is set to 'Bottom', and 'Range' is 'Automatic' with a date range of '1858/11/17/00:00:00.000 to 1858/11/17/00:00:00.000'. The 'Y Axis Data' dropdown is set to 'Amp: corrected'. Below that, 'Data' is 'Amp', 'Data Column' is 'corrected', 'Cached' is checked, 'Attach' is 'Left', and 'Range' is 'Automatic' with a range of '0 to 0'. At the bottom, there are buttons for 'Add Y Axis Data', 'Delete Y Axis Data', 'Add Plot', and 'Reload Plot'.



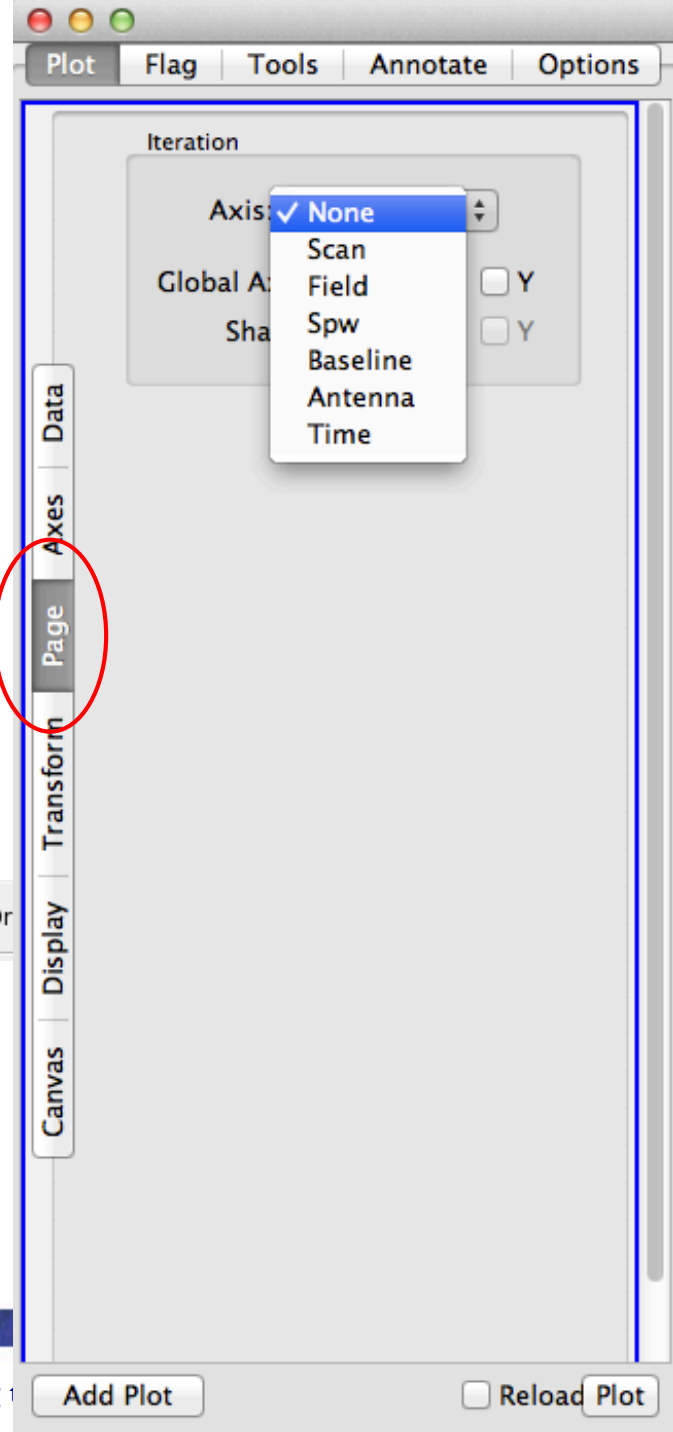
Data Review: *plotms*

Multi-page, cycling through/iterate

- Scan
- Field
- Spw
