

CASA

Data Examination

&

Flagging

Sandra Etoke

Data Examination, Editing, and Flagging

- `listobs` : summarize the contents of a MS
- `flagmanager` : save and manage versions of the flagging entries in the MS
- `flagautocorr` : non-interactive flagging of auto-correlations
- `plotms` : interactive X-Y plotting and flagging of visibility data
- `plotxy` : interactive X-Y plotting and flagging of visibility data
note: plotxy is slower than plotms and will eventually be phased out
- `flagdata` : non-interactive flagging (and unflagging) of specified data
- `viewer` : can display (as a raster image) MS data, with some editing capabilities

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Data Examination and Flagging

- interactive flagging: [plotxy / plotms](#)
- managing flags: [flagmanager](#)
- non interactive flagging: [flagdata](#)

Data Examination and Flagging

- interactive flagging: [plotxy](#) / `plotms`
- managing flags: `flagmanager`
- non interactive flagging: `flagdata`

- **plotxy task plots MS data**

choice of xaxis and yaxis

e.g.: 'time', 'uvdist', 'chan', 'amp', 'phase', 'u', 'v', 'w', 'real', 'imag' ...

EX:

`xaxis='uvdist'; yaxis='amp'`

`xaxis='time'; yaxis='amp'`

`xaxis='u'; yaxis='v'`

`xaxis='x'` *(for the antenna array <=> plotants)*

vector and scalar averaging (averagemode)

- interactive flagging:
- managing flags:
- non interactive flagging

- **plotxy task plots MS data**
choice of xaxis and yaxis
e.g.: 'time', 'u'

EX:

xaxis='uvdist'; yaxis='amp'

xaxis='time'; yaxis='amp'

xaxis='u'; yaxis='v'

xaxis='x'

vector and scalar averaging

```
sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/jupiter
File Edit View Terminal Tabs Help

sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x

# plotxy :: An X-Y plotter/interactive flagger for visibility data.
vis                = 'jupiter6cm.demo.ms' # Name of input visibility dataset
xaxis              = 'uvdist'             # X-axis: def = 'time': see help for options
yaxis              = 'amp'                 # Y-axis: def = 'amp': see help for options
datacolumn         = 'data'               # data (raw), corrected, model, residual (corrected - model)

iteration          = ''                   # Plot separate panels by field, antenna, baseline, scan, feed
selectdata         = True                 # More data selection parameters (antenna, timerange etc)
  antenna          = ''                   # antenna/baselines: '==>all, antenna = '3,VA04'
  timerange        = ''                   # time range: '==>all, timerange='09:14:0~09:54:0'
  correlation       = 'RR LL'             # correlations: '==>all, correlations='RR LL'
  scan             = ''                   # scan numbers: '==>all
  feed             = ''                   # multi-feed numbers: Not yet implemented
  array            = ''                   # (sub)array numbers: '==>all
  uvrange          = ''                   # uv range: '==>all; uvrange = '0~100klambda'

spw                = ''                   # Spectral windows:channels: '==>all, spw='2:5~57'
field              = 'JUPITER'            # Field names or field index numbers: '==>all, field='0~2,3C286'
averagemode        = 'vector'             # Select averaging type: 'vector', 'scalar'
  timebin          = '0'                  # Averaging time in seconds, default='0', also: 'all'
  crossscans       = False                # have time averaging cross over scans?
  crossbls         = False                # have averaging cross over baselines?
  crossarrays      = False                # have averaging cross over arrays?
  stackspw         = False                # stack multiple spw on top of each other?
  width            = '1'                  # number of channels to average, default: '1', Also: 'all',
                                          # 'allspw'

restfreq           = ''                   # a frequency quanta or transition name. see help for options
extendflag         = False                # have flagging extend to other data points?
subplot            = 111                  # Multipanel display scheme (yxn)
plotsymbol         = '.'                  # Options include . : , o ^ v > < s + x D d 2 3 4 h H | _
plotcolor          = 'darkcyn'            # Plot color
plotrange          = [-1, -1, -1, -1]     # The range of data to be plotted (see help)
multicolor         = 'corr'               # Plot in different colors: Options: none, both, chan, corr
selectplot         = False                # Select additional plotting options (e.g, fontsize, title,etc)
overplot           = False                # Overplot on current plot (if possible)
showflags          = False                # Show flagged data?
interactive         = True                 # Show plot on gui?
figfile            = ''                   # ''= no plot hardcopy, otherwise supply name
async              = False                # If true the taskname must be started using plotxy(...)

CASA <129>: plotxy()
INF02 Number of points being plotted : 114750
INF02 Number of points being plotted : 114750
Total process time 8.25 sec.
Total wall clock time 10.69 sec.

CASA <130>: █
```

(Cf also the Message Logger for more details of the plotting process)

Data Examination and Flagging

- interactive flagging:
- managing flags:
- non interactive flagging:

- **plotxy task plots MS data**
choice of xaxis and yaxis
e.g.: 'time', 'uvdist'

EX:

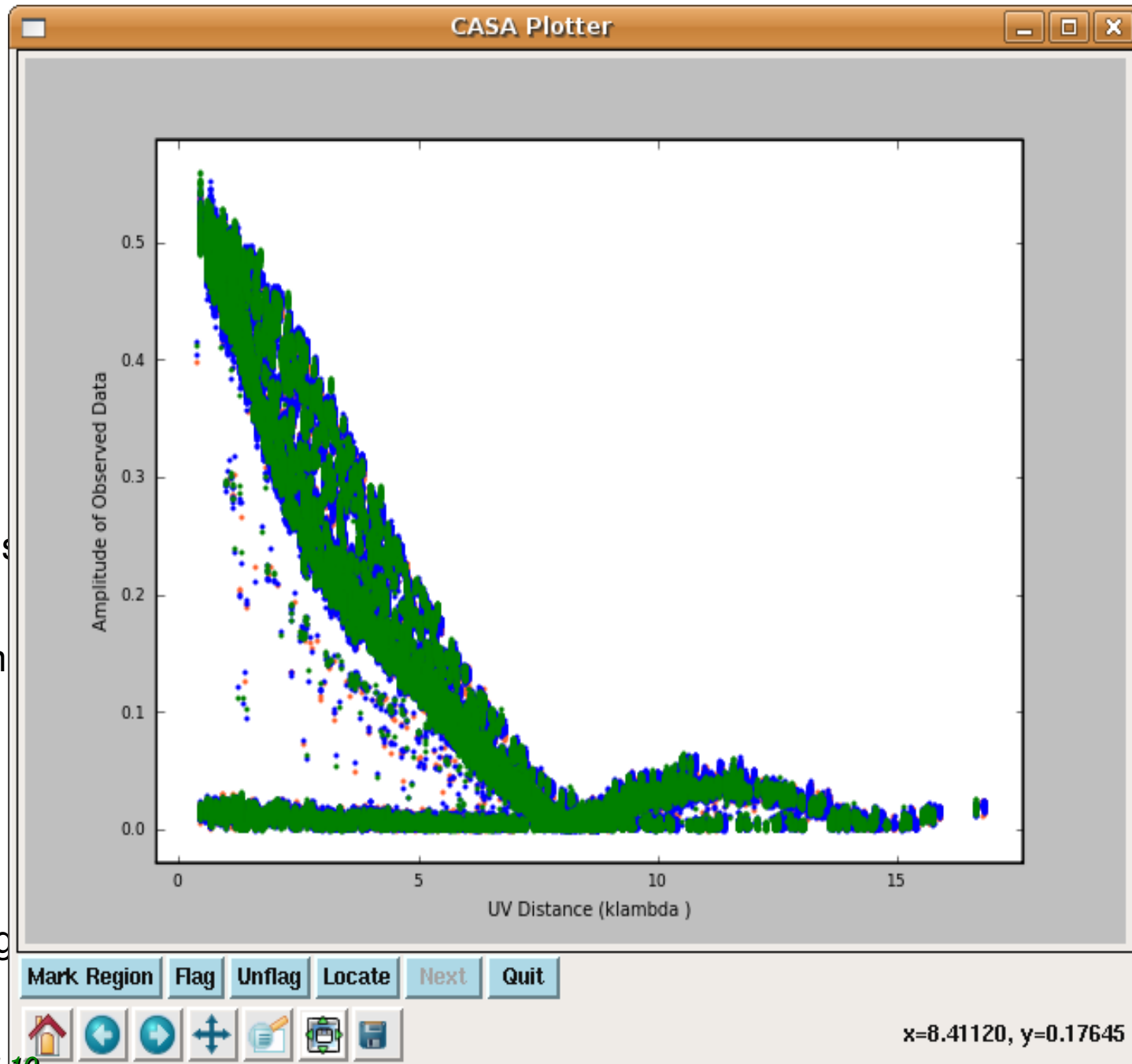
xaxis='uvdist'; yaxis='am'

xaxis='time'; yaxis='amp'

xaxis='u'; yaxis='v'

xaxis='x'

vector and scalar averaging



Data Examination and Flagging

- interactive flagging:
- managing flags:
- non interactive flagging:

- **plotxy task plots MS data**
choice of xaxis and yaxis
e.g.: 'time', 'uvdist'

EX:

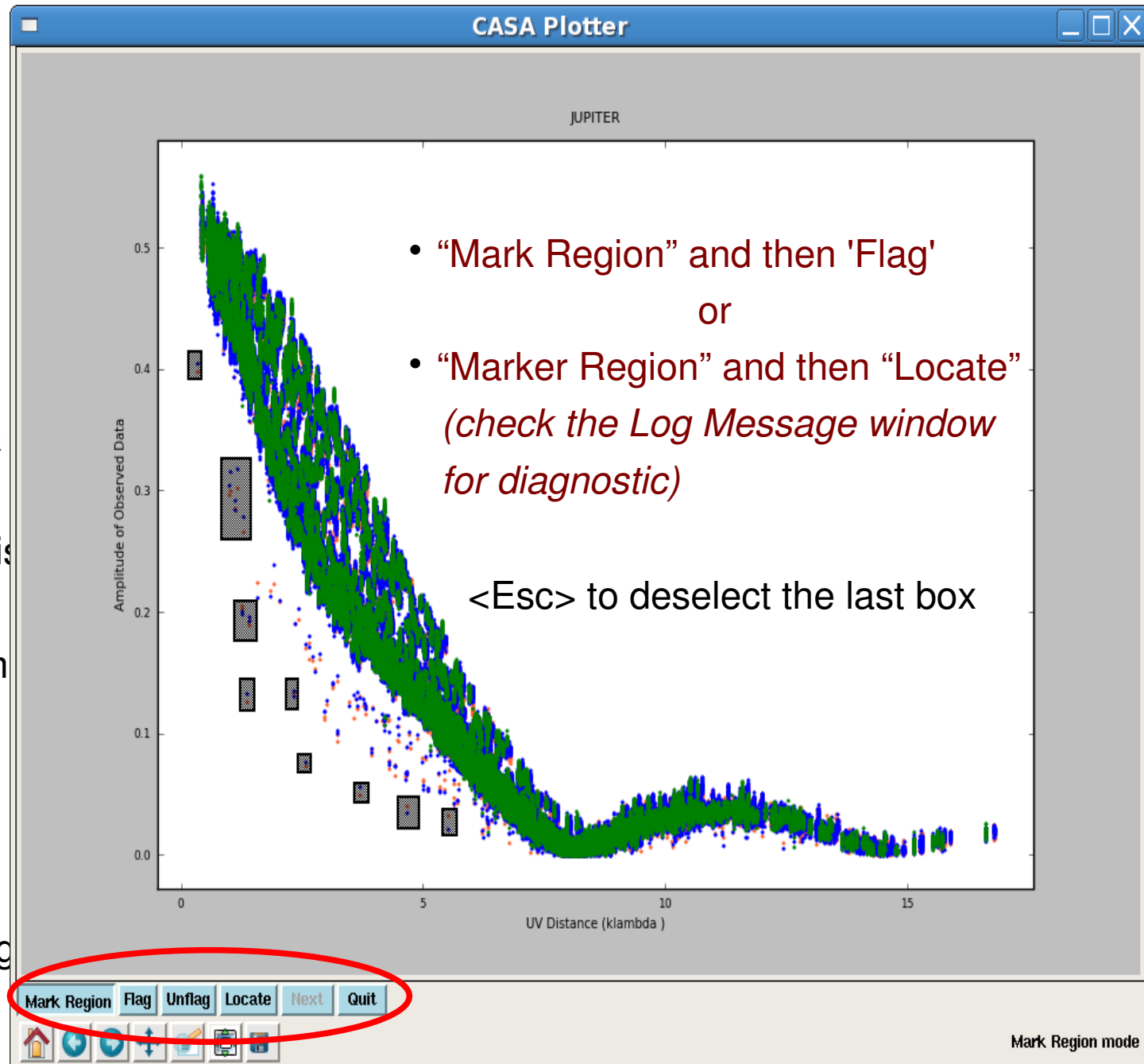
xaxis='uvdist'; yaxis='am

xaxis='time'; yaxis='amp'

