Application of Pipeline Calibration

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What are we talking about?

- What to do after a Pipeline Results email
- Extra flagging, re-derive & apply calibration
- Rerun for known issues that cause problems
- Apply existing pipeline calibration to raw data
- Things to consider when running on your own

Extra flagging

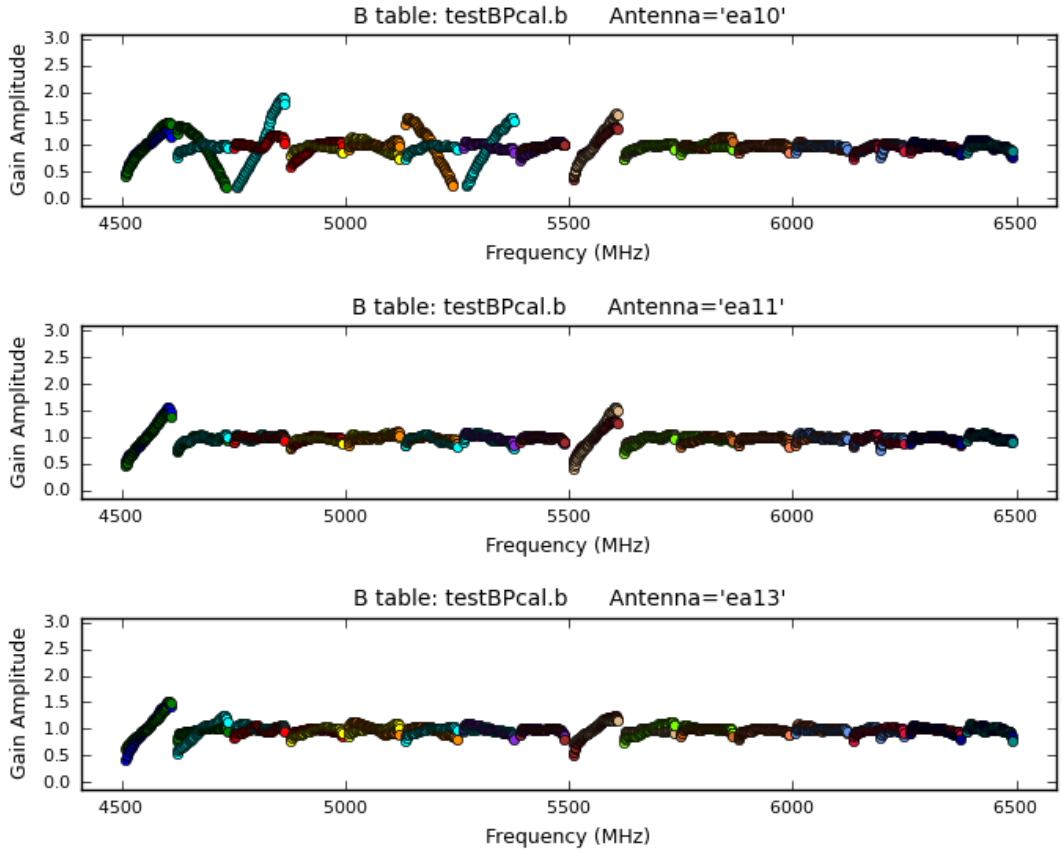
The pipeline may not flag everything needed …

