



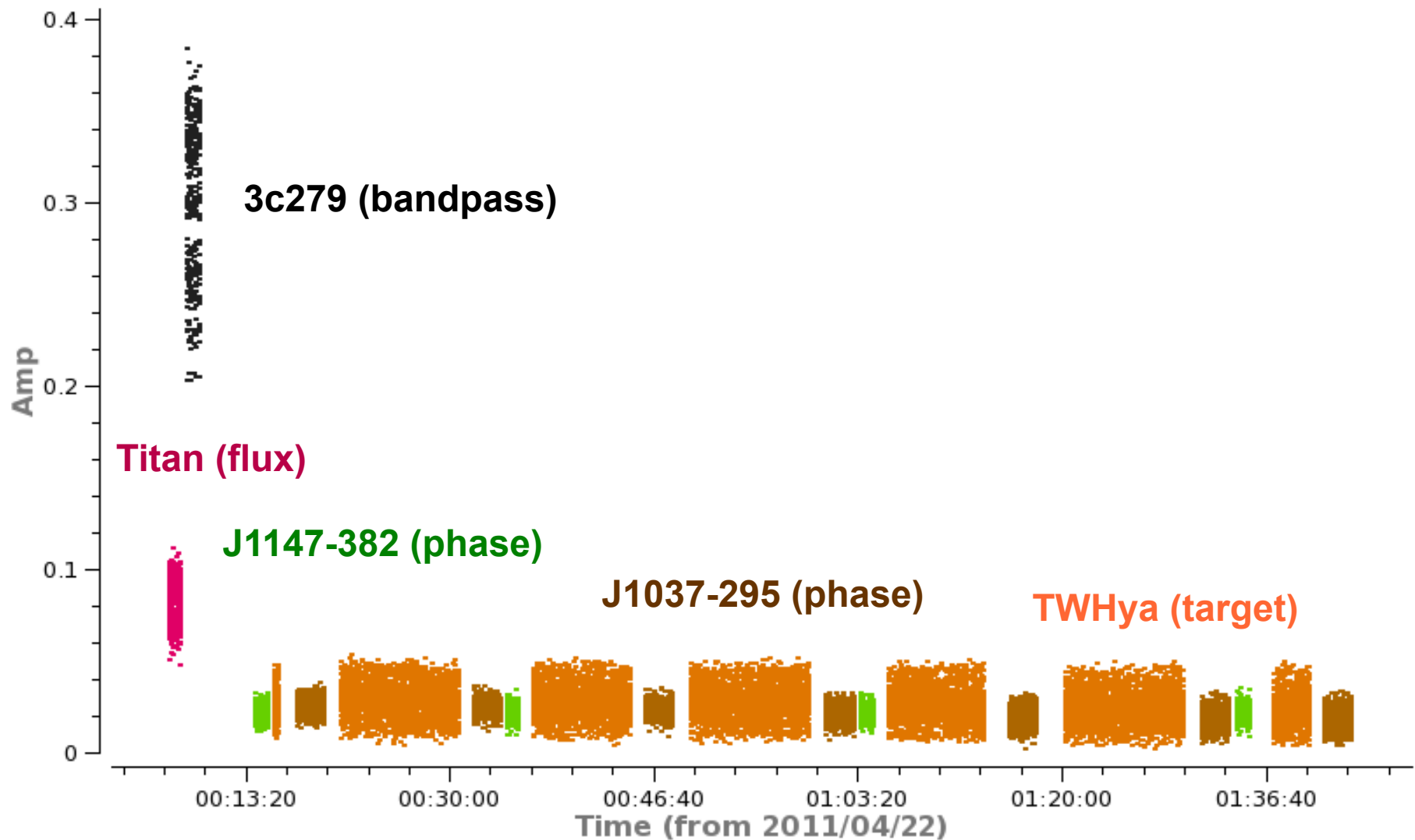
Hands-on exercise (I) DATA inspection

E. Chapillon
ASIAA

Observation sequences



Amp vs. Time Spw: 0



Data inspection



1. Informations on observations (antenna configuration, weather...)

[plotants, plotuv, plotweather](#)

2. Structure of the observation

[listobs](#)

3. Data inspection

[plotms](#)

4. Data structure and split

[split](#)