xaxis='u'; yaxis='v'

xaxis='x'

vector and scalar averaging



Data Examination and Flagging

- interactive flagging: `plotxy` / `plotms`
 - managing flags: `flagmanager`
 - non interactive flagging: `flagdata`
-
- **plotms task more interactive than plotxy**
 - can either be started as a task **within CASA**: `plotms`
 - or from **outside CASA** on the command line: `casaplotms`
- every single parameter for this task is optional**
- => you can launch the GUI and do all the selections from it

- interactive flagging
- managing flags
- non interactive

- **plotms task mode**

can either be started from the command line or from outside

every single parameter

=> you can launch

```
sandra@sandra-laptop: ~/CASA/Tutorials/Jupyter
File Edit View Terminal Tabs Help

sandra@sandra-la... x sandra@sandra-la... x sandra@sandra-la... x sandra@sandra-la... x sandra@sandra-la... x

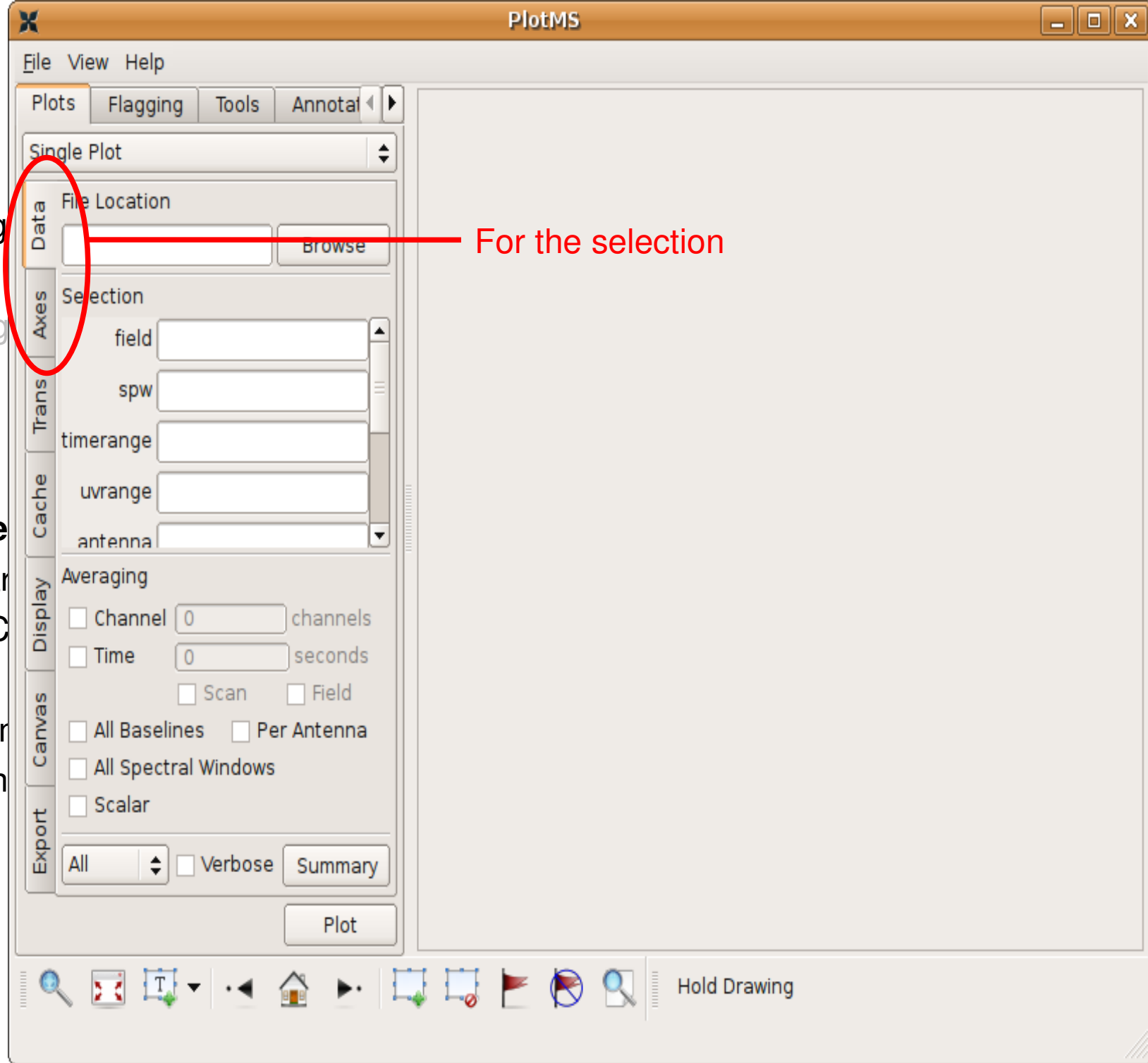
CASA <2>: default(plotms)

CASA <3>: inp
-----> inp()
# plotms :: A plotter/interactive flagger for visibility data.
vis                = ''          # input visibility dataset (blank for none)
xaxis              = ''          # plot x-axis (blank for default/current)
yaxis              = ''          # plot y-axis (blank for default/current)
selectdata         = True        # data selection parameters
  field            = ''          # field names or field index numbers (blank for all)
  spw              = ''          # spectral windows:channels (blank for all)
  timerange        = ''          # time range (blank for all)
  uvrange          = ''          # uv range (blank for all)
  antenna          = ''          # antenna/baselines (blank for all)
  scan             = ''          # scan numbers (blank for all)
  correlation       = ''          # correlations (blank for all)
  array            = ''          # (sub)array numbers (blank for all)
  msselect         = ''          # MS selection (blank for all)

averagedata        = True        # data averaging parameters
  avgchannel       = ''          # average over channel? (blank = False, otherwise value in
                                # channels)
  avgtime          = ''          # average over time? (blank = False, other value in seconds)
  avgscan          = False       # only valid if time averaging is turned on. average over
                                # scans?
  avgfield         = False       # only valid if time averaging is turned on. average over
                                # fields?
  avgbaseline      = False       # average over all baselines? (mutually exclusive with
                                # avgantenna)
  avgantenna       = False       # average by per-antenna? (mutually exclusive with
                                # avgbaseline)
  avgspw           = False       # average over all spectral windows?
  scalar           = False       # Do scalar averaging?

transform          = False       # transform data in various ways?
extendflag         = False       # have flagging extend to other data points?
async              = False       # If true the taskname must be started using plotms(...)

CASA <4>:
```