Antenna hardware issues – RFI – may flag good data – ~~Alien signals*~~

*Theoretical only at this time

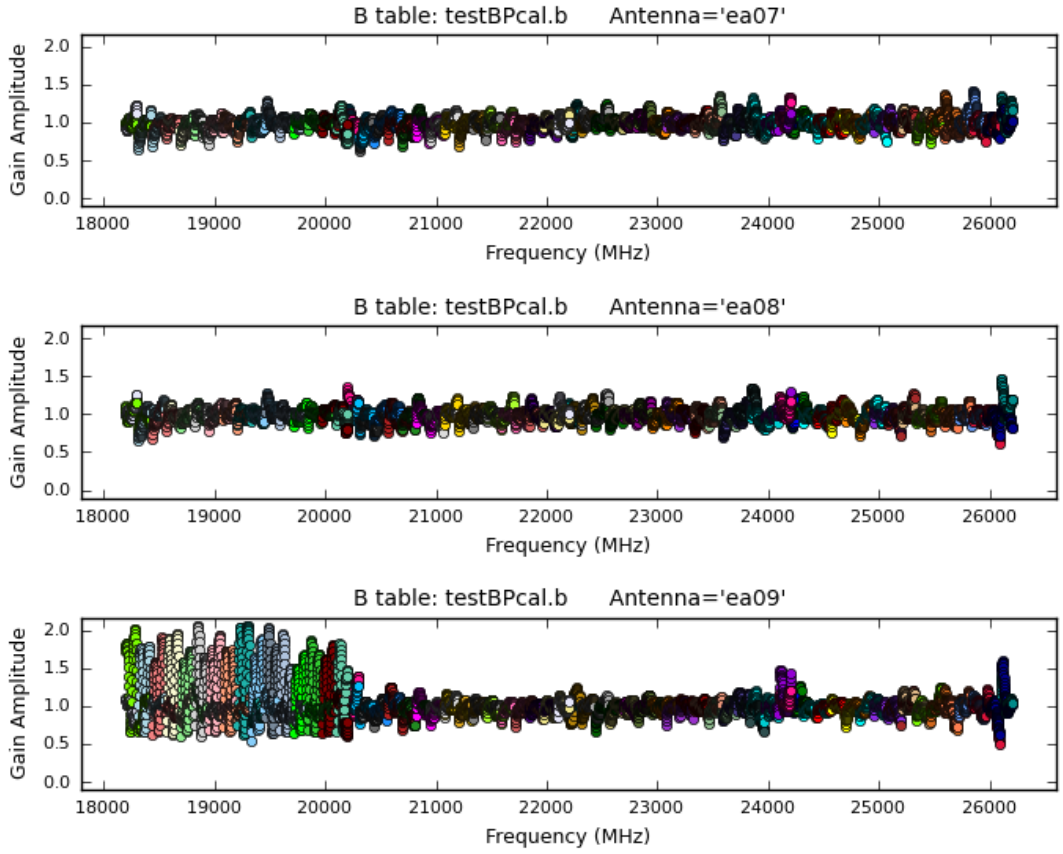
Additional flagging

ea10 bandpass, bad data (DTS issue); ea11, ea12 OK