Weather



`plotweather(vis='asdm.ms')`

Shows :

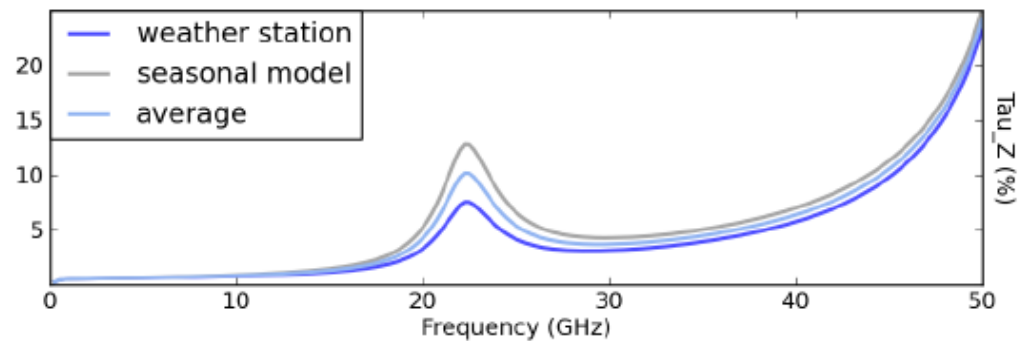
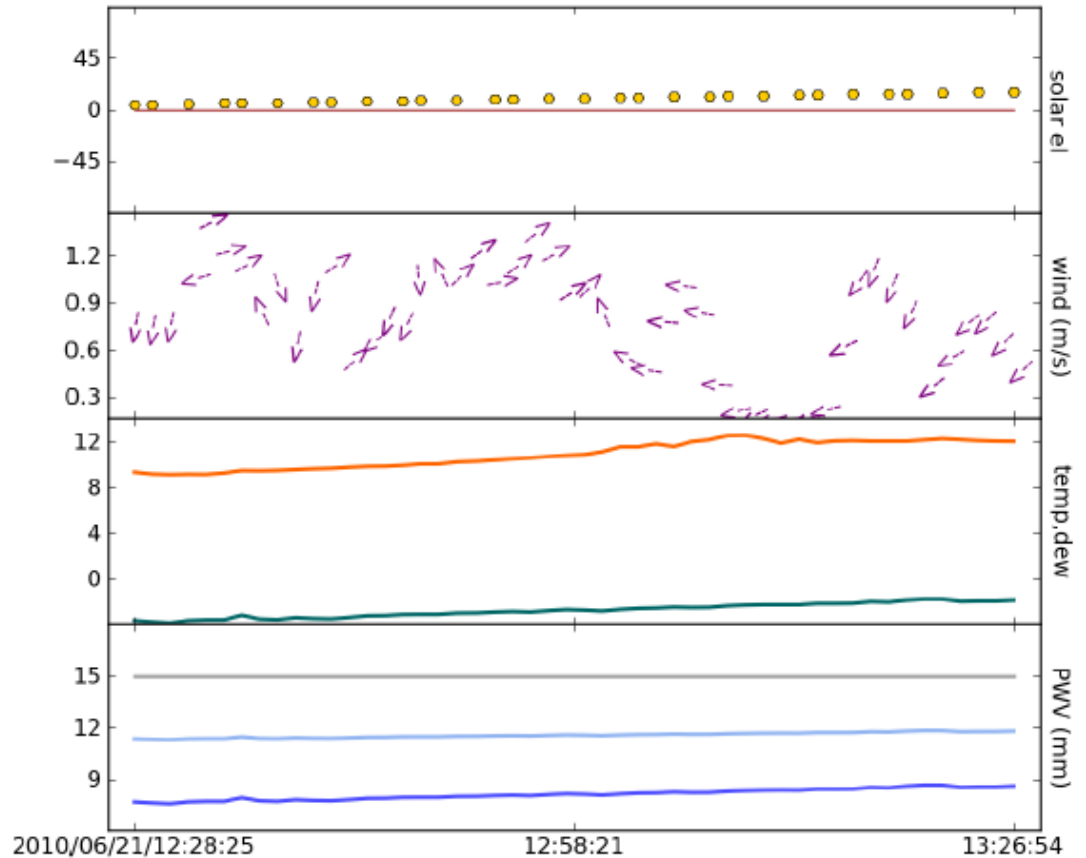
- Sun elevation
- Wind velocity and direction
- Temperature and dew point
- Pwv
- Estimation of opacity