- Baseline
- Antenna
- Time



Tool panel

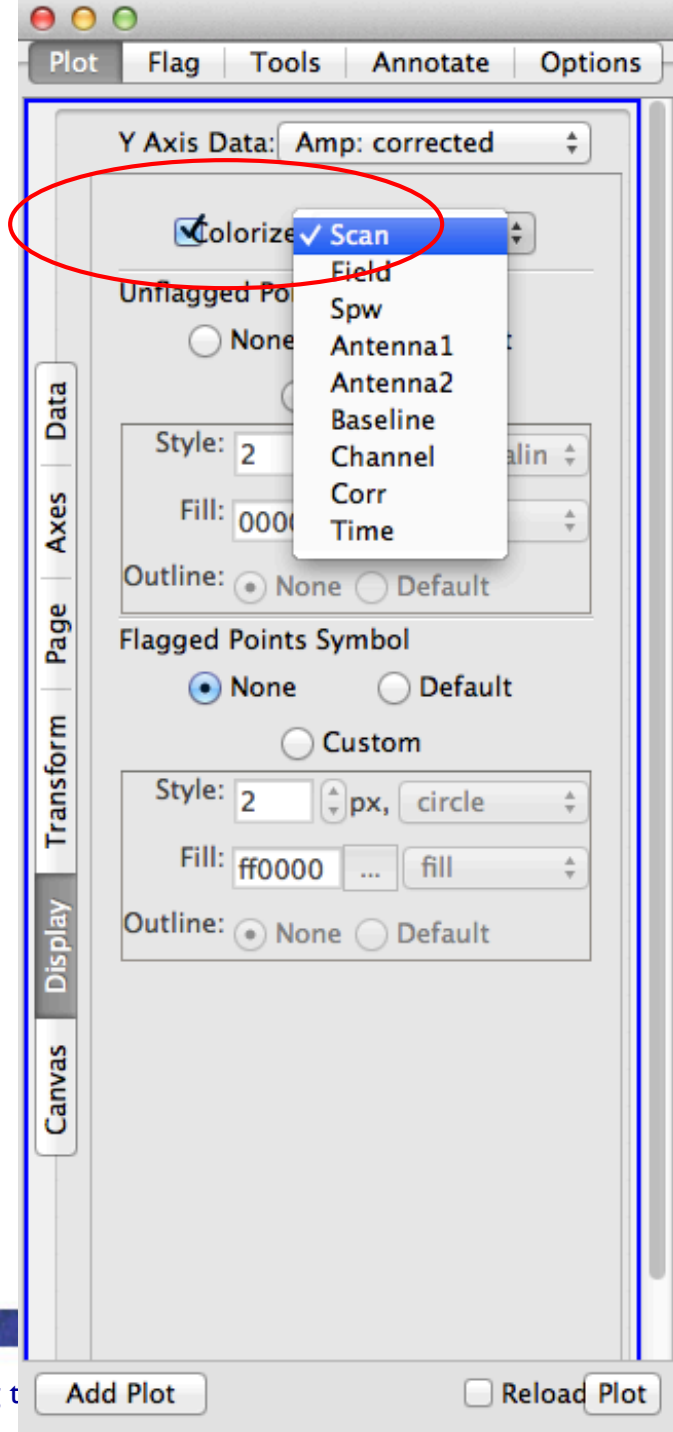


Data Review: *plotms*

Display

Colorize by:

- Scan
- Field
- Spw
- Antenna 1
- Antenna 2
- Baseline
- Channel
- Correlation
- Time



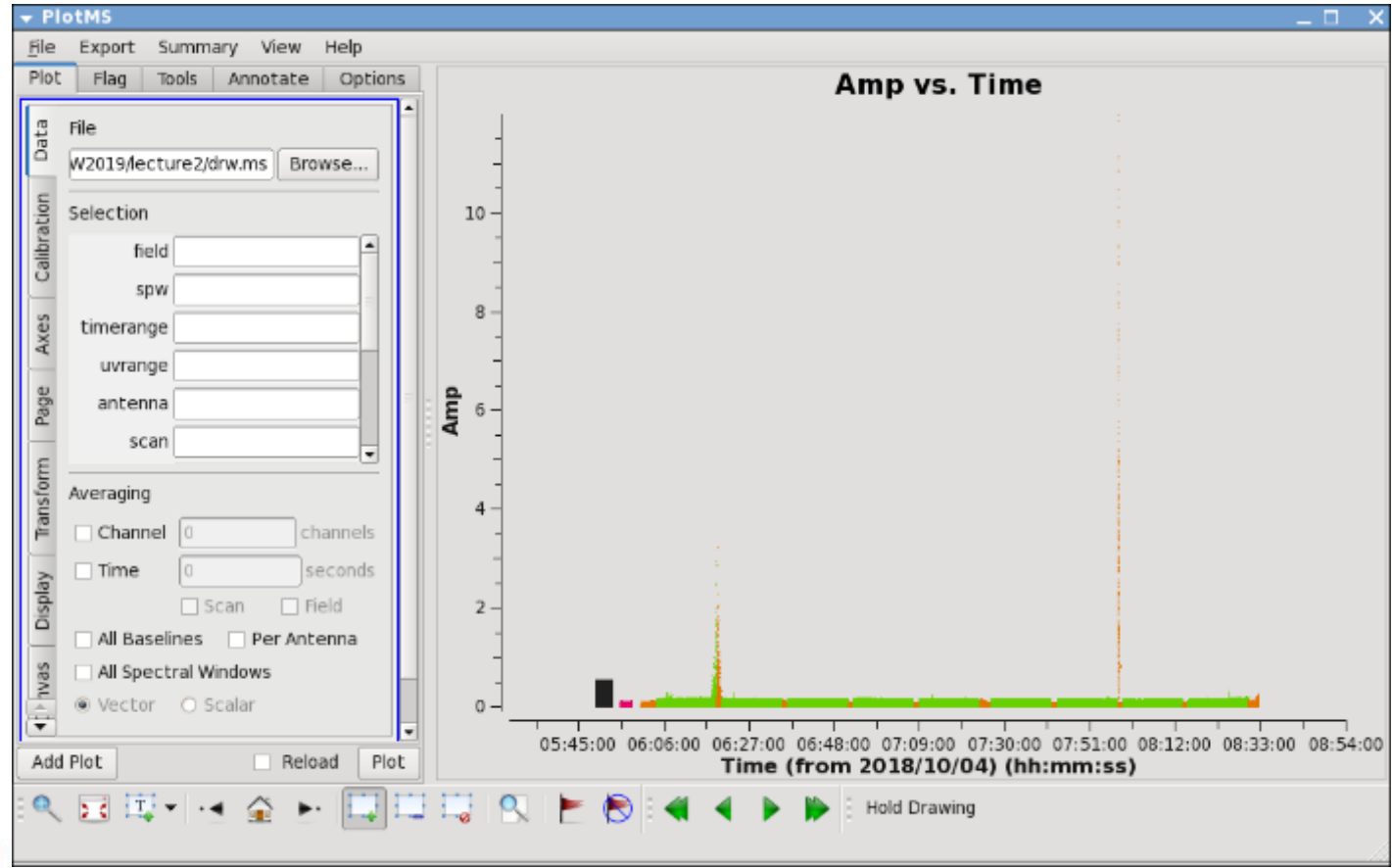
What are we looking for?

