MB007 Correlation Report

General

- Session info: http://www3.mpifr-bonn.mpg.de/div/vlbi/globalmm/
- Station feedback: http://www3.mpifr-bonn.mpg.de/div/vlbi/globalmm/sessions/apr17/feedback_apr17.asc
- ALMA QA2: 2016.1.00413.V used for polarization conversion (files are included in the data export folder)
- This experiment has ALMA with 32x62.5MHz, VLBA with 2x128MHz channels, and most of the EVN with a 1x512MHz channel
- Two EVN stations (Yebes, Pico Veleta) observed in an incorrect backend mode, with a 32 MHz polyphase filterbank.
- Due to the issue at Yebes and Pico, three correlations were performed:
    - a) standard ALMA correlation setup (58 MHz bands)
    - b) narrower band correlation setup (32 MHz bands)
    - c) emulated standard ALMA correlation setup (58 MHz bands), accomplished via a mixed-bandwidth correlation with additional postprocessing of all baselines to Yebes and Pico Veleta to reconstruct 58 MHz bands
- The details of correlation run (c) are: the experiment was correlated with 58 MHz bands and several narrower bands that fitted the Pico/Yebes recorded bands (e.g., 32 MHz, 24 MHz, 2 MHz and similar). After correlation the visibility data were ran through a post-processing script in order to form 58 MHz bands from the narrow bands (i.e., combining visibilities in frequency domain from e.g. 32 + 24 + 2 MHz bands). This step included spectrally averaging inside the 58 MHz bands from a total of 3712 channels per band down to the final 116 channels per band that matched the originally intended correlation mode.
- The FITS files are delivered in two variants due to the problems with Pico and Yebes that were outlined above:
    - **mb007.fits**: Standard correlation (a)
    - **mb007_merged.fits**: Special correlation with post-processing (c)

Status

What	Date
Correlation 2nd round finished	19.8.2017
Conversion to HOPS	4.9.2017
Fourfit fringe fitting	4.9.2017
Conversion to FITS with -u (union) option	4.9.2017
PCList check	4.9.2017
aedit plots, alist v6 residual rate and delay plots	4.9.2017
rerun polconvert	10.11.2017
Release to PI	14.11.2017
re-processing of correlation (c) to fix Pico polarization and a difx2difx postprocessing error affecting autocorrelations	14.1.2018
Re-release to PI	16.1.2018

Fringe search:

Station	Code	Fringes	Plots	Comments
AA	A	yes		
Gb	G	yes		
Br	b	yes		
Fd	f	yes		
Kp	k	yes		
La	l	yes		
Mk	m	yes		
Nl	n	yes		
Ov	o	yes		
Pt	p	yes		
Ef	B	yes		Effelsberg DBBC2
Eb	E	yes		Effelsberg RDBE
Ys	Y	yes		fringes in 32 MHz correlation run, and in 58 MHz -emulated run
Pv	P	yes		fringes in 32 MHz correlation run, and in 58 MHz -emulated run

Fringes in e.g. scans No0023 and No0082 on ALMA baselines in 32 MHz correlation run (No0023 PDF all but GB and Mk in this scan; No0082 PDF with GB and Mk), likewise in 58 MHz correlation run (No0023 DF, No0082 PDF)