Do not work on old dataset

To get help :

`help (task)`

Weather Summary for AS1039_sb1382796_2_000.55368.51883247685.ms



Antenna configuration and positions



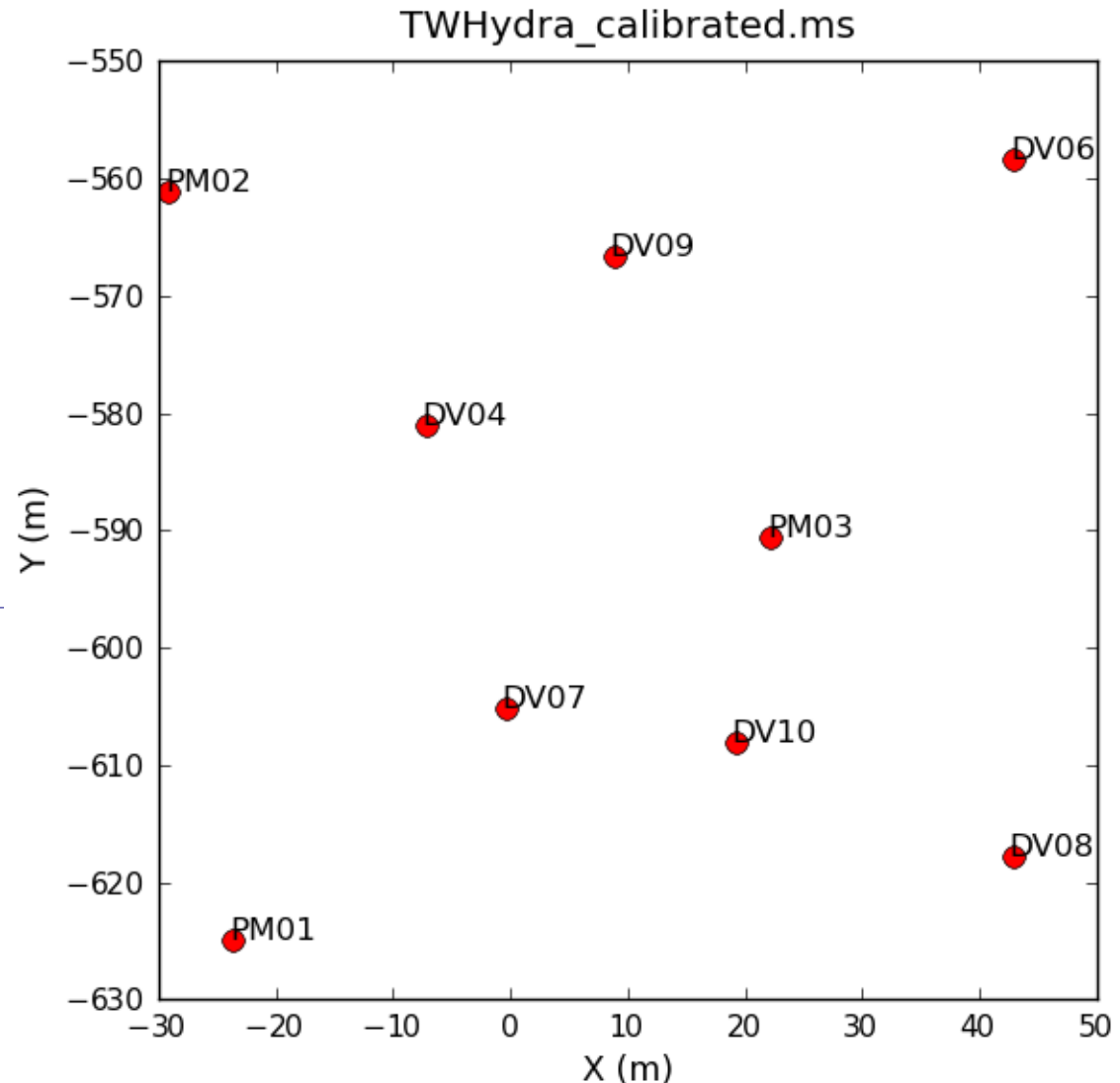
```
plotants(vis='asdm.ms',  
         figfile='toto')
```