- A feel of the overall structure of the data (see also the OPT schedule):
 - Calibrators and target visibilities, frequency setup
 - Observing conditions, instrumental response
- Where to expect bad data
 - Specific ill-performing antennas/baseline(boards)
 - In time
 - Start of scans
 - Bad weather/pointing (observing conditions)
 - In frequency
 - Bandpass, subband edges
 - RFI – not your line!



Data Review: *plotms*

Example: xaxis='time', yaxis='amp,' coloraxis='field'



Radio Frequency Interference (RFI)

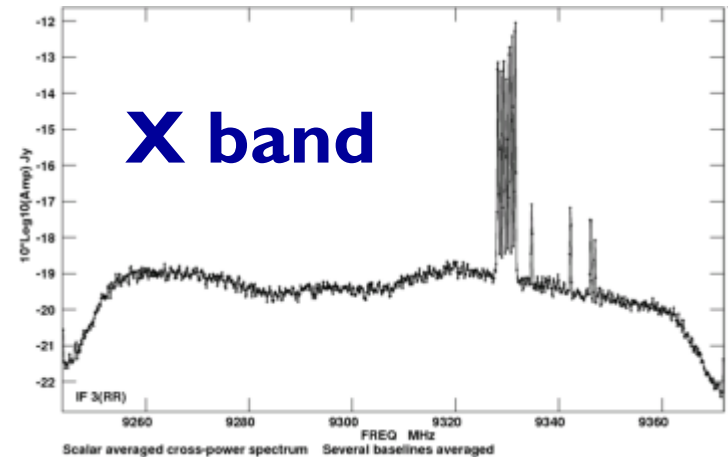
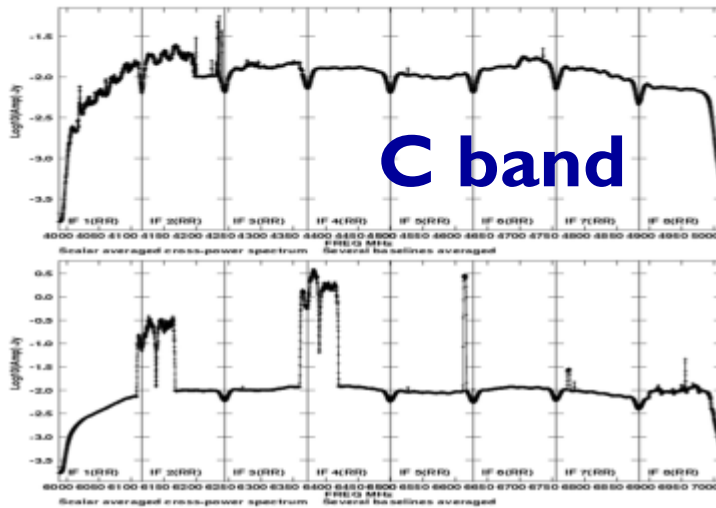
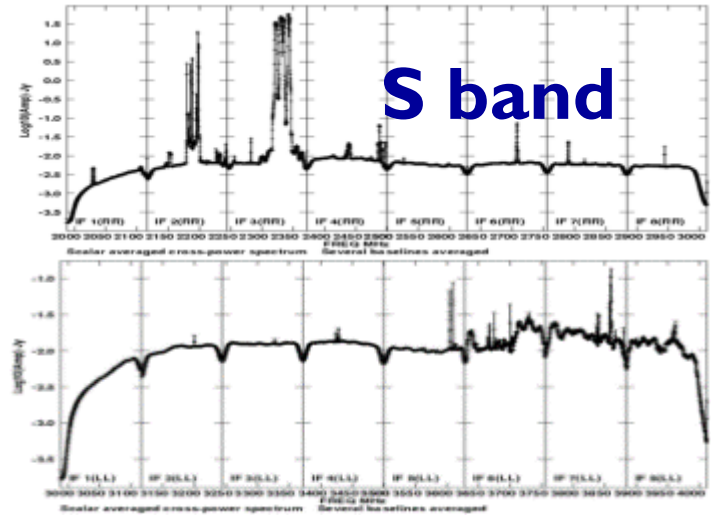
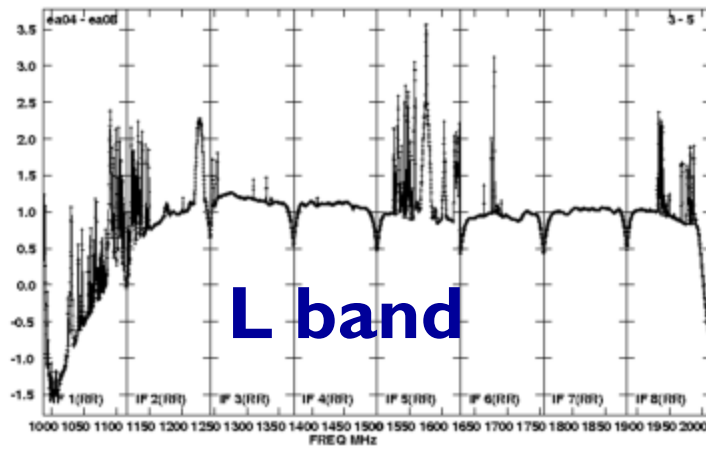
1. VLA observations, particularly at the lower frequency bands, will be severely affected by RFI.
2. VLA RFI information is available at:

<https://science.nrao.edu/facilities/vla/> → Observing → VLA Observing Guide → #5: Radio Frequency Interference

- RFI listings per frequency band.
- Spectra of various RFI sweeps between 1-50 GHz.

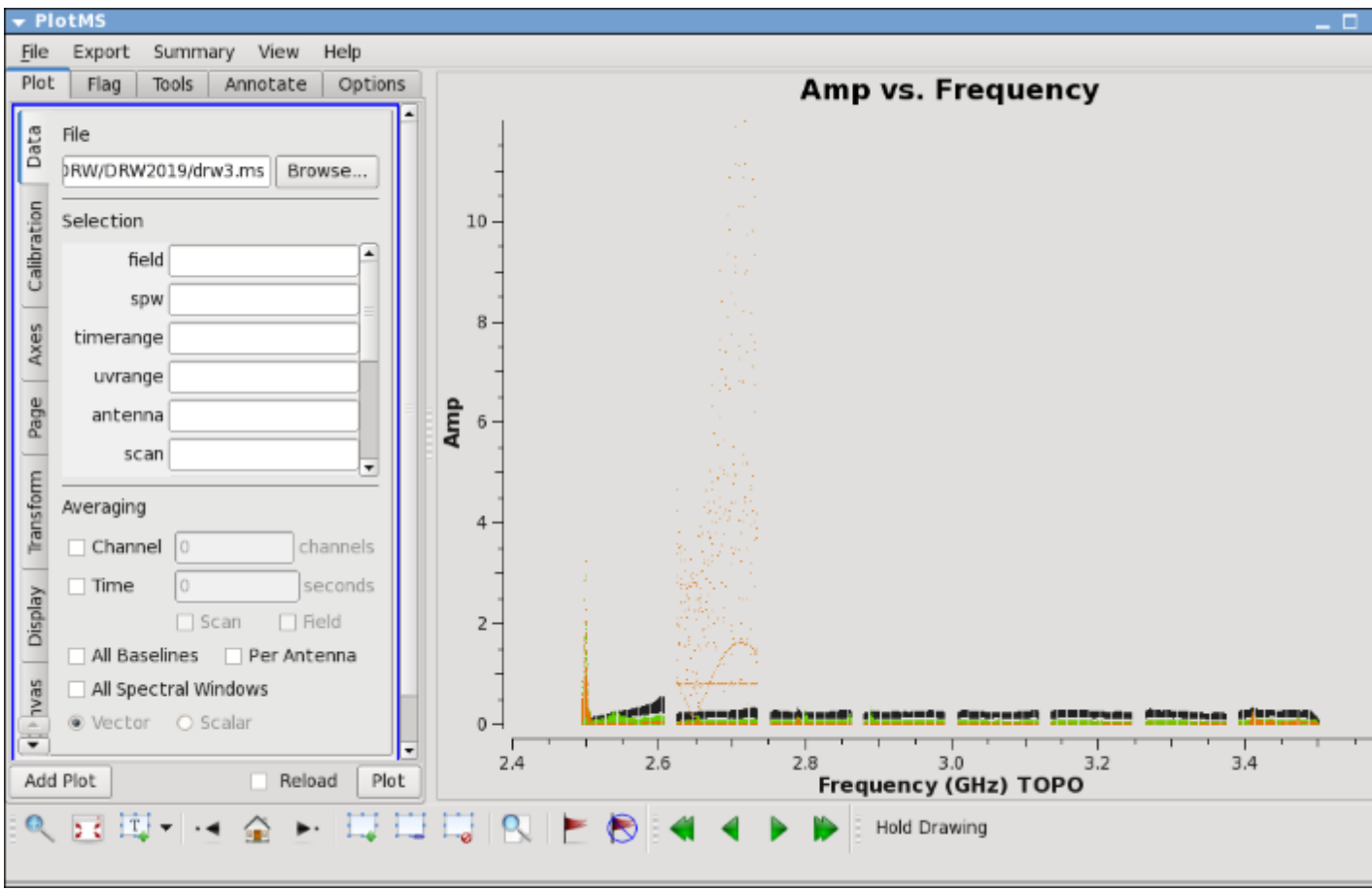


RFI is present at lower frequency bands



Data Review: *plotms*

Example: xaxis='frequency', yaxis='amp', coloraxis='field'



Preparing for calibration: editing



Editing/Flagging (or unflagging) Data

1. *flagdata*: All purpose flagging task based on selection.
 - Includes RFI flagging capabilities (RFLAG,TFCROP).
2. *flagcmd*: All purpose flagging task based on commands (alternative to *flagdata* for certain types of flagging).
3. *plotms*: Interactive flagging

Review the VLA operator's log carefully.

Certain issues (e.g., antennas without receivers), do not end up in the online flags, and may need to be flagged manually.



Editing/Flagging (or unflagging) Data

A few important notes

- Data in CASA are either flagged or not flagged.
 - Every MS has a flag column.
 - Every bit of data has its own flag (set either to True or False).
 - Applying flags means setting the flag column entries of the selected bits of data to True.
 - Unflagging sets it to False, *regardless* it's immediate previous setting
- **Most** flagging tasks have the option to create a flag backup.
 - In particular *plotms* does not have this option!
- A flag backup is an MS table and contains the state of the flags before running the flagging task.
- With *flagmanager* flag back-ups can be restored (and made)



Editing Data: *flagdata* - Modes

- *list* = apply a list of flagging commands
- *manual* = flagging based on specific selection parameters
- *clip* = clip data according to values
- *quack* = remove/keep specific time range at scan beginning/end
- *shadow* = remove antenna-shadowed data
- *elevation* = remove data below/above given elevations
- *tfcrop* = auto identification of outliers on the time-freq plane
- *rflag* = auto detection of outliers based on sliding-window RMS filters
- *extend* = extend and/or grow flags
- Also *summary* (per antenna, correlation, field, scan, total), and *unflag*.
- Can also flag calibration tables.



Editing Data: *flagcmd*

- It allows listing, plotting, saving, applying, or un-applying flags.
- Flagging modes (`inpmode`) are:
 - *table*: uses the FLAG_CMD MS table (created by *importasdm*)
 - *list*: uses an ASCII file that contains a set of flagging commands.
 - *xml*: uses the online flags from Flag.xml in the MS.
- It allows the user to save the flag records in the FLAG_CMD MS table or a file.