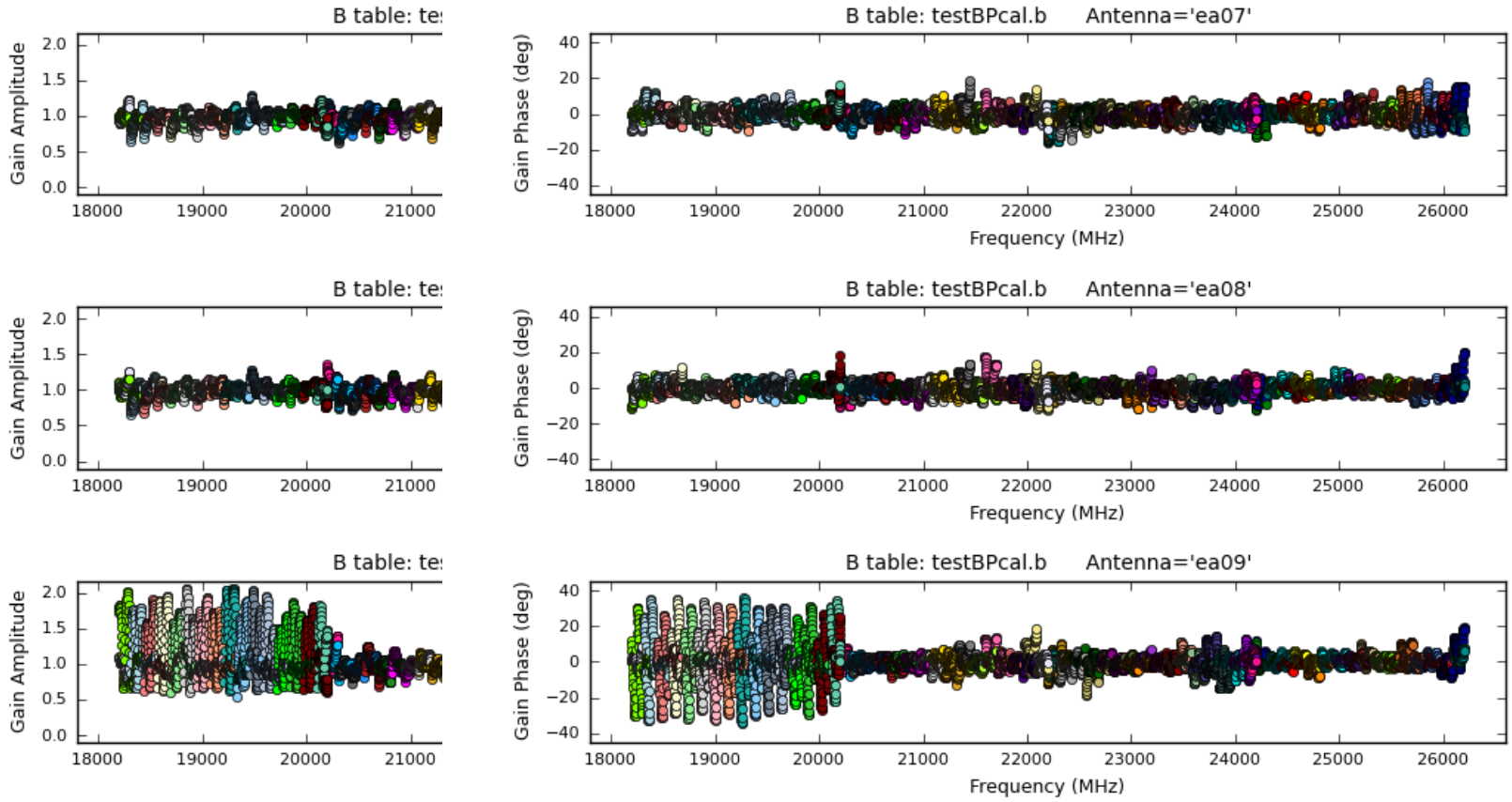
Additional flagging

ea09 bandpass, bad data (DTS issue); ea07, ea08 OK



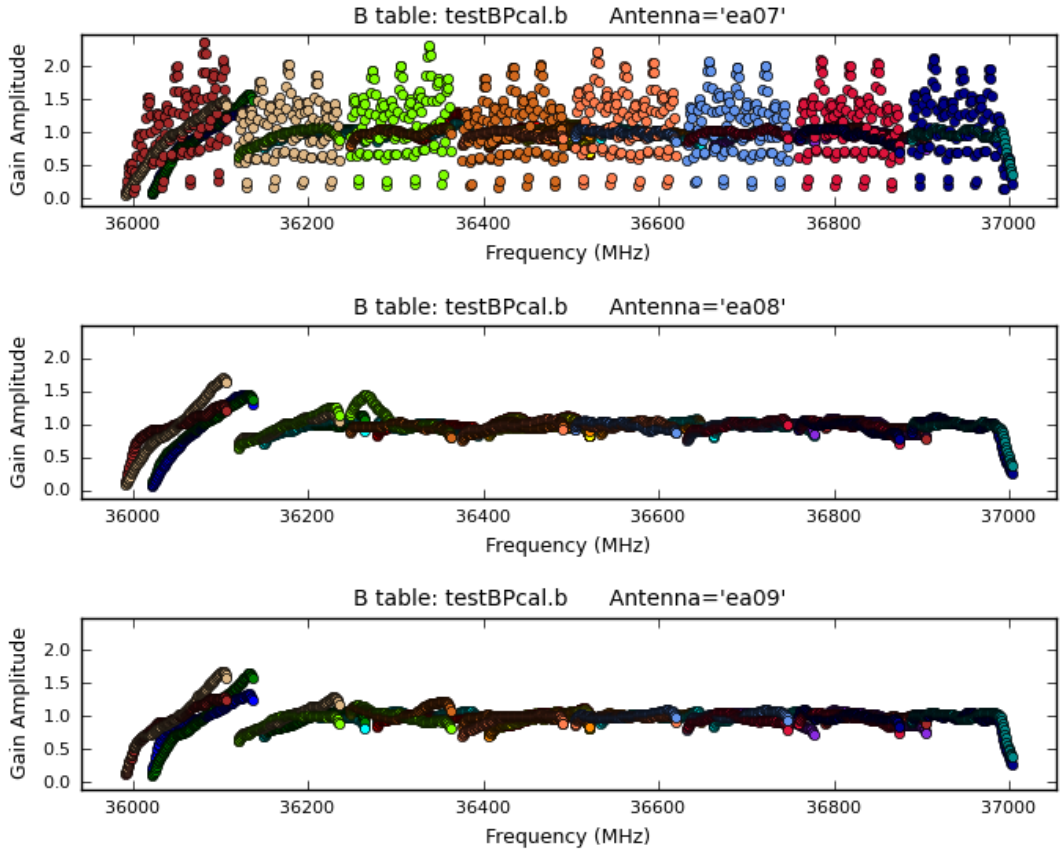
Additional flagging

ea09 bandpass **and** phase, bad data (DTS issue)