Hands-on :

```
# alias for the ms name :  
msname='TWHydra_calibrated'
```

```
# plot antenna position
```

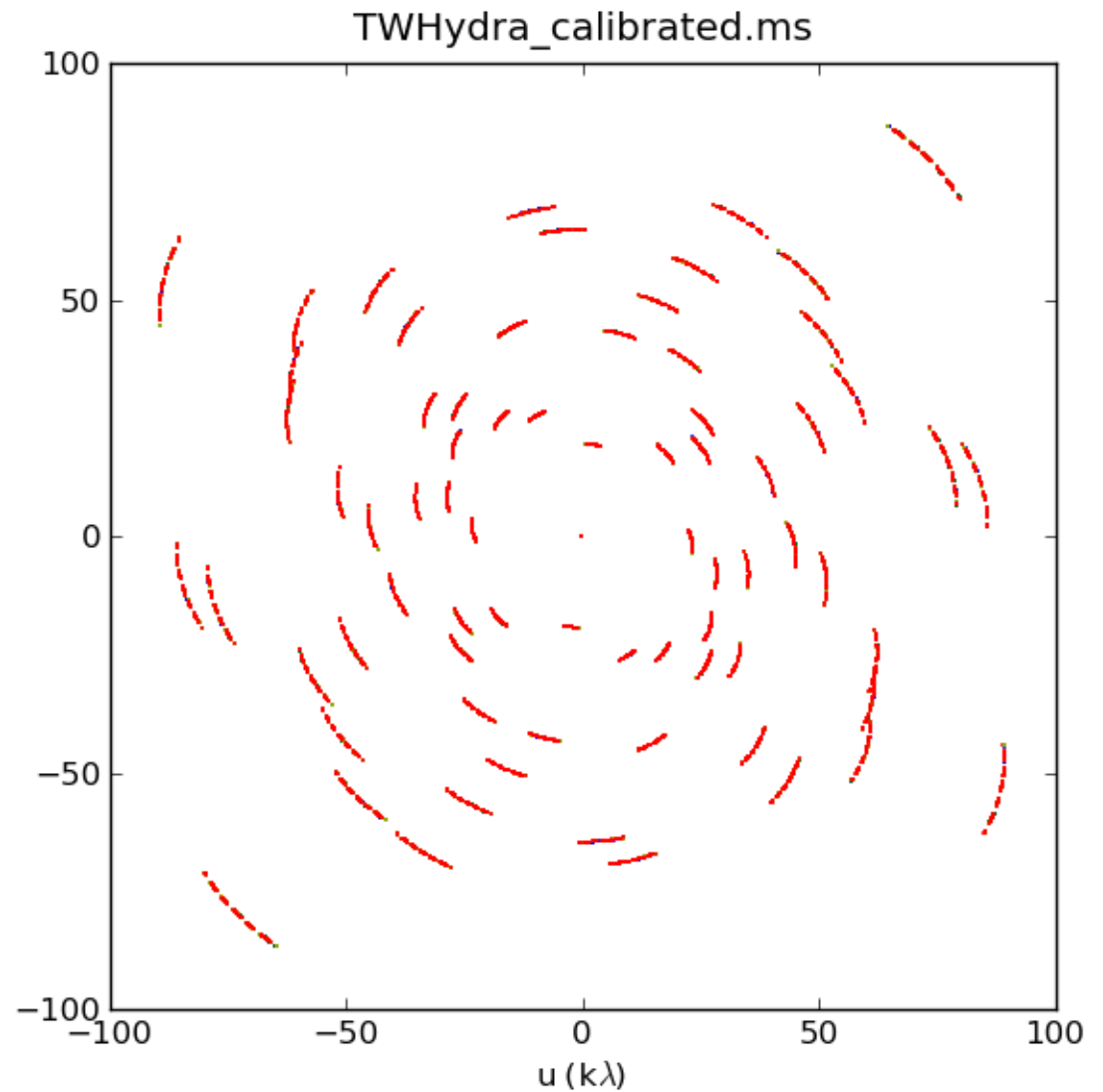
```
plotants(vis=msname+'.ms',  
         figfile='plot_antenna_positions.png')
```



uv coverage



```
plotuv(vis='asdm.ms',  
field="",  
antenna="",  
spw="",  
observation="",  
figfile="")
```



Data inspection : **listobs(vis=")**

=====
MeasurementSet Name: TWHydra_calibrated.ms MS Version 2
=====

Observer: Unknown Project: T.B.D.

