

Data Reduction



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Reduction Software Documentation

GBTIDL:

- User's Guide: http://www.gb.nrao.edu/GBT/DA/gbtidl/users_guide/
- Quick Reference:
http://www.gb.nrao.edu/GBT/DA/gbtidl/QRG_release.pdf
- Calibration documentation:
http://www.gb.nrao.edu/GBT/DA/gbtidl/gbtidl_calibration.pdf
- Reference Manuals:
 - User: <http://www.gb.nrao.edu/GBT/DA/gbtidl/release/user/>
 - Contrib: <http://www.gb.nrao.edu/GBT/DA/gbtidl/release/contrib>

sdfits:

<https://safe.nrao.edu/wiki/bin/view/Main/SdfitsDetails>

gbtpipeline:

<https://safe.nrao.edu/wiki/bin/view/GB/Gbtpipeline/PipelineRelease>

gbtgridder: (gbtgridder -h)

GBO Data Directories

- Home area: `/users/user_name`
- Scratch data area: `/home/scratch/user_name`
- Raw gbtdata by project (e.g.,
AGBT16B_037_04):
`/home/gbtdata/AGBT16B_037_04`
- Raw Vegas data by project:
`/lustre/gbtdata/AGBT16B_037_04/VEGAS`
- sdfits data by project:
`/home/sdfits/AGBT16B_037/04`

Public Data Processing Machines with lustre access:

- newton, planck, fourier (192GB ram)
- euclid, thales (16GB ram)
- arcturus (132GB ram) {pipeline machine}

- Extra disk space:
/lustre/pipeline/scratch/user_name

gbtidl (=unipops [12m and 140ft reduction package] converted to IDL)

- Data access (connecting to sdfits file)
 - gbtidl> online
 - gbtidl> offline,'AGBT16B_037_04'
 - gbtidl> filein,'mysdfitsfile.fits'
 - gbtidl> summary

- User "pro" directory used by gbtidl:
/users/user_name/gbtidlpro

Standard Reduction scripts

☐ Ta=Tsys(ON-OFF/OFF):

- getps,scan# (position switch)
- getfs,scan# (frequency switch)
- getnod,scan# (nod data)
- getsigref,scan_sig,scan_ref

☐ Raw passband

- gettp,scan# (total power for scan)
- gettp,scan,ifnum=ifnum,plnum=plnum,fdnum=fdnum,sig_state=sig_state,subref=subref,wcalpos=wcalpos
- getrec,rec# (get an individual record, see list)

Demo PS data

- Offline,'AGBT16B_037_04'
- getps,6
- getsigref,8,9
- dotri,8,66 (example)

Example script: “dotri.pro”

```
pro dotri,sc1,sc2
;;16A054 HI project
;;does ON-OFF-ON reduction for scans sc1-->sc2
;;Session 1: sc1=16, sc2=39
sclear
for ii=sc1,sc2,3 do begin
  print,'combining ON-OFF',ii,ii+1
  getsigref,ii,ii+1,plnum=0
  accum
  getsigref,ii,ii+1,plnum=1
  accum
  print,'combining ON-OFF',ii+2,ii+1
  getsigref,ii+2,ii+1,plnum=0
  accum
  getsigref,ii+2,ii+1,plnum=1
  accum
endfor
ave
copy,0,10
return
end
```


KFPA Nod vs SubBeamNod

- TGBT15A_901_30
- getnod,15
- snod,14
- getatmos,el=el,freq=freq,mjd=mjd

Saving data and Mapping

- fileout,'mysave.fits'
- Reduce data like you want then type: keep
- See example script [argus_caltap.pro](#)
- After calibration within gbtidl can run gbtgridder (eg.):

```
gbtgridder -c 11000:11251 -a 7 --noline -  
nocont -o myout mysave.fits
```

```
➔ myout_cube.fits myout_weight.fits
```

Running the Pipeline

- Works for receivers with noise diodes (designed for KFPA):
- `%gbtpipeline -i my.sdfits.raw.vegas -m 14:24 -refscan 13,26`

(where 14-24 are the map scans and 13 and 26 are the reference scans)

➔ will calibrate and do the gridding (defaults setup for KFPA)

Reducing DCR Data (outside of gbtidl), e.g., W-band

- `sdfits -backends=dcr TRCO_20160927 -scans=1`
- `IDL>ftab_ext,INdcr,[7,13,15,19,59,60],data,ra,dec,scan,plnum,fdnum,exten_no=1`
- {calibrate data based on plnum and fdnum:
`data1=gain*data`}
- `IDL> hpfilt,data1,100,10,ndata`
- `IDL>mymap=griddata(ra,dec,ndata,dimension=[60,60])`
- `IDL>smmap=filter_image(mymap,FWHM_gaussian=3)`
- `IDL> atv,smmap`