

# EVN Amplitude Calibration

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## Quality of Calibration

### Session 1/2014

Station	18cm	6cm	5cm	1.3cm
Ef	0.08 (7)	0.05 (12)	0.02 (5)	0.10 (2)
Jb1	0.12 (7) *	0.23 (10) *		
Jb2			0.10 (5)	0.22 (2) *
Mc	0.13 (6) *	0.03 (12)	0.06 (5)	0.10 (2)
Nt	0.13 (7) *	0.07 (7)	0.22 (2) *	0.26 (1) *
On	0.18 (7) *	0.07 (11)	0.07 (4)	0.37 (2) *
Tr	0.16 (7) *	0.03 (7)	0.02 (4)	0.35 (2) *
Wb	0.06 (7)	0.04 (12)	0.05 (4)	
Ys		0.04 (10)	0.03 (5)	0.04 (2)
Hh	0.08 (4)	0.05 (7)		0.29 (1) *
Ur	0.26 (6) *	0.07 (11)		0.05 (1)
Sh	0.13 (6) *	0.07 (10)	0.08 (1)	0.16 (2)
Bd	0.10 (5)	0.04 (5)		
Zc	0.07 (7)	0.09 (10)		
Sv	0.07 (6)	0.05 (11)		0.85 (1) *
Ro	0.08 (1)			
Sr	0.17 (1) *			1.13 (1) *
Mh				1.04 (1) *
Ku				0.13 (1)
Kt				0.13 (1)
Ky				0.18 (1)

Numbers here are the median absolute error in the antenna gain amplitude. This number will be approx half the error in the SEFD and is the same that you see in AIPS gain plots. The number in brackets after each entry is the number of experiments that were used to determine the median error for that entry.

## Quality of Calibration

### Session 1/2014 (L-band):

- Large amplitude errors in several stations. Probably artificial, slightly wrong calibration in Ef and Wb
- **Ef:** Computed SEFD (9 -16) lower than the nominal one (19)
- **Wb:** SEFD probably overestimated. Computed ~50-65, nominal one =40
- **Additional problems:**
  - **Ur:** Tsys higher than normal. Perhaps something wrong with TCal calibration.
  - **Sr: Test observations.** Sensitivity loss in N14L1. Expected SEFD=38Jy, observed SEFD=49Jy. Also, dummy Tsys tables were used

## Quality of Calibration

### Session 1/2014 (C-band): Mostly fine

- **Jb:** Cal system failure in some user programs

### Session 1/2014 (M-band): Mostly fine

- **Nt:** RCP received broken since mid 2013. Station hopes to restore soon

### Session 1/2014 (K-band):

- **Mh:** Wrong calibration of DBBC. Problem solved for session II.
- **Sr:** Test observations, N14K1. Fringes found but configuration of DBBC not optimum
- **Sv:** Poor RCP sensitivity by a factor of  $\sim 2.5$ . Possible problem with LO sync

## Quality of Calibration

### Session 1/2014 (K-band):

- **Jb**: Dummy Tsys tables based on nominal SEFD
- **Nt**: No good RCP data
- **Tr**: Bad data on RCP IFs 7 and 8. Low amplitude on RCP IFs 1 and 2
- **Hh**: Heavy rain

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### GENERAL NOTE:

Nominal SEFDs were used to make dummy Tsys tables for **Bd**, **Sv**, **Zc** and a significant number of observations by **Jb**.

These stations often suffer from larger amplitude calibration errors

## Quality of Calibration

### Session 3/2013

Station	6cm	18cm	3.6cm	1.3cm
Ef	0.07 (5)	0.07 (6)	0.06 (3)	0.13 (3)
Jb1	0.08 (5)			
Jb2				1.44 (3) *
Mc	0.02 (5)	0.09 (6)	0.06 (4)	0.11 (3)
Nt	0.18 (5) *	0.14 (5) *		0.23 (3) *
On	0.07 (4)	0.08 (5)	0.23 (4) *	0.38 (3) *
Tr	0.04 (2)	0.13 (7)		0.16 (3)
Wb	0.05 (5)	0.04 (7)	0.09 (4)	
Ys	0.09 (5)		0.11 (4)	0.05 (3)
Hh	0.05 (2)	0.06 (3)	0.05 (2)	0.12 (1)
Ur	0.07 (3)	0.18 (4) *	0.20 (2) *	0.18 (3)
Sh	0.09 (3)	0.20 (4) *		0.21 (2)
Bd	0.05 (4)	0.07 (6)	0.11 (3)	0.55 (3) *
Zc	0.15 (4) *	0.06 (5)	0.09 (3)	0.16 (3)
Sv	0.24 (5) *	0.05 (5)	0.15 (3) *	0.07 (3)
Ar		0.04 (2)		
Ro		0.06 (1)		

Numbers here are the median absolute error in the antenna gain amplitude. This number will be approx half the error in the SEFD and is the same that you see in AIPS gain plots. The number in brackets after each entry is the number of experiments that were used to determine the median error for that entry.