Observation: ALMA

Data records: 10800 **Total integration time** = 5067.07 seconds

Observed from **22-Apr-2011**/00:15:41.8 to 22-Apr-2011/01:40:08.8 (UTC)

ObservationID = 0 ArrayID = 0

Date	Timerange (UTC)	Scan	FldId	FieldName	nRows	Int(s)	SpwIds	ScanIntent
22-Apr-2011/00:15:41.8 - 00:16:01.9		9	0	TW Hya	135	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	00:21:02.8 - 00:30:38.1	13	0	TW Hya	2160	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	00:36:54.2 - 00:44:38.4	18	0	TW Hya	1755	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	00:49:39.0 - 00:59:14.3	22	0	TW Hya	2160	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	01:05:51.9 - 01:13:36.1	27	0	TW Hya	1755	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	01:20:12.3 - 01:29:47.6	31	0	TW Hya	2160	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								
	01:37:20.6 - 01:40:08.8	36	0	TW Hya	675	10.1	[0]	OBSERVE_TARGET
#ON_SOURCE								

(nRows = Total number of rows per scan)

Data inspection : `listobs(vis="")`



Fields: 1

ID	Code Name	RA	Decl	Epoch	SrcId	nRows
0	none TW Hya	11:01:51.84498	-34.42.17.1609	J2000	0	10800

Spectral Windows: (1 unique spectral windows and 1 unique polarization setups)

SpwID	#Chans	Frame	Ch1(MHz)	ChanWid(kHz)	TotBW(kHz)	Corrs
0	501	TOPO	356681.042	122.070312	61157.2266	XX YY

Sources: 1

ID	Name	Spwld	RestFreq(MHz)	SysVel(km/s)
0	TW Hya	0	-	-

Antennas: 9:

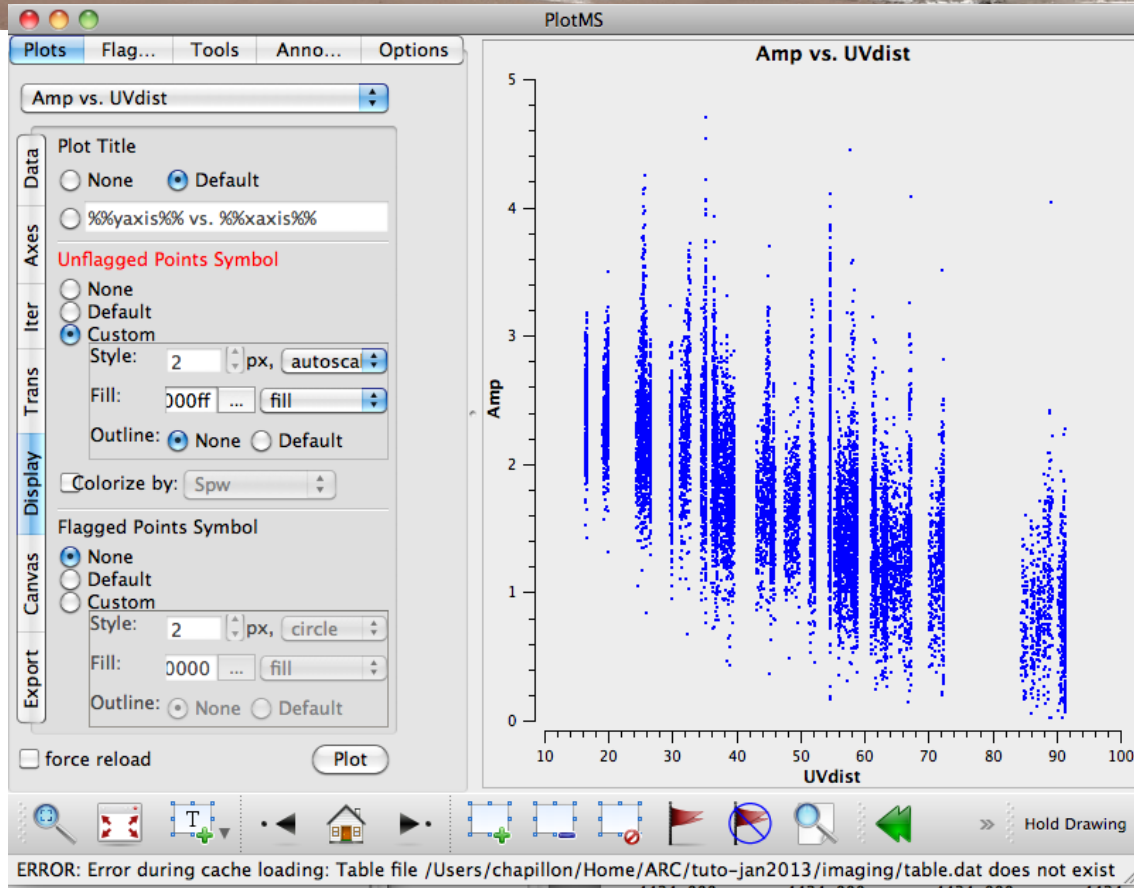
ID	Name	Station	Diam.	Long.	Lat.
0	DV04	J505	12.0 m	-067.45.18.0	-22.53.22.8
1	DV06	T704	12.0 m	-067.45.16.2	-22.53.22.1
2	DV07	J510	12.0 m	-067.45.17.8	-22.53.23.5
3	DV08	T703	12.0 m	-067.45.16.2	-22.53.23.9
4	DV09	N602	12.0 m	-067.45.17.4	-22.53.22.3
5	DV10	N606	12.0 m	-067.45.17.1	-22.53.23.6
6	PM01	T702	12.0 m	-067.45.18.6	-22.53.24.1
7	PM02	T701	12.0 m	-067.45.18.8	-22.53.22.2
8	PM03	J504	12.0 m	-067.45.17.0	-22.53.23.0