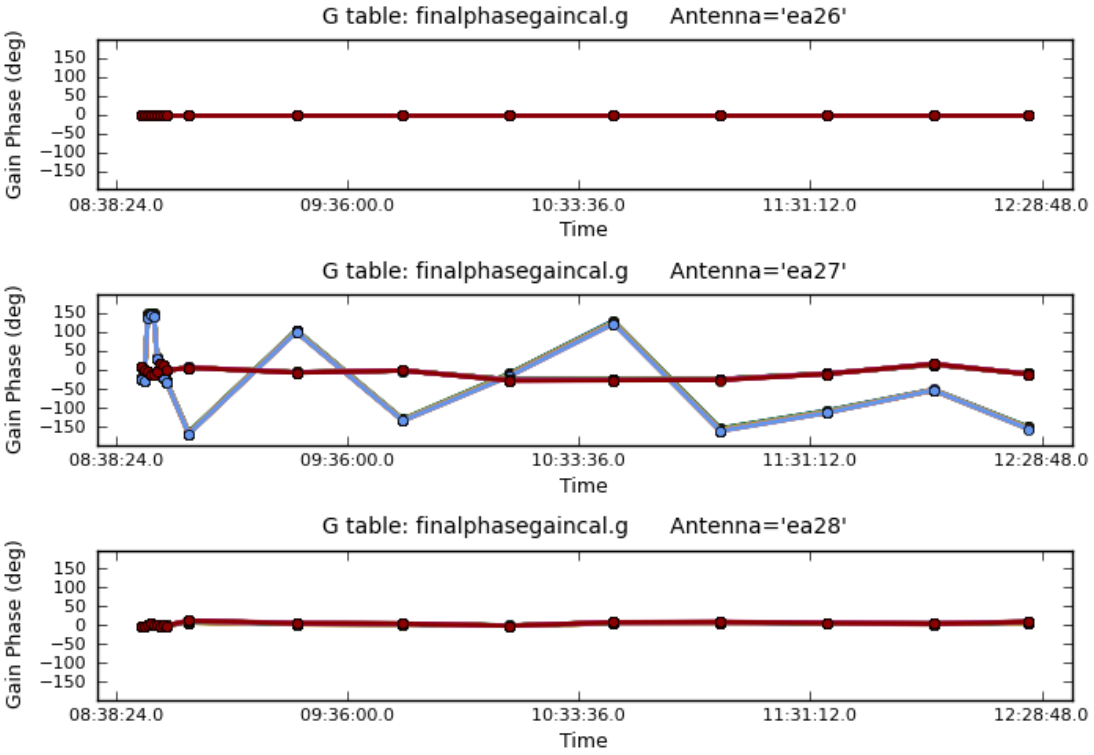
Additional flagging

ea07 bandpass, bad data (DTS issue); ea08, ea09 OK



Additional flagging

ea27 phase jumps for some spws; ea26, ea28 OK



Additional flagging

- Carefully check your data and the calibration from the pipeline.

- If extra flagging **ONLY** on your science target(s), no recalibration of your data required: use CASA as usual.

- IF any of your **calibrator sources** require additional flagging, you should re-derive the calibration with your additional flagging included.

- To recalibrate your data using the VLA Calibration Pipeline scripts, there are two good starting points:

1. Pipeline calibrated MS

2. Raw data (SDM-BDF)

Additional flagging

Starting from the pipeline calibrated MS

1. Inspect the calibrated MS and flag as needed in CASA.

2. Create a **new directory** and copy **ONLY** the calibrated and fully flagged MS to this new directory. **No** other files should be copied.

3. From your new directory with the MS, start CASA. You will clear the calibration using **clearcal** with addmodel=False. *See the pipeline web page (special topics), for more details.

4. Next, run the **clearstat** task in CASA.

5. Start the pipeline via the pipeline scripts. **BE SURE** to set Hanning smoothing to 'n' (NO) when prompted so Hanning smoothing is **not** applied again if the data have already been Hanning smoothed.

Rerun for known issues

The pipeline may choose the worst possible option …

- Problems during the flux or delay calibration scan(s)
- Bad reference antenna
- Setup issues

Rerun for known issues

1. From the SMD-BDF, create a MS and apply online flags. You may request the online-flags-applied MS from the NRAO archive.

2. Carefully inspect your data to determine what additional flagging is required

3. Using the **flagdata** task in CASA, you will create a text file (e.g. additional_flags.txt) for all additional flags needed (no need to apply these flags now!) We recommend:

   flagdata(action='none',mode='manual',savepars=True,outfile='additional_flags.txt', antenna='ea##,ea##', scan='scan#,scan#')

4. Rerun the above until all additional flags have been added. Through this approach, all the flags will be accumulated in a single text file that may be applied on the data through one application once all extra flags have been recorded.