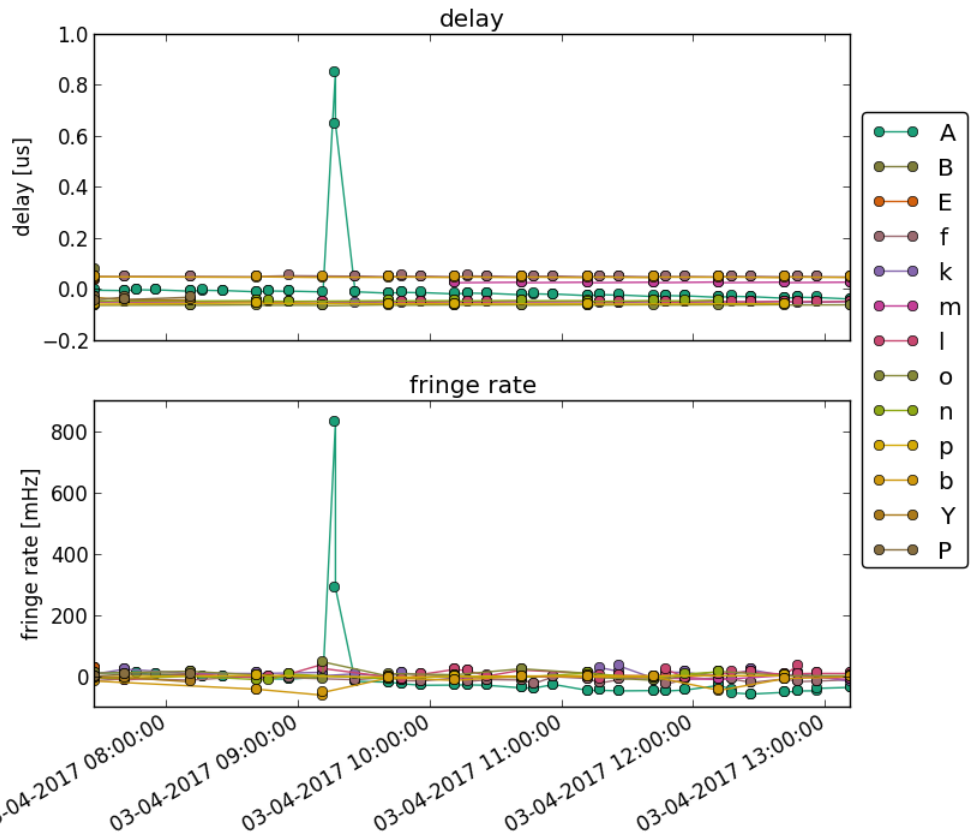
Notes:

1. In case (c) the additional processing consisted of, first, correlation with 58 MHz bands and several narrower bands that fitted the Pico/Yebes recorded bands (e.g., 32 MHz, 24 MHz, 2 MHz and similar), secondly, after correlation passing the visibility data through a post-processing script to form 58 MHz bands on the affected baselines using the narrow bands (i.e., combining visibilities in frequency domain from 32 + 24 + 2 MHz bands), thirdly, spectrally averaging inside the 58 MHz bands from 3712 channels per band to the final goal of 116 channels per band that matches the originally intended correlation mode.
2. Yebes began recording 20 seconds late in every scan

Post-Correlation checks

Residuals

reference G (GBT) pols RR and LL



Delays statistics

st	#pts	mean	std. dev
A	69	+0.0070	0.130494
B	02	+0.0672	0.013006
E	02	+0.0387	0.002128
f	55	+0.0526	0.001234
k	39	-0.0473	0.001365
m	14	+0.0293	0.001105
l	53	-0.0465	0.001063
o	24	-0.0594	0.001013
n	23	-0.0431	0.001141
p	12	-0.0544	0.001383
b	22	+0.0498	0.001026
Y	04	-0.0367	0.004183
P	05	-0.0329	0.005127