Hands-on :

list in the logger
: `listobs(vis=msname+'.ms')`

#list in a file
`listobs(vis=msname+'.ms',`
`verbose=T,`
`listfile=msname+'.listobs')`

Data inspection : **plotms**



Plays with : axes,
parameter selection (source, antennas...)
iteration (cannot display several windows),
color,
zoom

Hands-on :

```
plotms(vis=msname+'.ms',  
Spw="", field="",  
xaxis='uvdist',  
yaxis='amp',  
avgchannel='501',  
antenna='*&*)
```

```
plotms(vis=msname+'.ms',  
Spw="", field="",  
xaxis='channel',  
yaxis='amp',  
avgtime='1e9',  
avgscan=T,  
antenna='*&*)
```

+ Interactive inspection

Data structure



ALMA .ms contains 3 columns

- Data : "raw" data
- Corrected : calibrated data (from calibration)
- Model : model set (from calibration)

Plotms can display the 3 columns + residuals

Split (vis="",
outputvis="",
datacolumn="",
field="", spw="", antenna="",...)

- copy "corrected" column into "data" column
- can select only part of the observation (i.e. only on scientific target)

Hands-on :

```
# remove any already existing file  
os.system('rm -rf TWHydra_line.ms')
```

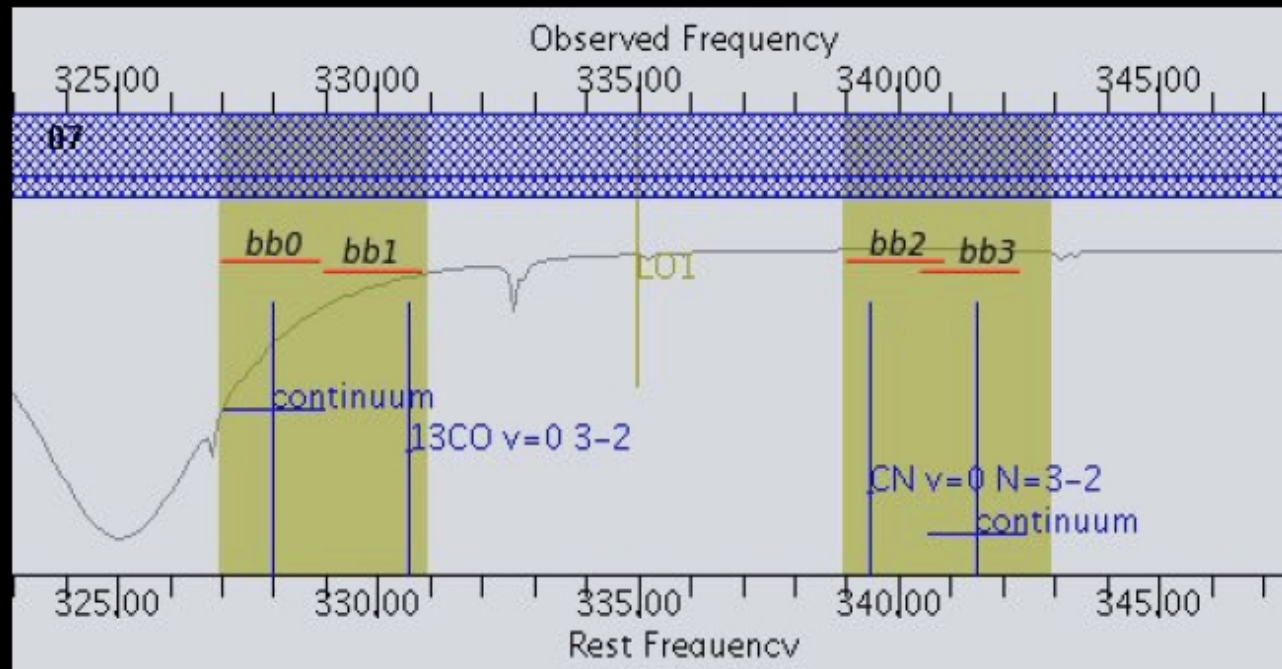
```
split(vis=msname+'.ms',  
outputvis='TWHydra_line.ms',  
spw='0:197~220',  
width=2,  
datacolumn='data')
```



It is time to do imaging !

You will need to find the lines you want to image using plotms

2SB Receivers



Correlator = 4 quadrants

1 quadrants can handle a pair of baseband (2 polarization)

Each baseband = 2 GHz

► **Up to 16 GHz (8GHz per polarization)**