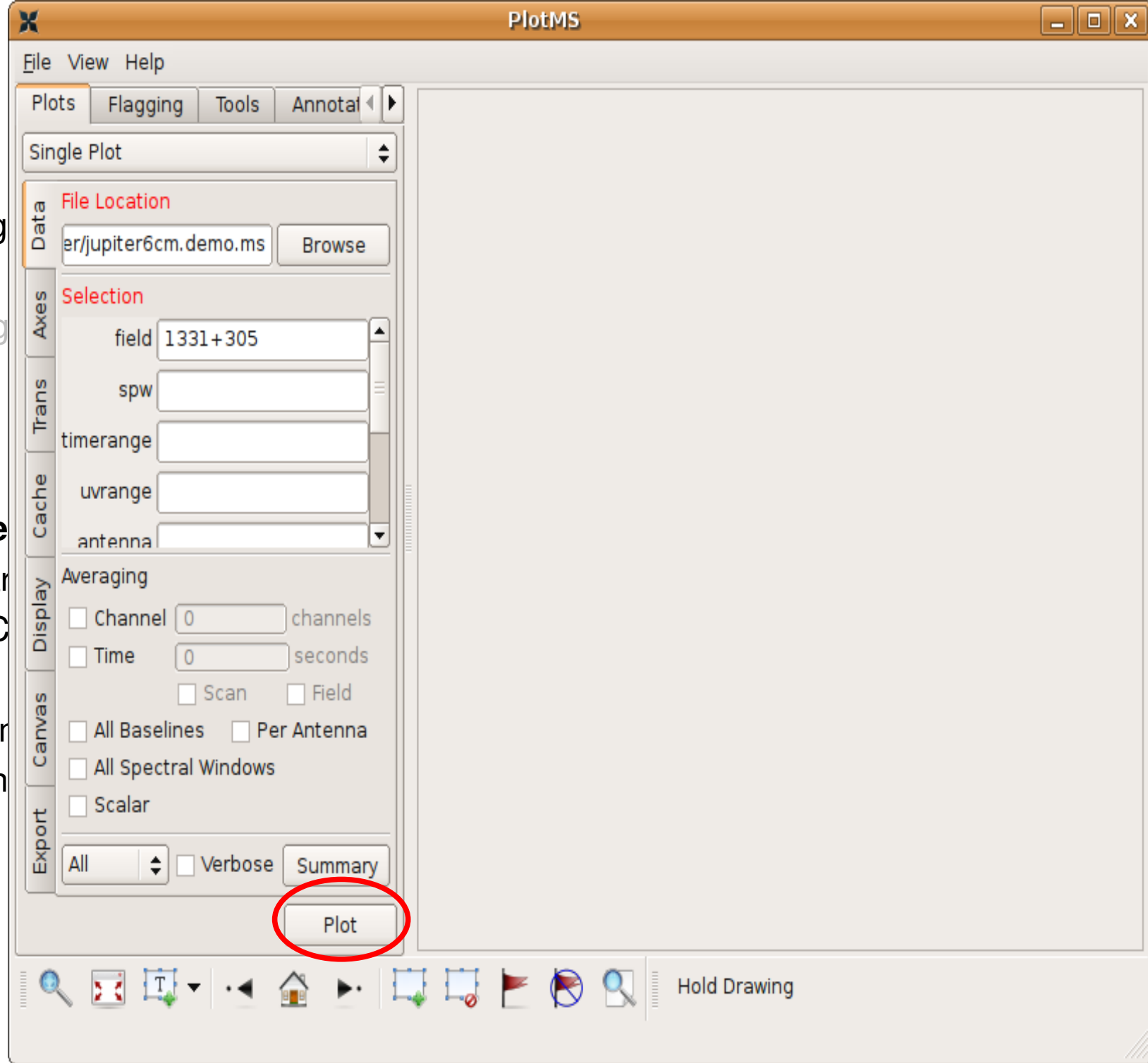
- interactive flagging
- managing flags:
- non interactive flagging

- **plotms task more**
can either be started
or from outside CASA
- every single parameter
=> you can launch