## Quality of Calibration

### Session 3/2014 (C-band):

- **Sv:** LCP receiver warm on some user programs. Sensitivities at LCP clearly affected
- **Nt:** Low sensitivity on LCP (more prominent on subbands 7 and 8)
- **Zc:** Self-calibration gains  $\sim 0.85$

### Session 3/2014 (L-band):

- **Sh:** Low sensitivity both RCP and LCP. Self calibration gains  $\sim 1.13$  to  $\sim 1.19$
- **Nt:** Self-calibration gains on LCP and RCP  $\sim 0.90$  to  $0.77$ .
- **Ur:** Variable self-calibration gains from 2 to 0.7. Strong RFI in the whole bandpass

## Quality of Calibration

### Session 3/2014 (X-band):

- **Ur:** LCP sub-bands 7 and 8 dominate amplitude errors (gains up to 2.2). Receiver specs may not meet astronomical requirements (being investigated)
- **On:** Over-high amplitude caused by over-narrow DBBC 16MHz filter (valid bandwidth 13 MHz) and DBBC power sampling outside of the linear region (solved)
- **Sv:** LCP receiver affected by low sensitivity. Self-calibration gains to  $\sim 1.25$  to  $\sim 1.35$

### Session 3/2014 (K-band):

- **Jb:** No optimum .rxg files for appropriate amplitude calibration. No K-band .rxg file generated.
- **On:** Over-high amplitude caused by over-narrow DBBC 16MHz filter (valid bandwidth 13 MHz) and DBBC power sampling outside of the linear region (solved)
- **Bd:** Low sensitivity. Self-calibration gains by  $\sim 1.8$  to  $\sim 1.5$
- **Nt:** No good RCP data. LCP self-calibration gains were  $\sim 0.92$  to  $\sim 0.59$ , plausibly produced by degradation of the receivers.



### AGAIN, GENERAL NOTE:

Nominal SEFDs were used to make dummy Tsys tables for **Bd**, **Sv**, **Zc** and a significant number of observations by **Jb**.