Fringe rate statistics

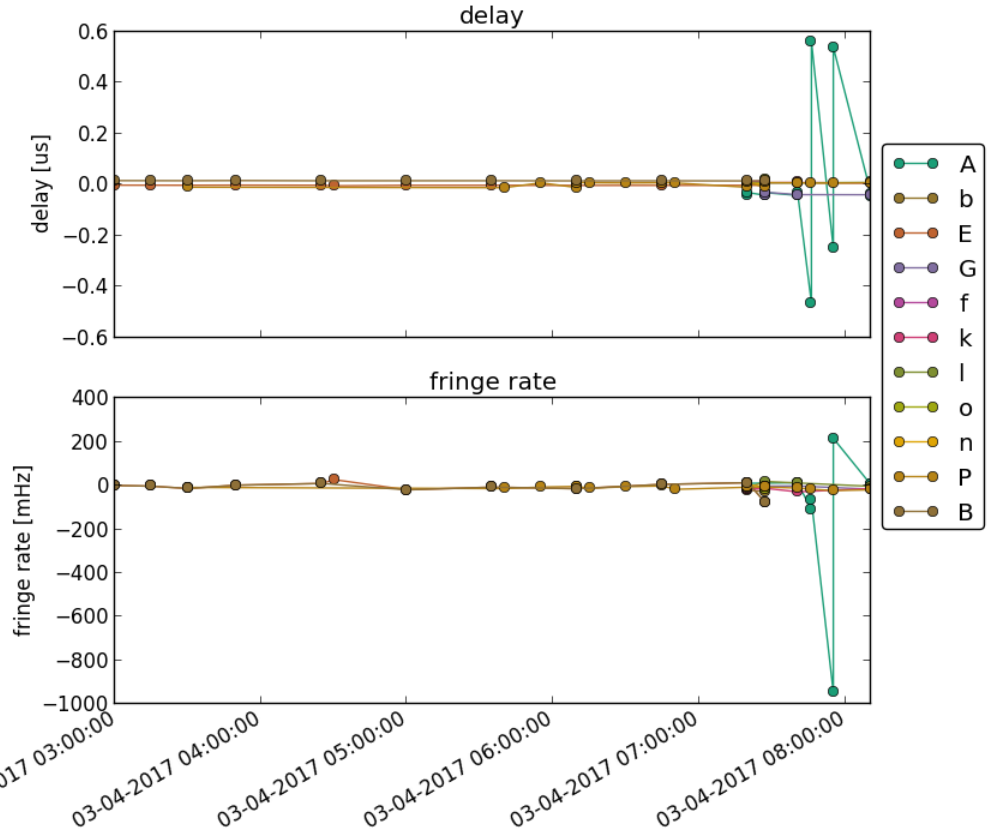
st	#pts	mean	std. dev
A	69	-5.3517	110.495962
B	02	+30.2429	0.010509
E	02	+30.2770	0.010811
f	55	-8.1956	6.723552
k	39	+9.8624	10.476902
m	14	-1.4834	4.533072
l	53	+9.6552	11.014737
o	24	+10.9482	12.612372
n	23	+1.6139	8.094761
p	12	+3.2236	2.073630
b	22	-14.1161	20.037005
Y	04	-4.7990	6.096161
P	05	+7.2721	2.993229

Reference station: G

Pol: RR,LL

Notes:

reference Y (Yebes), pols RR and LL




```
Delays statistics
st #pts mean    std. dev
A  12   +0.0077 0.273106
b  02   +0.0101 0.001606
E  12   -0.0023 0.000680