For the selection

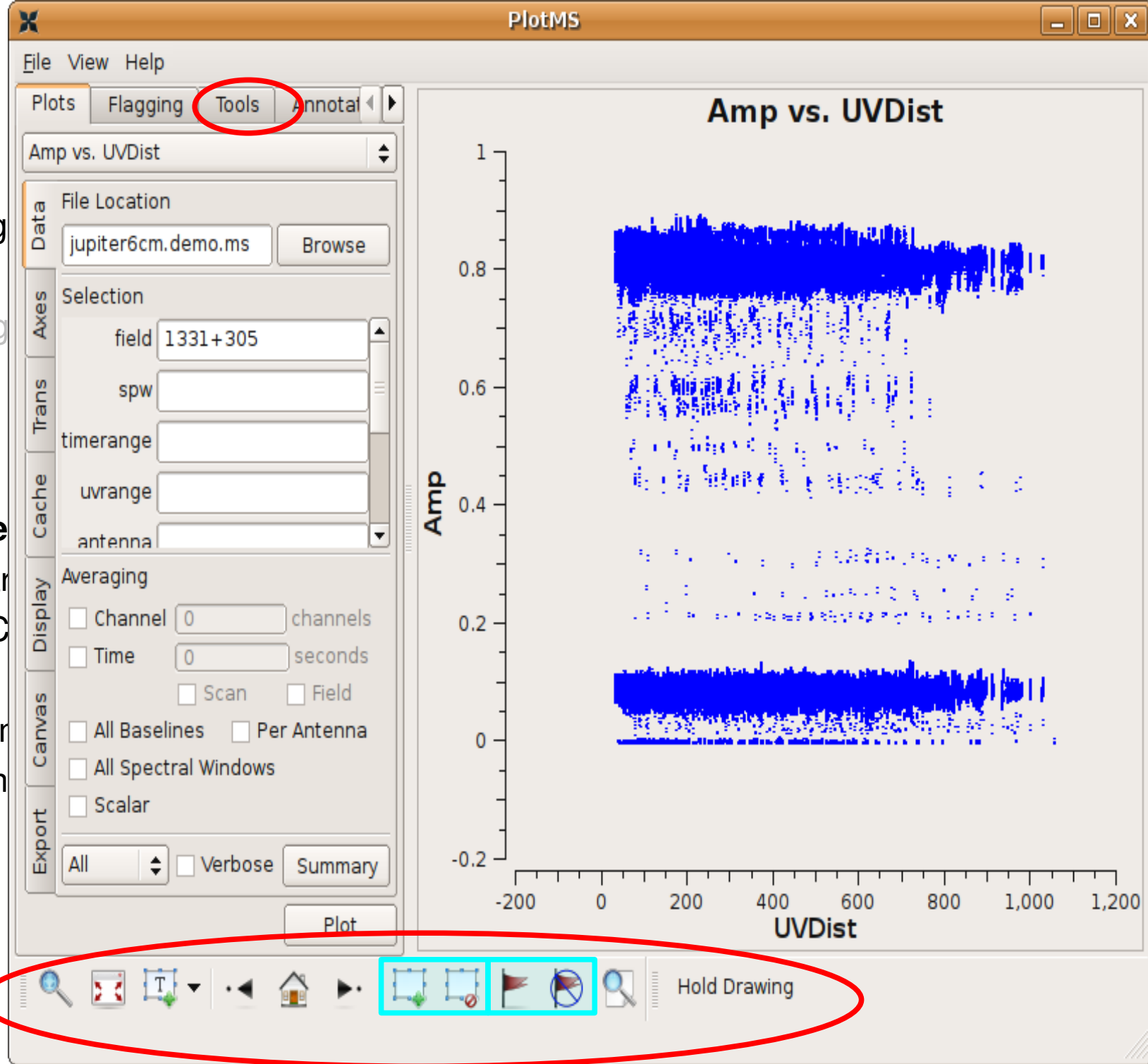
- interactive flagging
- managing flags:
- non interactive flagging

- **plotms task more**
can either be started
or from outside CASA
- every single parameter
=> you can launch



- interactive flagging
- managing flags:
- non interactive flagging

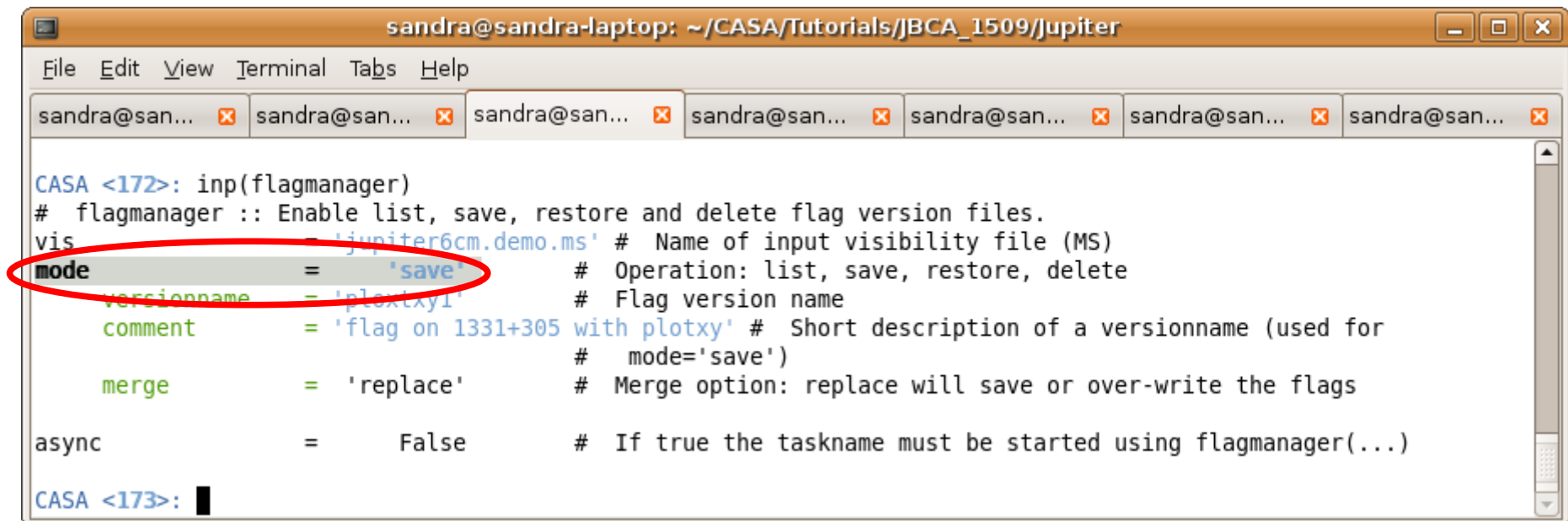
- **plotms task more**
can either be started
or from outside CASA
- every single parameter
=> you can launch



Data Examination and Flagging

- interactive flagging: `plotxy / plotms`
- managing flags: `flagmanager`
- non interactive flagging: `flagdata`

