GREEN BANK NORTH CELESTIAL CAP SURVEY (GBNCC) REFERENCE
A Step-by-Step Reference for Remote Observing Using a Mac

I.   HOW TO START A VNC SERVER:

1. Open a terminal on the local computer and type:
    ```
    ssh [USERNAME]@stargate.gb.nrao.edu
    ssh titania
    vncserver -geometry 3600x1400
    ```
    Note the vnc server number, 'n', its located in the output `titania:n` after you enter the command. Also, the geometry 3600x1400 is for a larger screen; you may also use the command `vnc server` and this will use the default dimensions.

2. Open a new terminal on the local computer and type:
    ```
    ssh -N -C -L 590n:titania.gbt.nrao.edu:590n [USERNAME]@stargate.gb.nrao.edu
    ```
    For 'n' enter the vnc server number. After this command no output message will appear in the terminal.

3. Open Chicken of the VNC and enter the following parameters:
    Host: localhost
    Display: n
    Password: [VNC PASSWORD]
    Check allow other clients
    The vnc password typed here in Chicken of the VNC is made up by the vnc server creator at this point.

4. Press [Connect].

II.   HOW TO VIEW A VNC SERVER:

1. Open a terminal on the local computer and type:
    ```
    ssh -N -C -L590n:titania.gbt.nrao.edu:590n [USERNAME]@stargate.gb.nrao.edu
    ```
    For 'n' enter the vnc server number. After this command no output message will appear in the terminal.

2. Open Chicken of the VNC and enter the following parameters:
    Host: localhost
    Display: n
    Password: [VNC PASSWORD]
    Check allow other clients

3. Press [Connect].

III.   HOW TO BEGIN AN OBSERVATION SESSION:

1. In the vnc viewer, open a new terminal (herein referenced as the 'titania terminal') and type:
   ```
   cleo
   ```

2. Click [Cleo]->[Utilities and Tools]->[Talk and Draw].

3. Greet the operator in Talk and Draw; also, let them know you are doing the GBNCC observation with the 350MHz receiver.
   They will need to switch the boom probably, which could take up to 10 minutes.

4. Open a new vnc viewer terminal (herein referenced as the 'beef terminal'). Check if there was an observation earlier in the day, to do this type in the beef terminal:
   ```
   ssh -X beef
   source /opt/64bit/guppi/guppi_daq/guppi.bash
   cd /users/sransom/GBNCC/
   ls
   ```
   Check the directory for an observed file in the form YYYYMMDD.observed with today's date. Here YYYYMMDD refers to year, month and day.

5. Make a catalog for today's observation, to do this type in the beef terminal:
   ```
   python make_catalog.py [LST] [LENGTH] > catalogs/GBNCC_YYYYMMDD.cat
   ```
   LST, [LST] and length of observation, [LENGTH], should be given in decimal hours. If there was an observation earlier in the day then change your YYYYMMDD to YYYYMMDDb or the next letter so it does not conflict with the earlier observation.

6. Check the data disk space, to do this type in the beef terminal:
   ```
   df -h
   ```
   Scroll up to find the amount of data on both data1 and data2; use the data disk with the least space. 12 hours of observation is approximately 2Tb.

7. Open Astrid; to do this type in the titania terminal:
   ```
   astrid
   ```

8. Once Astrid loads, it will ask wither you want control of the telescope, check *work offline*.

9. In Astrid, in the Observation Management tab, in the Edit tab, in the A_ scheduling block change:
   do_calibration=False
   test_scan_time=185
   pause_for_adc_hist=True
   guppi.datadisk=datan
   Here 'datan' refers to the data disk you chose.

10. Find a suitable test pulsar from the list inside the A_ scheduling block and uncomment it.
    It can be uncommented by removing the '#' symbol in front of the 'test_psr=[TEST PULSAR]' line only; make sure this test pulsar is the only uncommented test pulsar in the scheduling block.

11. Hit [Save to Database].

12. In the B_ scheduling block change:
    datadisk=datan
    Here 'datan' refers to the data disk you chose.

13. Hit [Save to Database].

14. In the C_ scheduling block change:
    Catalog filename to your YYYYMMDD
    run_number=0
    The run number is 0, if you are starting a new observation; if you are continuing in the middle of another, find which run number the observation stopped.

15. Hit [Save to Database].

16. Edit the Run tab, in Astrid within Observation Management, for the following:
    Project name
    Observer
    Operator

17. Stop! Wait for the operator to tell you to proceed.

18. Once the operator says it's ok, gain control in Astrid by [File]->[Real Time Mode] and check *work online with control of the telescope*. It will ask if you would like to increase the session increment, click [Yes].

19. In the Run tab, in Astrid within Observation Management, submit the A_ scheduling block. Wait for it to finish, the telescope will need to slew and observe the test pulsar. A window will appear in Astrid for the guppi_adc_hist, do not click anything in this window.

20. In the beef terminal type:
    `guppi_adc_hist`
    The two Gaussian curves should overlap. In the terminal hold crtl+c to close guppi_adc_hist.

21. Click [Yes] in the prompt window for Astrid, if the histogram looks good.

22. In the Run tab submit the B_ scheduling block and C_ scheduling block, one after the other.
    These will begin the observation for the catalog created for today's observation.

23. In the beef terminal type:
    `cd /datan/[USERNAME]/AGBT09C_057/YYYYMMDD/`
    `ls -l`
    Check the directory for the test pulsar's file in the form of a .fits extension, the filename begins with 'guppi.'