Editing Data: *flagdata* vs. *flagcmd*

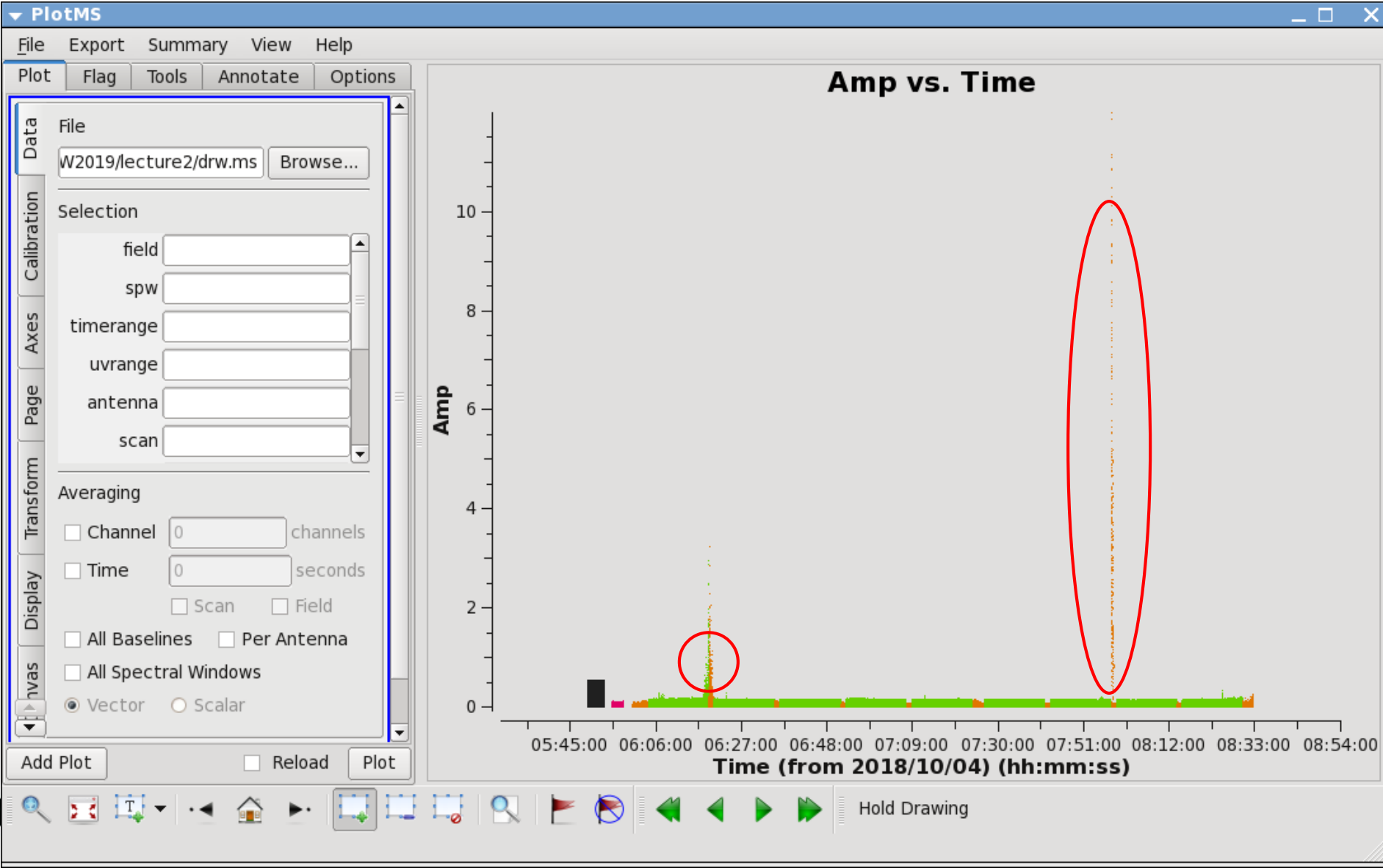
- Complementary flagging tasks.
- Have several common features.
- Some of the important differences:

Flagdata	Flagcmd
RFI flagging (tfcrop, rflag)*	Access to the Flag.xml
Runtime displays* (before and after flagging)	Apply the online (and other) flags in FLAG_CMD MS table
	Plot Flags



* More details on Tuesday (RFI talk)

Editing Data: *plotms*



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The screenshot displays the PlotMS software interface. On the left is a configuration panel with the following sections:

- Data:** File path: W2019/lecture2/drw.ms (with a Browse... button)
- Selection:** field, spw, timerange, uvrange, antenna, scan (all in dropdown menus)
- Averaging:** Channel: 0 channels, Time: 0 seconds, Scan, Field, All Baselines, Per Antenna, All Spectral Windows, Vector (selected), Scalar

At the bottom of the panel are buttons for "Add Plot", "Reload", and "Plot".

The main plot area is titled "Amp vs. Time". The y-axis is labeled "Amp" and ranges from 0 to 10. The x-axis is labeled "Time (from 2018/10/04) (hh:mm:ss)" and ranges from 05:45:00 to 08:54:00. The plot shows a signal with two prominent peaks highlighted by vertical shaded regions: one at approximately 06:27:00 and a much larger one at approximately 07:51:00. A blue arrow points from the text "To select regions" to the first shaded region.

At the bottom of the window is a toolbar with various icons for zooming, panning, and navigation, along with a "Hold Drawing" button.