- **flagmanager is to save flag versions**



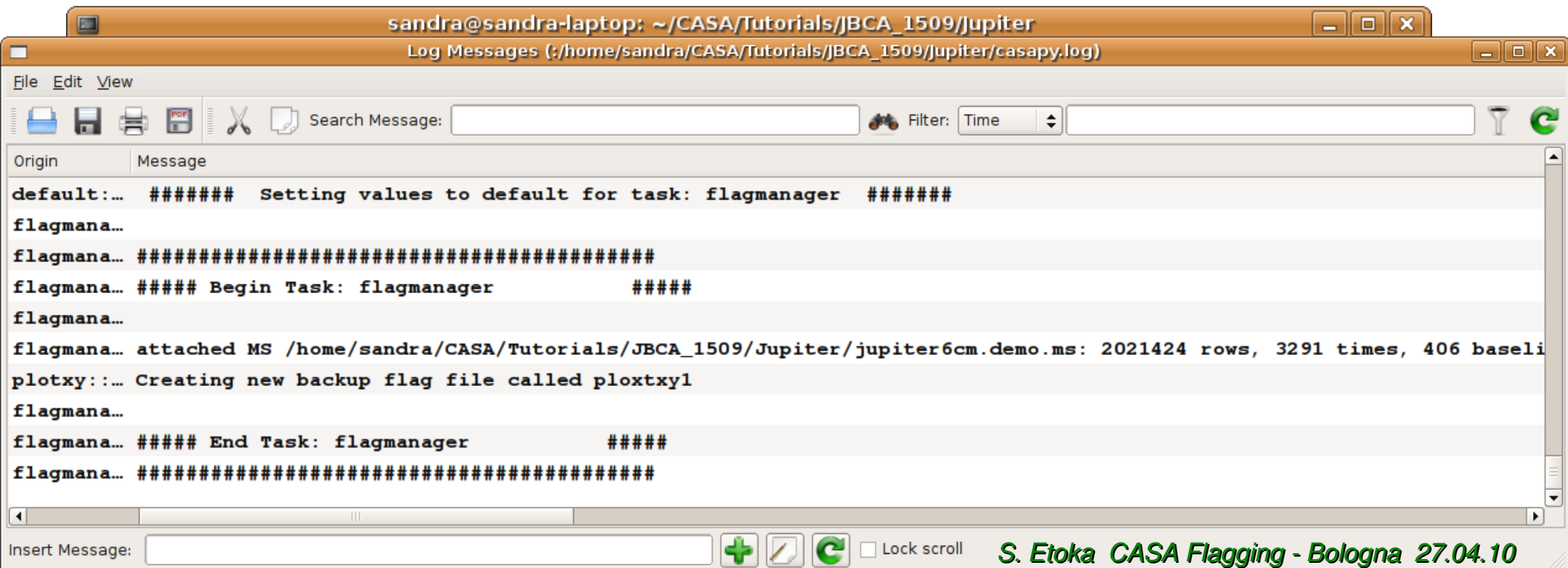
The screenshot shows a terminal window titled "sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/Jupyter". The terminal displays the command `inp(flagmanager)` and its help text. The `mode` parameter is highlighted with a red circle and set to `'save'`. Other parameters include `vis` (input visibility file), `versionname` (flag version name), `comment` (short description), `merge` (merge option), and `async` (if true, task must be started using `flagmanager(...)`).

```
sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/Jupyter
File Edit View Terminal Tabs Help
sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x sandra@san... x
CASA <172>: inp(flagmanager)
# flagmanager :: Enable list, save, restore and delete flag version files.
vis = 'jupyter6cm.demo.ms' # Name of input visibility file (MS)
mode = 'save' # Operation: list, save, restore, delete
versionname = 'plotxy1' # Flag version name
comment = 'flag on 1331+305 with plotxy' # Short description of a versionname (used for
# mode='save')
merge = 'replace' # Merge option: replace will save or over-write the flags
async = False # If true the taskname must be started using flagmanager(...)
CASA <173>: █
```

Data Examination and Flagging

- interactive flagging: `plotxy / plotms`
- managing flags: `flagmanager`
- non interactive flagging: `flagdata`

- **flagmanager is to save flag versions**



The screenshot shows a terminal window titled "sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/Jupiter" with a subtitle "Log Messages (:/home/sandra/CASA/Tutorials/JBCA_1509/Jupiter/casapy.log)". The window contains a list of log messages with columns for "Origin" and "Message". The messages show the execution of the `flagmanager` command, including setting default values, beginning and ending tasks, and creating a backup flag file. The `plotxy` command is also shown creating a new backup flag file.

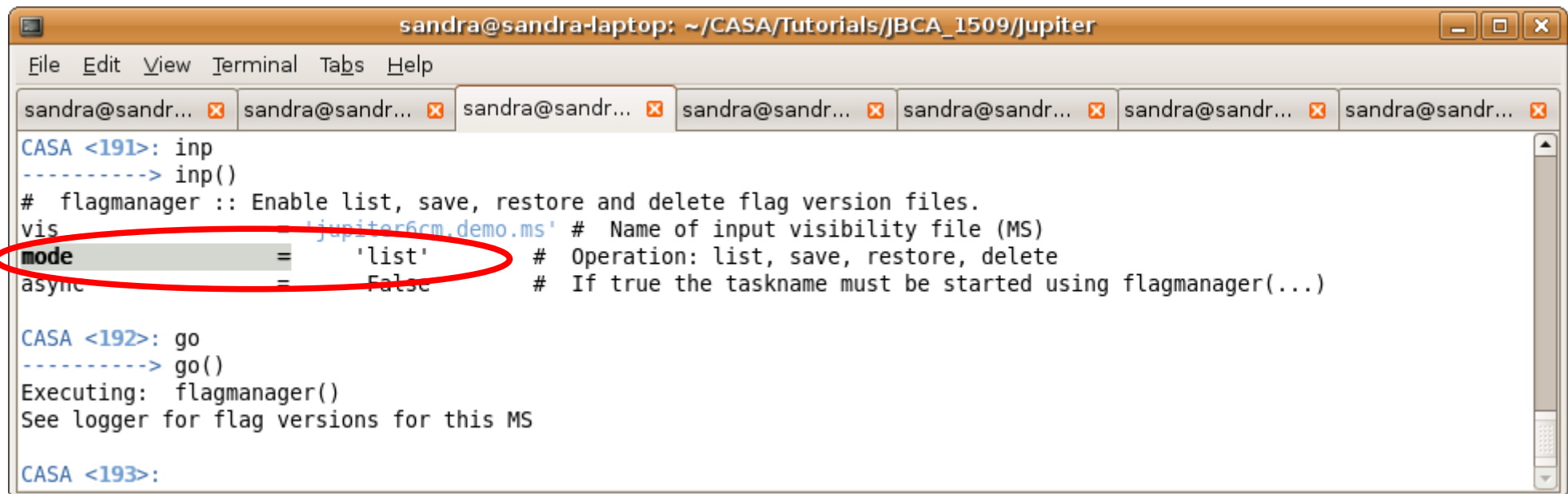
```
default:... ##### Setting values to default for task: flagmanager #####
flagmana...
flagmana... #####
flagmana... ##### Begin Task: flagmanager #####
flagmana...
flagmana... attached MS /home/sandra/CASA/Tutorials/JBCA_1509/Jupiter/jupiter6cm.demo.ms: 2021424 rows, 3291 times, 406 baseli
plotxy:... Creating new backup flag file called ploctxy1
flagmana...
flagmana... ##### End Task: flagmanager #####
flagmana... #####
```

At the bottom of the window, there is an "Insert Message:" field and a "Lock scroll" checkbox. The bottom right corner of the image contains the text "S. Etoka CASA Flagging - Bologna 27.04.10".