Rerun for known issues

5. Make a copy of the file "EVLA_pipeline.py" and rename it.

6. Edit your renamed copy of EVLA_pipeline.py to include an extra step of the CASA task **flagcmd** just after 'flagall.py' is called.

   flagcmd(inpmode='list', inpfile='additional_flags.txt', action='apply', flagbackup=True)

   Please take care to **notice indentation** amounts and to set your CASA flagcmd command to the same indentation as the other "execfile()" commands.

7. In a new directory with the SDM-BDF, start the pipeline by calling your edited version of EVLA_pipeline.py

   execfile('/path/on/computer/EVLE_pipeline_edit.py')

8. Wait … wait longer … come back the next day.

Apply to Raw Data

May only have pipeline calibration & flag tables, no MS

- Calibrated MS held by NRAO for only 15 days
  Calibration tables, flag tables, weblog archived!

- Local storage limitations
  Reduced storage needs if only keeping the tables.

Apply to Raw Data

If you are running these scripts on an NRAO computer, skip this slide!

1. Download the scripts.
2. Open "EVLA_pipeline.py" to change a variable named "pipepath" to point to the location of your local set of scripts.
3. Open "EVLA_pipe_restore.py" and find the line

   execfile(pipepath+'ELVA_pipe_startup.py')

4. Above this line, add in the pipepath definition pointing to your copy of the scripts as in step No. 2.

Apply to Raw Data

1. Create a directory where you will run CASA, and copy the SDM-BDF and the pipeline calibration & flag tables, and the restore file. Your directory should have:

   SDM
   caltables.tgz
   flagtables.tgz
   pipeline_shelf.restore

2. Start CASA, and run the "EVLA_pipe_restore.py" script you downloaded with the other pipeline scripts: this will look for the pipeline_shelf.restore file and set needed environment variables.

   execfile('/path/to/scripts/EVLA_pipe_restore.py')

3. Run “EVLA_pipe_import.py” to create a MS.

   execfile('/path/to/scripts/EVLA_pipe_import.py')

Apply to Raw Data

4. The pipeline Hanning smoothes the data by default: applying calibration obtained from the pipeline to non-Hanning smoothed data is incorrect! If your MS is **NOT** Hanning smoothed yet, set the following pipeline variable by typing the following at the CASA prompt:

   myHanning = 'y'

5. Run the Hanning smoothing script from the pipeline script set:

   execfile('/path/to/scripts/EVLA_pipe_hanning.py')

6. When this finishes, use a new terminal session and navigate to the directory where you are working.

   If a MS-name.ms.flagversions directory has been created, remove it: you will use the pipeline's flagversion file instead.

Apply to Raw Data

7. Untar the flagtables.tgz file. This should produce a directory with the same name as the MS, but with an extra ".flagversions" at the end, such as: SB-name.ms.flagversions. ***If it does not***, you will need to create a directory, MS-name.ms.flagversions, such that MS-name matches the full name of your MS, and put the contents of flagtables.tgz in this new directory.

8. Untar the caltables.tgz file. This should produce a "final_caltables" directory. Move the contents out of this directory so the .g, .b, and .k calibration tables are in the same directory as the .ms and .ms.flagversions directories.

9. Go back to the terminal session where CASA is running.

10. Restore flags prior to the point where the pipeline applied the final calibration tables by running:

    flagmanager(vis=ms_active,mode='restore',versionname='before_applycal_1')

Apply to Raw Data

11. Apply the final pipeline calibration by running:

    execfile('/path/to/scripts/EVLA_pipe_applycals.py')

12. If desired, run RFLAG on the target. Plots produced during these steps should look the same (or at least very close to) the plots in the weblog.

    execfile('/path/to/scripts/EVLA_pipe_targetflag.py')

13. Run statwt:

    execfile('/path/to/scripts/EVLA_pipe_statwt.py')

Considerations

Scan intents correct?

Hanning Smoothing?

Computing time

Disk space – 2-3X raw size!

NRAO cluster available

PL version difference.

CASA version difference.

Questions?

- VLA CASA Calibration Pipeline information at:

https://science.nrao.edu/facilities/vla/data-processing/pipeline

- Have Questions?
- Need Help?

- Use the **NRAO HelpDesk**: **https://help.nrao.edu/**

- Submit your ticket under the **Pipeline Department.**

- Please include specific details when submitting HelpDesk tickets.