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The screenshot displays the PlotMS software interface. The main window is titled "PlotMS" and contains a menu bar (File, Export, Summary, View, Help) and a toolbar (Plot, Flag, Tools, Annotate, Options). The left sidebar has tabs for Data, Calibration, Axes, Page, Transform, Display, and hvas. The "Data" tab is active, showing the file path "W2019/lecture2/drw.ms" and a "Browse..." button. Below this are "Selection" fields for "field", "spw", "timerange", "uvrange", "antenna", and "scan". The "Averaging" section includes checkboxes for "Channel", "Time", "Scan", and "Field", as well as "All Baselines", "Per Antenna", and "All Spectral Windows". The "hvas" section has radio buttons for "Vector" and "Scalar". At the bottom left are "Add Plot", "Reload", and "Plot" buttons. The main plot area is titled "Amp vs. Time" and shows a graph of amplitude versus time. The y-axis is labeled "Amp" and ranges from 0 to 10. The x-axis is labeled "Time (from 2018/10/04) (hh:mm:ss)" and ranges from 05:45:00 to 08:54:00. The plot shows a green baseline with several vertical spikes. Two regions are highlighted with shaded vertical bars: one at approximately 06:27:00 and a larger one at approximately 07:51:00. A blue arrow points from the text "To select regions" to the first shaded region. A red arrow points from the text "To flag" to the second shaded region. The bottom toolbar includes various icons for zooming, panning, and navigation, along with a "Hold Drawing" button.

Editing Data: *plotms*

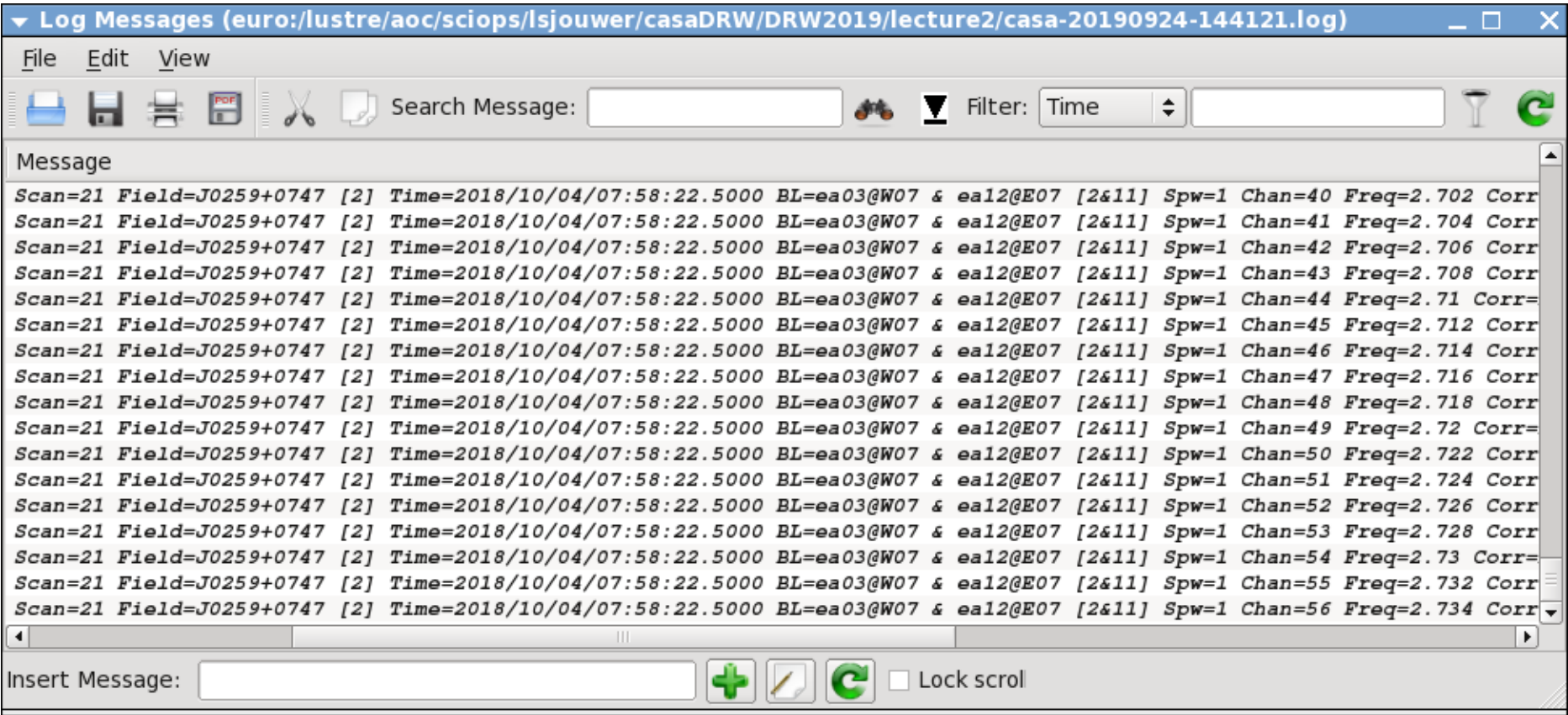
The image shows the PlotMS software interface. On the left is a configuration panel with tabs for Data, Calibration, Axes, Page, Transform, Display, and hvas. The Data tab is active, showing the file path 'W2019/lecture2/drw.ms'. The Calibration section includes fields for 'field', 'spw', 'timerange', 'uvrange', 'antenna', and 'scan'. The Averaging section has checkboxes for 'Channel', 'Time', 'Scan', and 'Field', and radio buttons for 'All Baselines', 'Per Antenna', 'All Spectral Windows', 'Vector', and 'Scalar'. At the bottom of the panel are 'Add Plot', 'Reload', and 'Plot' buttons.