A more complex listobs



=====
MeasurementSet Name: /media/RAID01_ext4/akiyama/svdata/uid___A002_X4267ef_X1b6.ms.split
MS Version 2
=====

Observer: mrawlings Project: uid://A002/X413132/X48

Observation: ALMA

Data records: 209544 Total integration time = 3399.31 seconds

Observed from 09-Jun-2012/05:34:15.8 to 09-Jun-2012/06:30:55.2 (UTC)

ObservationID = 0 ArrayID = 0

Date	Timerange (UTC)	Scan	FldId	FieldName	nRows	Int(s)	SpwIds
------	-----------------	------	-------	-----------	-------	--------	--------

ScanIntent

09-Jun-2012/05:34:15.8 - 05:40:50.7	4	0	J1924-292	37924	6.05	[0, 1, 2, 3]
-------------------------------------	---	---	------------------	-------	------	--------------

CALIBRATE **BANDPASS**#ON_SOURCE,CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE

05:42:42.0 - 05:46:32.2	6	1	Juno	22344	6.05	[0, 1, 2, 3]
-------------------------	---	---	-------------	-------	------	--------------

CALIBRATE **AMPLI**#ON_SOURCE,CALIBRATE **PHASE**#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE

05:49:43.9 - 05:50:49.2	9	2	J1733-130	7600	6.05	[0, 1, 2, 3]
-------------------------	---	---	------------------	------	------	--------------

CALIBRATE **PHASE**#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE

05:52:23.4 - 06:04:00.7	11	3	HD163296	46444	6.05	[0, 1, 2, 3]
-------------------------	----	---	-----------------	-------	------	--------------

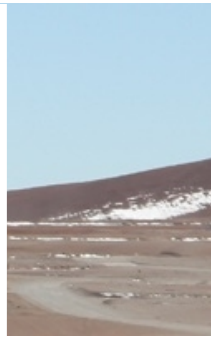
OBSERVE_TARGET#**ON_SOURCE**,CALIBRATE_WVR#ON_SOURCE