Data Examination and Flagging

- interactive flagging: `plotxy / plotms`
- managing flags: `flagmanager`
- non interactive flagging: `flagdata`

- **flagmanager is to save flag versions but also to list your current flag versions**



The screenshot shows a terminal window titled "sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/Jupiter". The terminal has a menu bar with "File", "Edit", "View", "Terminal", "Tabs", and "Help". Below the menu bar, there are several tabs, each labeled "sandra@sandr...". The main terminal area shows the following text:

```
CASA <191>: inp
-----> inp()
# flagmanager :: Enable list, save, restore and delete flag version files.
vis = 'jupiter6cm.demo.ms' # Name of input visibility file (MS)
mode = 'list' # Operation: list, save, restore, delete
async = False # If true the taskname must be started using flagmanager(...)

CASA <192>: go
-----> go()
Executing: flagmanager()
See logger for flag versions for this MS

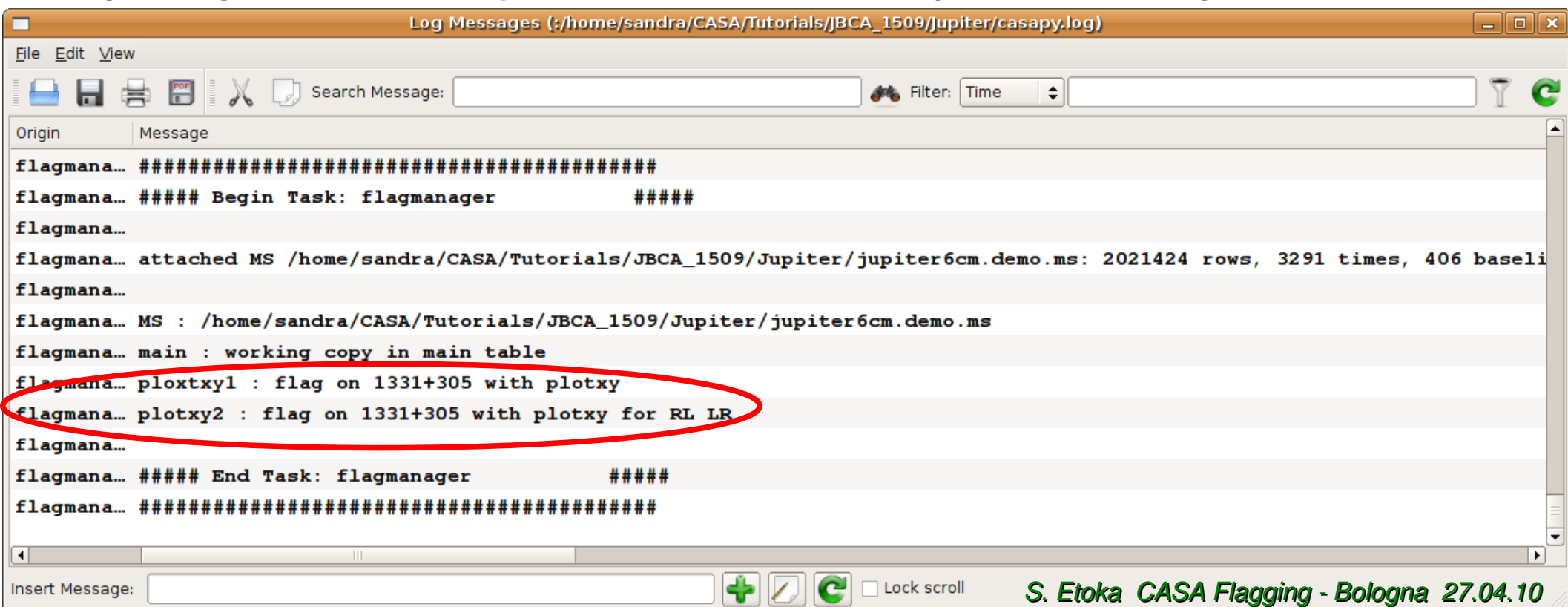
CASA <193>:
```

A red circle highlights the `mode = 'list'` line in the terminal output.

Data Examination and Flagging

- interactive flagging: plotxy / plotms
- managing flags: [flagmanager](#)
- non interactive flagging: flagdata

• **flagmanager is to save flag versions but also to list your current flag versions**



The screenshot shows a window titled "Log Messages (/home/sandra/CASA/Tutorials/JBCA_1509/Jupiter/casapy.log)". The window contains a table with two columns: "Origin" and "Message". The messages are as follows:

Origin	Message
flagmana...	#####
flagmana...	##### Begin Task: flagmanager #####
flagmana...	
flagmana...	attached MS /home/sandra/CASA/Tutorials/JBCA_1509/Jupiter/jupiter6cm.demo.ms: 2021424 rows, 3291 times, 406 baseli
flagmana...	
flagmana...	MS : /home/sandra/CASA/Tutorials/JBCA_1509/Jupiter/jupiter6cm.demo.ms
flagmana...	main : working copy in main table
flagmana...	plotxy1 : flag on 1331+305 with plotxy
flagmana...	plotxy2 : flag on 1331+305 with plotxy for RL LR
flagmana...	
flagmana...	##### End Task: flagmanager #####
flagmana...	#####

The last two lines of the log, "plotxy1 : flag on 1331+305 with plotxy" and "plotxy2 : flag on 1331+305 with plotxy for RL LR", are circled in red. At the bottom of the window, there is an "Insert Message:" field and a "Lock scroll" checkbox.