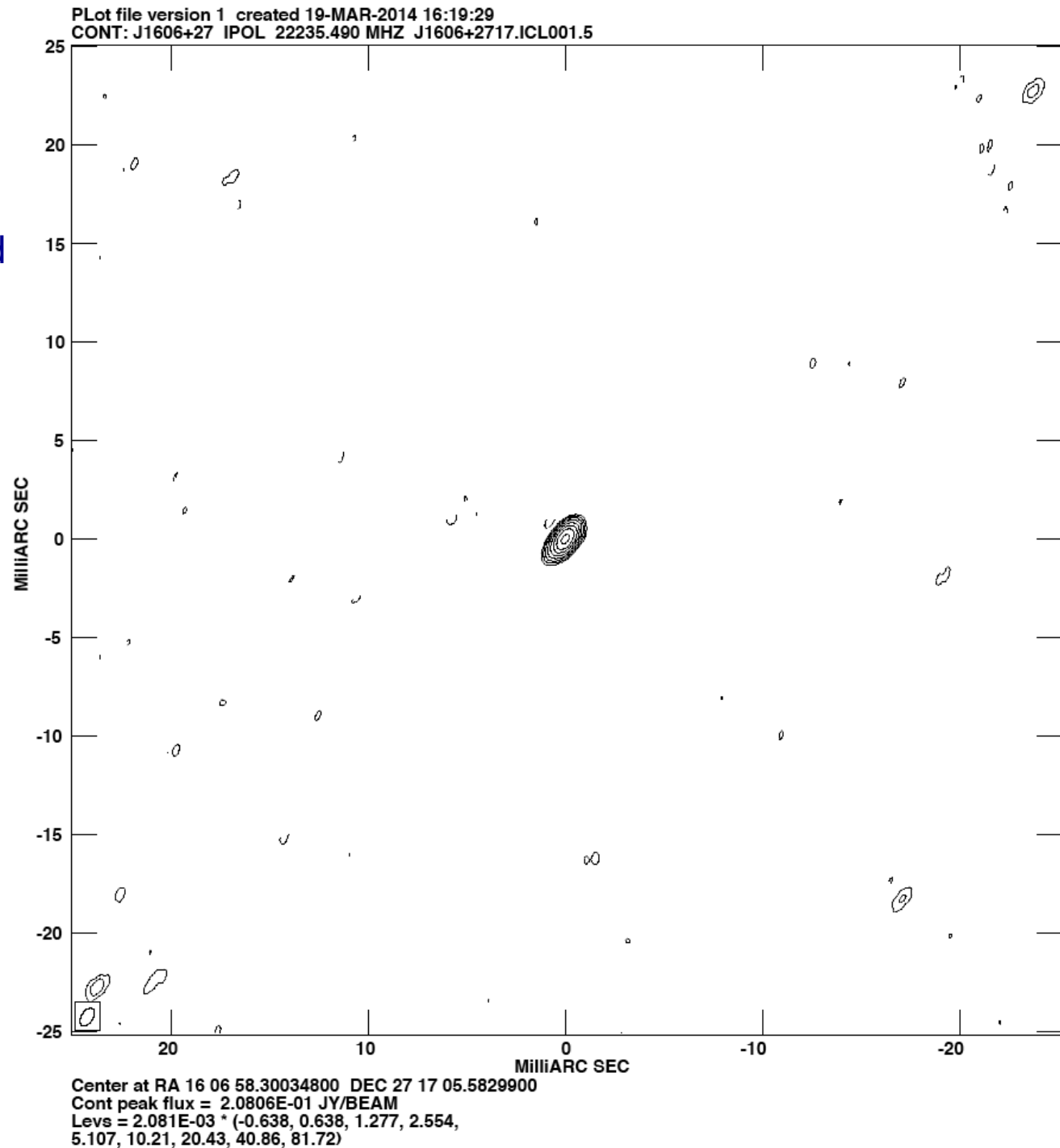
These stations often suffer from larger amplitude calibration errors

These and other problems related to non optimum Tsys calibration tables:

**MAKES ONE OF THE MAIN WEAKNESSES OF THE EVN!**

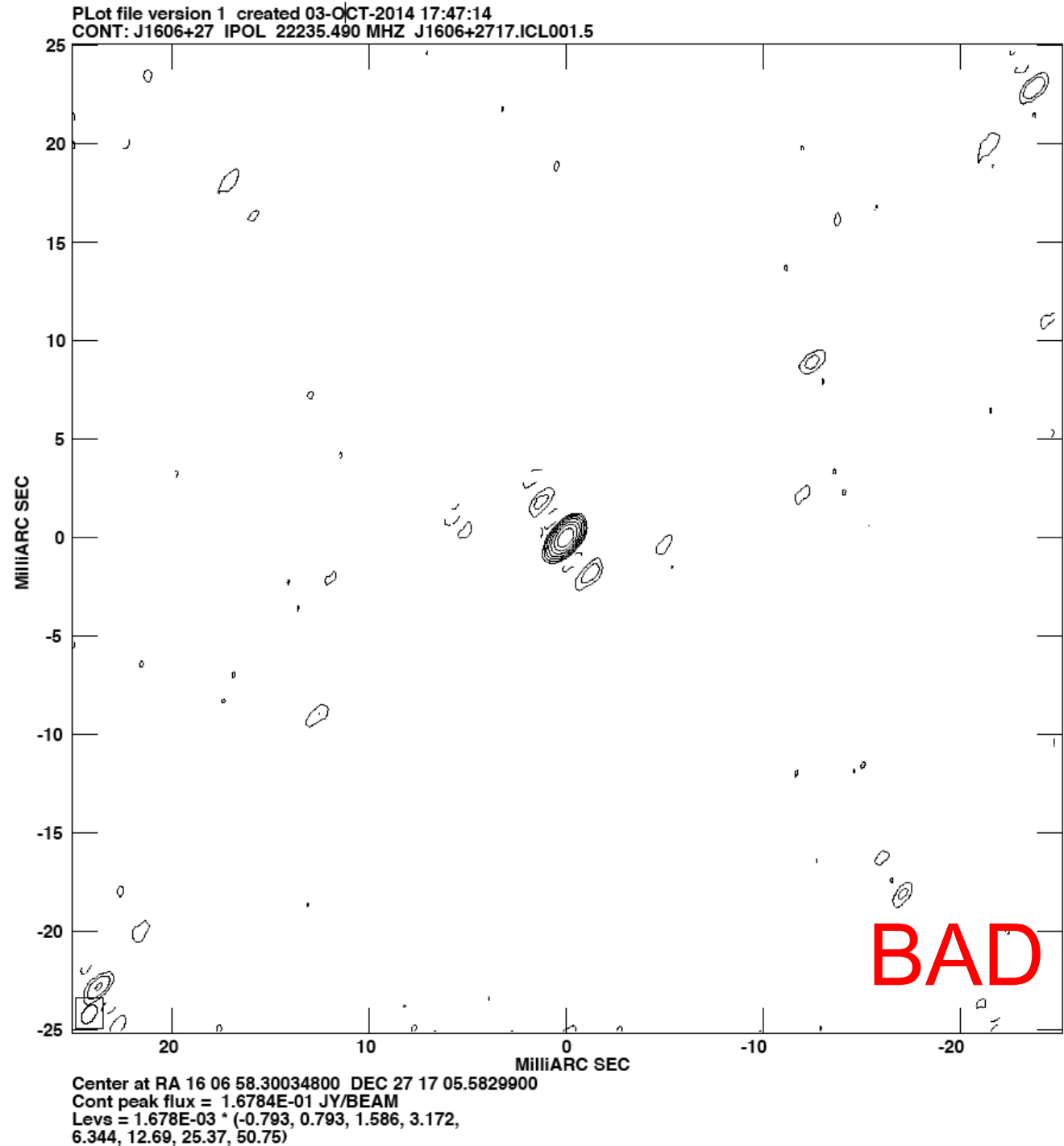
## Quality of Calibration

- K-band
- Full track of Ef Jb On  
Mc Nt Tr Ys Mh Sv Zc Bd  
Ur Sh
- Tsys measurements for  
ALL stations but Jb, Sv,  
Zc, and Bd
- rms ~1.3 mJy/beam



## Quality of Calibration

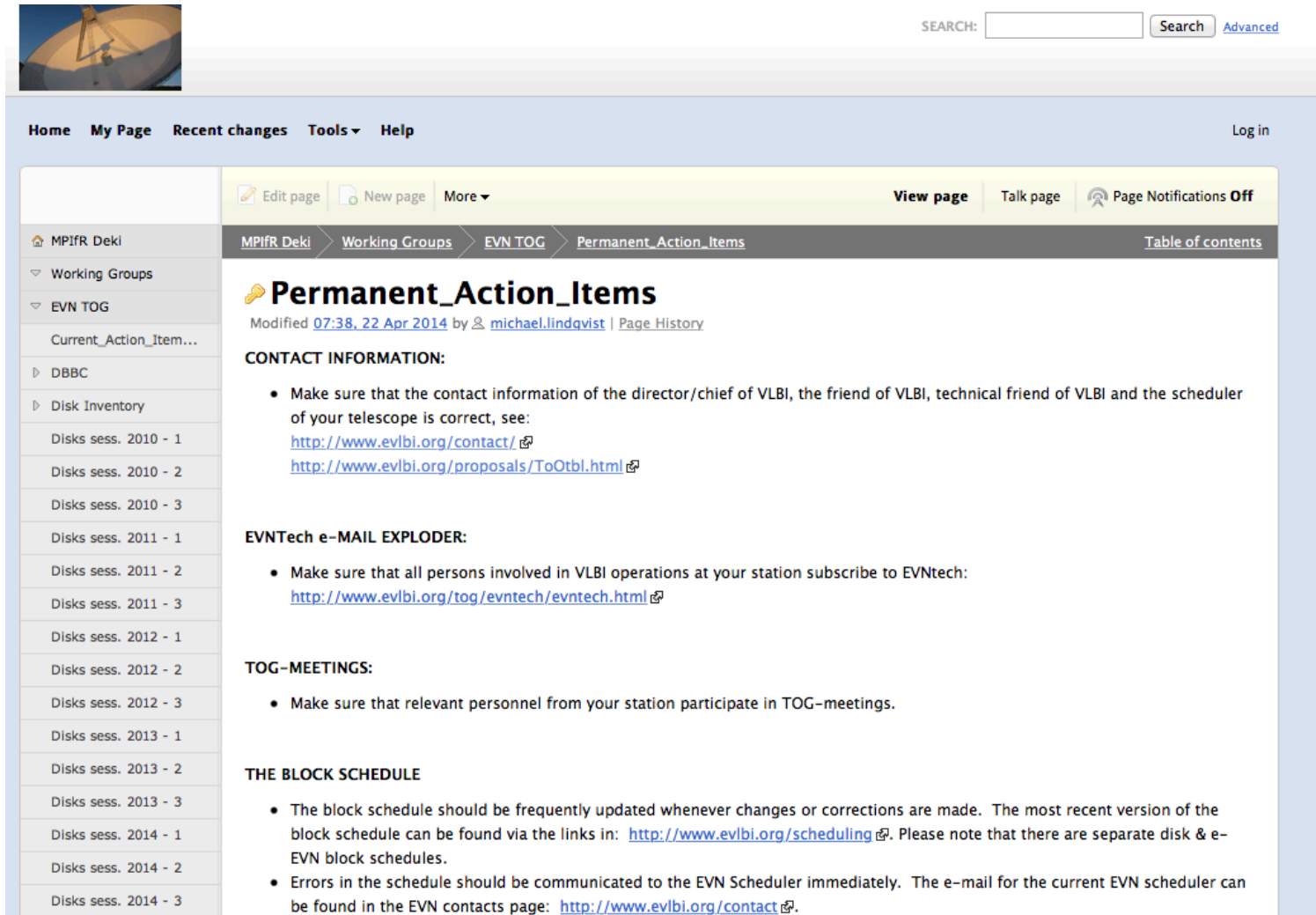
- K-band
- Full track of Ef Jb On  
Mc Nt Tr Ys Mh Sv Zc Bd  
Ur Sh
- Tsys measurements  
only for Ef & Ys
- rms ~1.3 mJy/beam
- Total flux density scale  
differs by ~ 20%
- Clear amplitude  
calibration errors appear  
as strong side-lobes
- May lead to non  
detections in weak  
sources