06:05:12.8 - 06:06:18.1	13	2	J1733-130	7600	6.05	[0, 1, 2, 3]
-------------------------	----	---	------------------	------	------	--------------

CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE

06:07:39.3 - 06:19:16.6	15	3	HD163296	46668	6.05	[0, 1, 2, 3]
-------------------------	----	---	-----------------	-------	------	--------------

OBSERVE_TARGET#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE



```

06:20:39.5 - 06:21:44.8  17   2 J1733-130      7600  6.05  [0, 1, 2, 3]
CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE
06:23:13.3 - 06:29:28.0  19   3 HD163296      25764 6.05  [0, 1, 2, 3]
OBSERVE_TARGET#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE
06:29:49.8 - 06:30:55.2  20   2 J1733-130      7600  6.05  [0, 1, 2, 3]
CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_WVR#ON_SOURCE
(nRows = Total number of rows per scan)

```

Fields: 4

ID	Code Name	RA	Decl	Epoch	SrcId	nRows
0	none J1924-292	19:24:51.05594	-29.14.30.1211	J2000	0	37924
1	none Juno	15:46:36.72137	-02.15.12.3361	J2000	1	22344
2	none J1733-130	17:33:02.71000	-13.04.49.5500	J2000	2	30400
3	none HD163296	17:56:21.28138	-21.57.22.3577	J2000	3	118876

Spectral Windows: (4 unique spectral windows and 1 unique polarization setups)

SpwID	#Chans	Frame	Ch1(MHz)	ChanWid(kHz)	TotBW(kHz)	Corrs
0	3840	TOPO	218042.236	-488.28125	1875000	XX YY
1	3840	TOPO	220438.628	-244.140625	937500	XX YY
2	3840	TOPO	230501.372	244.140625	937500	XX YY
3	3840	TOPO	233062.759	488.28125	1875000	XX YY

Sources: 16

ID	Name	SpwId	RestFreq(MHz)	SysVel(km/s)
0	J1924-292	0	-	-
0	J1924-292	1	-	-
0	J1924-292	2	-	-
0	J1924-292	3	-	-
1	Juno	0	-	-
1	Juno	1	-	-
1	Juno	2	-	-
1	Juno	3	-	-



2	J1733-130	0	-	-
2	J1733-130	1	-	-
2	J1733-130	2	-	-
2	J1733-130	3	-	-
3	HD163296	0	-	-
3	HD163296	1	-	-
3	HD163296	2	-	-
3	HD163296	3	-	-

Antennas: 20:

ID	Name	Station	Diam.	Long.	Lat.						
0	CM05	J503	7.0 m	-067.45.17.4	-22.53.23.2	10	DV05	A082	12.0 m	-067.45.08.3	-22.53.29.2
1	CM08	J505	7.0 m	-067.45.18.0	-22.53.22.8	11	DV08	A021	12.0 m	-067.45.17.2	-22.53.27.0
2	DA41	A003	12.0 m	-067.45.16.5	-22.53.27.0	12	DV09	A046	12.0 m	-067.45.17.0	-22.53.29.3
3	DA42	A050	12.0 m	-067.45.16.2	-22.53.29.3	13	DV10	A071	12.0 m	-067.45.19.9	-22.53.23.5
4	DA43	A075	12.0 m	-067.45.17.9	-22.53.21.4	14	DV12	A011	12.0 m	-067.45.14.4	-22.53.28.4
5	DA44	A068	12.0 m	-067.45.20.6	-22.53.25.7	15	DV14	A025	12.0 m	-067.45.18.7	-22.53.27.4
6	DA45	A070	12.0 m	-067.45.11.9	-22.53.29.3	16	DV15	A074	12.0 m	-067.45.12.1	-22.53.32.0
7	DV02	A077	12.0 m	-067.45.10.1	-22.53.25.9	17	DV16	A069	12.0 m	-067.45.21.3	-22.53.30.2
8	DV03	A137	12.0 m	-067.45.15.2	-22.53.22.7	18	DV17	A138	12.0 m	-067.45.17.1	-22.53.34.4
9	DV04	A004	12.0 m	-067.45.15.9	-22.53.28.0	19	DV18	A053	12.0 m	-067.45.17.3	-22.53.31.2