Data Examination and Flagging

- interactive flagging: `plotxy / plotms`
- managing flags: `flagmanager`
- non interactive flagging: `flagdata`

to *flag & unflag* a specific antennas, baselines, channels, deal with shadowing ...
but also *retrieve a summary* of flagging

e.g.:

`mode = 'manualflag'`

the default flagging mode

`mode='summary'`

print out a summary of the current state of flagging
into the logger

`mode='quack'`

allow dropping of integrations from the beginning of scans

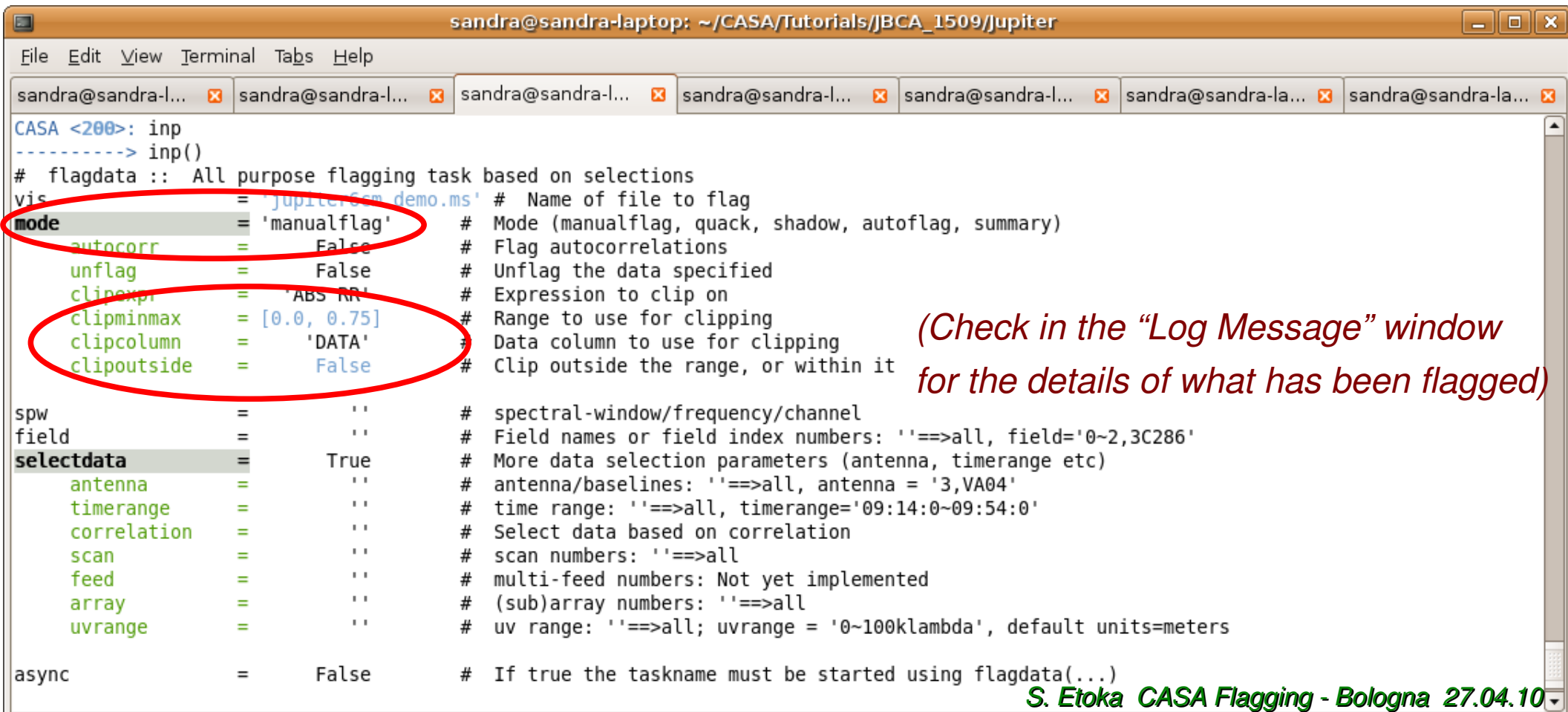
`mode='shadow'`

allow shadowed data to be flagged
(if it has not already be down)

Data Examination and Flagging

- interactive flagging: plotxy / plotms
- managing flags: flagmanager
- non interactive flagging: **flagdata**

EX:



```
sandra@sandra-laptop: ~/CASA/Tutorials/JBCA_1509/Jupiter
File Edit View Terminal Tabs Help
sandra@sandra-l... x sandra@sandra-l... x sandra@sandra-l... x sandra@sandra-l... x sandra@sandra-l... x sandra@sandra-la... x sandra@sandra-la... x
CASA <200>: inp
-----> inp()
# flagdata :: All purpose flagging task based on selections
vis = 'jupiter/sem demo.ms' # Name of file to flag
mode = 'manualflag' # Mode (manualflag, quack, shadow, autoflag, summary)
autocorr = False # Flag autocorrelations
unflag = False # Unflag the data specified
clipexpr = 'ABS RR' # Expression to clip on
clipminmax = [0.0, 0.75] # Range to use for clipping
clipcolumn = 'DATA' # Data column to use for clipping
clipoutside = False # Clip outside the range, or within it
spw = '' # spectral-window/frequency/channel
field = '' # Field names or field index numbers: ''==>all, field='0~2,3C286'
selectdata = True # More data selection parameters (antenna, timerange etc)
antenna = '' # antenna/baselines: ''==>all, antenna = '3,VA04'
timerange = '' # time range: ''==>all, timerange='09:14:0~09:54:0'
correlation = '' # Select data based on correlation
scan = '' # scan numbers: ''==>all
feed = '' # multi-feed numbers: Not yet implemented
array = '' # (sub)array numbers: ''==>all
uvrange = '' # uv range: ''==>all; uvrange = '0~100klambda', default units=meters
async = False # If true the taskname must be started using flagdata(...)
```

(Check in the “Log Message” window for the details of what has been flagged)

S. Etoke CASA Flagging - Bologna 27.04.10

Exercices

- Run through:

jupiter6cm_Flagdemo.py

*a trimmed down version of “jupiter6cm_demo.py”
using “plotxy” to flag the data*

and/or

jupiter6cm_Flagdemo_plotms_simple.py

*∧ it is a simple “copy-paste + read the notes” version
using “plotms” for the flagging this time*

*∧ **remember to** save regularly your flagging work with “flagmanager”*