G  04   -0.0367 0.004183
f  02   +0.0136 0.001321
k  04   +0.0077 0.000855
l  04   +0.0076 0.000870
o  01   +0.0210 0.000000
n  02   +0.0044 0.001387
P  17   +0.0022 0.008301
B  11   +0.0157 0.000353
```

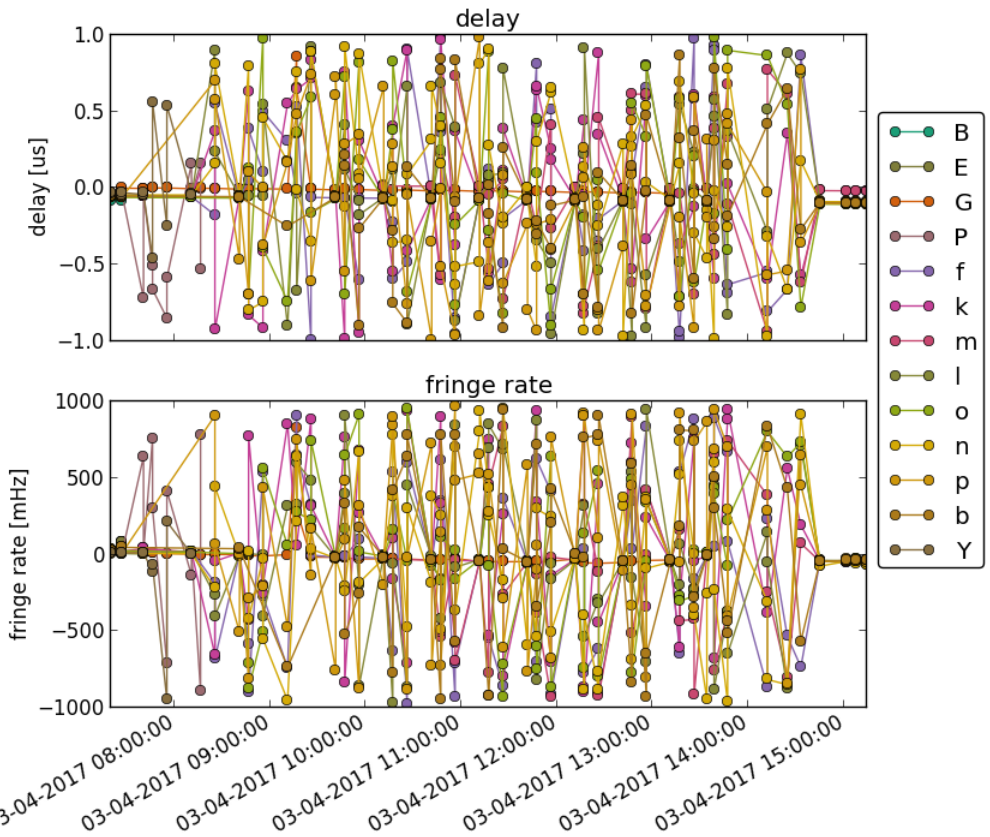
```
Fringe rate statistics
st #pts mean    std. dev
A  12   -68.2980 274.479828
b  02   -23.0471 3.387671
E  12   -5.1428 24.482167
G  04   -4.7990 6.096161
f  02   -13.4465 0.902919
k  04   -16.4160 6.589954
l  04   +5.4219 11.708730
o  01   -15.5074 0.000000
n  02   +0.0732 5.579546
P  17   -9.0369 5.849868
B  11   -8.2317 23.249215
```