24. To fold the test pulsar data type:
    `fold_psrfits -t 5 -P ~sransom/parfiles/[TEST PULSAR].par [guppi FILENAME EDITED]`
    [TEST PULSAR] is the name of your test pulsar. [guppi FILENAME EDITED] is the file name found from the directory that was checked right beforehand, however, do not enter the last four digits or the file extension '.fits' in the command.

25. Check the test pulsar with the following commands in the beef terminal:
    `pav -DFT [GUPPI FILENAME]`
    `pav -YFpd [GUPPI FILENAME]`
    `pav -GTpd [GUPPI FILENAME]`
    `pav -f 128 [GUPPI FILENAME]`
    The filename here is taken from the output of folding the test pulsar data in the beef terminal; include the entire filename, it begins with 'GUPPI' in all caps.

26. To view the observation log in the beef terminal type:
```
tail -f /tmp/guppi_daq_server.log
```

27. Open a new terminal (herein referenced as the 'guppi_status terminal'). In the guppi_status terminal type:
```
ssh beef
source /opt/64bit/guppi/guppi_daq/guppi.bash
guppi_status
```

IV. HOW TO END AN OBSERVATION SESSION:

1. At the end of the session after the last observation but before another begins, click [Stop] and then [Abort]. Try to make the last observation as close to the observation session end time as possible but do not go over the allotted time. If it begins another observation before you abort, this partial observation will need to be deleted.

2. Tell the operator that you are done.

3. In Astrid click the Observation Management tab, then go offline via [File]->[Real Time Mode] and check *work offline*.

4. In the beef terminal hold ctrl+c to end the observation log.

5. In the beef terminal type:
```
cd datan/[USERNAME]/AGBT09C_057/YYYYMMDD/
ls
/bin/ls -altr *GBNCC*fits > /users/sransom/GBNCC/YYYYMMDD.observed
```
This generates an .observed file in the directory users/sransom/GBNCC/ for today's observation.

6. Check that the .observed file was successfully created, to do this type in the beef terminal:
```
cd /users/sransom/GBNCC/
ls
```

7. Log into nadrach, then check the disk space for raid1; to do this type:
```
ssh nadrach
df -H
```

8. To create a directory and transfer the data from beef to nadrach type:
```
cd /export/raid1/survey/AGBT09C_057/
mkdir YYYYMMDD
chmod 1777 YYYYMMDD
cd YYYYMMDD/
rsync --bwlimit=80000 -axvP beef_10::datan/[USERNAME]/AGBT09C_057/YYYYMMDD/\* .
```
Do the transfer when guppi is not being used, if it is then instead use the following rsync command:
```
nice -n 19 rsync -bwlimit=80000 -axvP beef_10::datan/[USERNAME]/AGBT09C_057/YYYYMMDD/\* .
```
(there is a space and period at the end of the command). If there is a partial observation that needs to be excluded then add `--exclude=[FILENAME]` to the command; the filename should have a '.fits' file extension in the directory datan/[USERNAME]/AGBT09C_057/YYYYMMDD/.

9. When the transfer has completed (this may take several hours), exit terminals by typing:
```
exit
```

10. Kill the vncserver using the titania terminal by typing:
```
vncserver -kill :n
```
Here 'n' refers to your vnc server number.

V.   HOW TO CHECK FILE SIZES WHILE OBSERVING:

1. Open a new terminal (herein referenced as the 'shell terminal'); type:
   ```
   ssh beef
   source /opt/64bit/guppi/guppi_daq/guppi.bash
   cd datan/[USERNAME]/AGBT09C_057/YYYYMMDD/
   ls -ltrh
   ```
   The file sizes should be about 5.7Gb.

VI.   HOW TO CHECK GUPPI_MONITOR WHILE OBSERVING:

1. Open a new terminal (herein referenced as the 'shell terminal'); type:
   ```
   ssh beef
   source /opt/64bit/guppi/guppi_daq/guppi.bash
   guppi_monitor
   ```
   Close the bandpass window after observing it for awhile, it should not be run long.

VII.   HOW TO DETERMINE A TEST PULSAR:

- Check the LST in the A_ scheduling block and use a 4 hour window from the LST as a general rule of thumb; the current LST can be checked in Astrid in the GBTStatus tab.

1. To use Skyview click [Cleo]->[Utilities and Tools]->[Scheduler and Skyview].
2. Click [Catalog].
3. In new window click [Add User Catalog] and add the following catalogs:
   /users/sransom/GBNCC/catalogs/GBNCC_YYYYMMDD.cat
   /users/sransom/scott.cat
4. Hit [Apply].
5. Hit [Real Time Mode].

VIII.   HOW TO GET THE RUN NUMBER:

1. Open a new terminal (herein referenced as the 'shell terminal'); type:
   ```
   ssh beef
   source /opt/64bit/guppi/guppi_daq/guppi.bash
   cd datan/[USERNAME]/AGBT09C_057/YYYYMMDD/
   ls -ltrh
   ```
   Look for the filename of the last pointing in the form `guppi_XXXXX_GBNCCXXXXX_nnnn_0001.fits` and use 'nnnn' as the run number.

IX.   HOW TO DELETE A PARTIAL OBSERVING:

1. Open a text editor for the .observed file; in the beef terminal type:
   ```
   cd /users/sransom/GBNCC/
   jed [FILENAME]
   ```
   The filename should be the YYYYMMDD.observed file, located in the /users/sransom/GBNCC/ directory.
2. Locate the partial observing in the text editor and delete it. Save and exit.
   To get to the menu in jed, press the escape key and then the F10 key.

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