## Timely delivery of ANTAB-files

- Now described in the list of Permanent Action Items (now a merge of the Bologna Rules and the previous Permanent Action Items):

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Permanent\\_Action\\_Items](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Permanent_Action_Items)



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### Permanent\_Action\_Items

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**CONTACT INFORMATION:**

- Make sure that the contact information of the director/chief of VLBI, the friend of VLBI, technical friend of VLBI and the scheduler of your telescope is correct, see:  
<http://www.evbi.org/contact/>  
<http://www.evbi.org/proposals/ToOtbl.html>

**EVN Tech e-MAIL EXPLODER:**

- Make sure that all persons involved in VLBI operations at your station subscribe to EVNtech:  
<http://www.evbi.org/tog/evntech/evntech.html>

**TOG-MEETINGS:**

- Make sure that relevant personnel from your station participate in TOG-meetings.

**THE BLOCK SCHEDULE**

- The block schedule should be frequently updated whenever changes or corrections are made. The most recent version of the block schedule can be found via the links in: <http://www.evbi.org/scheduling>. Please note that there are separate disk & e-EVN block schedules.
- Errors in the schedule should be communicated to the EVN Scheduler immediately. The e-mail for the current EVN scheduler can be found in the EVN contacts page: <http://www.evbi.org/contact>.

## Timely delivery of ANTAB-files

- Now described in the list of Permanent Action Items (now a merge of the Bologna Rules and the previous Permanent Action Items):

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Permanent\\_Action\\_Items](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Permanent_Action_Items)

- In particular:
  - "Stations must aim to produce ANTABFS-, UVFLG- and RXG-files within 2 weeks after the end of a session."
  - "ANTABFS files for eVLBI experiments should be produced as soon as possible (< 24 hours after the experiment)"
- Timely delivery can significantly speed up correlation (if no delays on uploading log files), post review, and pipeline processes
- Make more disk packs be available in the upcoming session.
- Automatically uploading log files and gps data are very welcome

### Major updates since last TOG meeting:

- **Feb 19, 2014:** Update for e-VLBI stations using FS-9.11.5 version or later
- **Thanks Jonathan Quick!**
- Needed for stations doing e-VLBI with a Mark5B (or B+) recorder, regardless of whether they are using a DBBC or analogue (Mk5) terminal
- If you need an update, ask Jonathan or me.