`Reference station: Y` `Pol: RR,LL`

reference A (ALMA), pols RR and LL

Note: Calibrator scans have stable delay and rate residuals scans have stable delay and rate residual. The large scatter happens on Sgr A only, and on long baselines (and not only with ALMA). This was verified in HOPS aedit.

all sources incl. Sgr A* (below)



Delays statistics

st	#pts	mean	std. dev
B	04	-0.0687	0.012438
E	04	-0.0401	0.001691
G	69	+0.0070	0.130494
P	14	-0.2700	0.339509
f	87	-0.0467	0.461557
k	85	-0.0074	0.447822
m	56	-0.0342	0.406189
l	87	-0.0103	0.438826
o	81	-0.0130	0.454302
n	87	+0.0106	0.443936
p	83	-0.1205	0.464711
b	72	-0.0594	0.381484
Y	12	+0.0077	0.273106

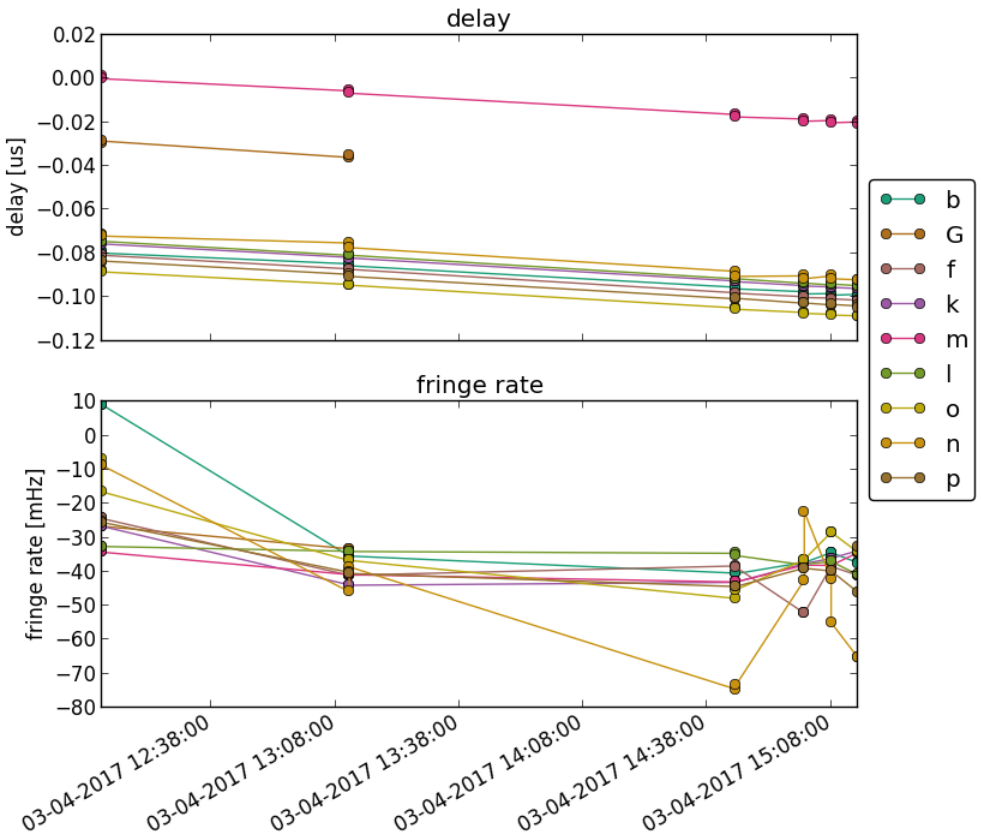
Fringe rate statistics

st	#pts	mean	std. dev
B	04	+52.8100	27.993372
E	04	+52.8324	28.031146
G	69	-5.3517	110.495962
P	14	+92.1869	467.914962
f	87	-46.1976	456.341055
k	85	+45.8946	451.677092
m	56	-83.6839	424.544383
l	87	-3.0764	411.906173
o	81	+11.7132	406.395186
n	87	-28.2960	449.119721
p	83	+120.9989	519.297235
b	72	+35.1062	478.522507
Y	12	-68.2980	274.479828

Reference station: A | Pol: RR,LL

source 1921-293 only (below)

Notes:



Delays statistics

st	#pts	mean	std. dev
b	12	-0.0927	0.007646
G	04	-0.0323	0.003263
f	12	-0.0947	0.007872
k	12	-0.0894	0.007856
m	12	-0.0136	0.007952
l	12	-0.0882	0.007775
o	12	-0.1019	0.007848
n	12	-0.0852	0.008124
p	12	-0.0975	0.007862

Fringe rate statistics

st	#pts	mean	std. dev
b	12	-29.2542	17.299371
G	04	-29.9051	3.305022
f	12	-39.2087	8.139461
k	12	-36.8022	5.840886
m	12	-38.0626	3.182347
l	12	-36.1424	2.729285
o	12	-32.2800	10.898903
n	12	-45.1174	21.980082
p	12	-37.9959	6.521451

Reference station: A | Pol: RR,LL

FITS completeness (pclist)

Legend:

o: station is included in the FITS-file (data is complete)

x: expected station is missing in the FITS-file

number: percentage of job time in the FITS-file compared to expected time.

					EF	EB	YS	PV	AA	NL	FD	PT	LA	KP	OV	BR	GB	MK
mb007_01	No0001	1749+096	3mm_ddc	o	o	95	.	.	.	.	.	.	.	.	.	.	.	
mb007_02	No0002	1749+096	3mm_ddc	o	o	o	.	.	.	.	.	.	.	.	.	.	.	
mb007_03	No0003	NRAO530	3mm_ddc	o	o	88	o	.	.	.	.	.	.	.	.	.	.	
mb007_04	No0004	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_05	No0005	NRAO530	3mm_ddc	o	o	88	o	.	.	.	.	.	.	.	.	.	.	
mb007_06	No0006	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_07	No0007	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_08	No0008	NRAO530	3mm_ddc	o	o	88	o	.	.	.	.	.	.	.	.	.	.	
mb007_09	No0009	SGRA	3mm_ddc	o	o	o	o	.	.	.	.	.	.	.	.	.	.	
mb007_10	No0010	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_11	No0011	NRAO530	3mm_ddc	o	o	o	o	.	.	.	.	.	.	.	.	.	.	
mb007_12	No0012	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_13	No0013	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	
mb007_14	No0014	NRAO530	3mm_ddc	o	o	88	o	.	.	.	.	.	.	.	.	.	.	
mb007_15	No0015	SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.	