The main plot area is titled 'Amp vs. Time'. The y-axis is labeled 'Amp' and ranges from 0 to 10. The x-axis is labeled 'Time (from 2018/10/04) (hh:mm:ss)' and shows a timeline from 05:45:00 to 08:54:00. The plot displays a signal with two prominent vertical spikes. The first spike is at approximately 06:27:00 and the second is at approximately 07:51:00. Both spikes are highlighted with a grey dotted pattern. A blue arrow points from the text 'To select regions' to the first spike. A green arrow points from the text 'To locate' to the second spike. A green box highlights the text 'To locate'.

At the bottom of the interface is a toolbar with various icons for zooming, panning, and other plot controls. A 'Hold Drawing' button is also present.

Editing Data: *plotms*

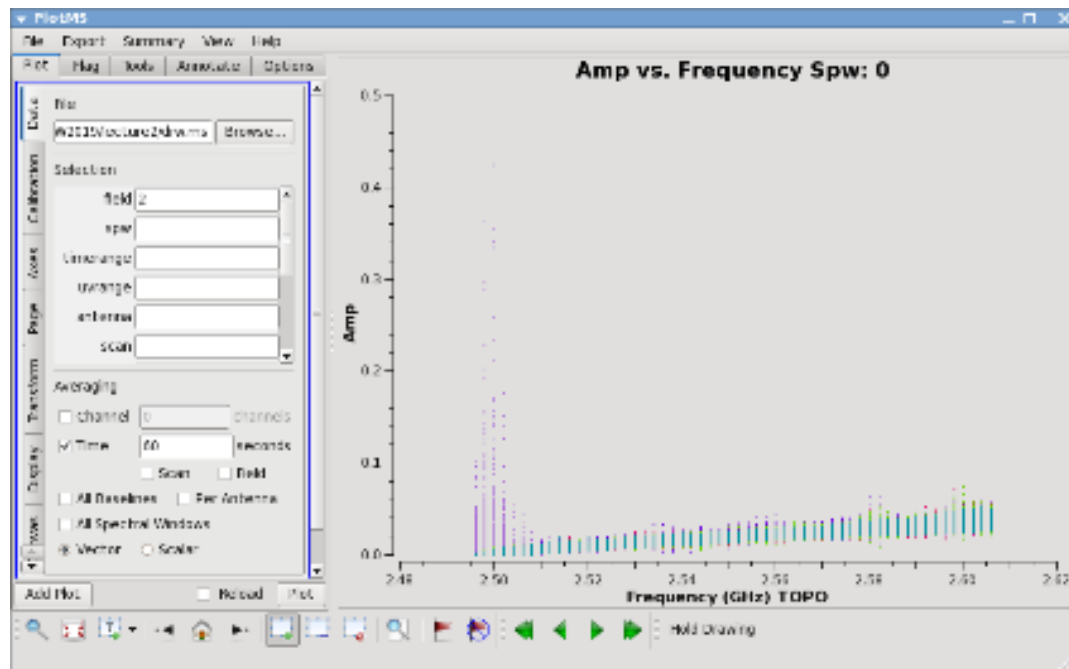
The output of “locate” in the logger – look for common lines



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- **Interactive CASA:**
 - Move to the web page for instructions

> default plotms
> vis = 'drw.ms'
> xaxis = 'frequency'
> yaxis = 'amp'
> field = '2'
> correlation = 'll,rr'
> avgtime = '60'
> iteraxis = 'spw'
> coloraxis = 'scan'
> inp
> ..
> go



- Much more on the web page...

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A few important notes

- Use *plotms* carefully for editing data.
- Keep in mind that editing data with *plotms* often requires extending the flags (through the Flag tab).
- *plotms* does not produce a flag backup (*flagmanager* has to be used).
- Use *plotms* to identify bad data (through the locate option). Then flag the bad data using *flagcmd* or *flagdata*.



Ready to calibrate the data?

- ✓ The data structure is understood, reference antenna picked
 - ✓ Calibrators (flux density, bandpass, gain) are identified
 - ✓ Bad antennas and bad basebands are flagged
 - ✓ RFI is removed (as much as possible), Hanning smooth?
 - ✓ Bad individual visibilities/baselines/times are flagged
- Maybe inspect (some parts of) the data again to make sure
Likely more flagging may need to be done during/after calibration steps
 - **Ready to start with data calibration**



Next lecture...



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