mb007_16	No0016		SGRA	3mm_ddc	o	o	96	o	.	.	.	.	.	.	.	.	.	.
mb007_17	No0017		NRAO530	3mm_ddc	o	o	88	o	.	.	.	.	.	.	.	.	.	.
mb007_18	No0018		SGRA	3mm_ddc	.	.	96	o	.	.	.	.	.	.	.	.	.	.
mb007_19	No0019		SGRA	3mm_ddc	.	.	96	o	.	.	.	.	.	.	.	.	.	.
mb007_20	No0020		NRAO530	3mm_ddc	o	o	o	o	.	.	.	.	.	.	.	.	.	.
mb007_21	No0021		SGRA	3mm_ddc	.	.	96	o	.	.	.	.	.	.	.	.	.	.
mb007_22	No0022		SGRA	3mm_ddc	.	.	o	o	.	.	.	.	.	.	.	.	.	.
mb007_23	No0023	1749+096		3mm_ddc	o	o	o	o	o	o	o	o	o	o	o	o	.	.
	No0024	1749+096		3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_24	No0025	1749+096		3mm_ddc	o	o	93	o	o	o	o	o	o	o	o	o	o	.
	No0026		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_25	No0027		NRAO530	3mm_ddc	o	o	o	o	o	o	o	o	o	o	o	.	o	.
mb007_26	No0028		SGRA	3mm_ddc	.	.	o	o	o	o	o	.	o	.	.	.	o	.
mb007_27	No0029		SGRA	3mm_ddc	.	.	o	o	o	o	o	o	o	o	.	.	o	.
mb007_28	No0030		NRAO530	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	o	.	.
	No0031		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_29	No0032		NRAO530	3mm_ddc	.	.	o	o	o	o	o	o	o	o	o	o	o	.
mb007_30	No0033		SGRA	3mm_ddc	.	.	.	o	o	o	o	o	o	o	.	.	o	.
mb007_31	No0034		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	.	.	o	.
mb007_32	No0035		NRAO530	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	o	.	.
	No0036		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_33	No0037		NRAO530	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	.
mb007_34	No0038		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o	.
mb007_35	No0039		SGRA	3mm_ddc	.	.	.	.	80	80	80	80	80	80	80	.	80	.
mb007_36	No0040		NRAO530	3mm_ddc	.	.	.	.	.	13	13	13	13	13	13	13	.	.
	No0041		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_37	No0042		NRAO530	3mm_ddc	.	.	.	.	11	11	11	11	11	11	11	11	11	.
mb007_38	No0043		SGRA	3mm_ddc	.	.	.	.	09	09	09	09	09	09	09	.	09	.
mb007_39	No0044		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o	.
mb007_40	No0045		NRAO530	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	o	.	.
	No0046		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_41	No0047		NRAO530	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	.
mb007_42	No0048		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	.
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	No0051		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
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mb007_47	No0054		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	.
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	No0056		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_49	No0057		NRAO530	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	o
mb007_50	No0058		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	o
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	No0061		NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	.	x	.
mb007_53	No0062		NRAO530	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	o
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mb007_55	No0064		SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o	o
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mb007_59	No0069	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o
mb007_60	No0070	SGRA	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	.	o
	No0071	1921-293	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	x	.
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mb007_63	No0074	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	o	o
mb007_64	No0075	1921-293	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	.	o
	No0076	NRAO530	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	x	.
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	No0081	1921-293	3mm_ddc	.	.	.	.	.	.	.	.	.	.	.	x	.
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mb007_71	No0084	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_72	No0085	NRAO530	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_73	No0086	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_74	No0087	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_75	No0088	1921-293	3mm_ddc	.	.	.	.	x	o	o	o	o	o	o	.	o
mb007_76	No0089	SGRA	3mm_ddc	.	.	.	.	x	o	o	o	o	o	o	.	o
mb007_77	No0090	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_78	No0091	NRAO530	3mm_ddc	.	.	.	.	.	o	o	o	o	o	o	.	o
mb007_79	No0092	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_80	No0093	SGRA	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_81	No0094	1921-293	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_82	No0095	SGRA	3mm_ddc	.	.	.	.	.	.	o	o	o	o	o	.	o
mb007_83	No0096	1921-293	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_84	No0097	1921-293	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o
mb007_85	No0098	1921-293	3mm_ddc	.	.	.	.	o	o	o	o	o	o	o	.	o