

## UNIT 4. Automatic batch processing with sh\_gamit

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Ref. GAMIT manual Ch 10.1, 10.2 and 10.3

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### 1. OVERVIEW

Once you understand the file structure and analysis tools of GAMIT, you can save time in processing significant quantities of data by using the automatic batch processing script sh\_gamit.

sh\_gamit takes you from RINEX data over a range of days to a complete solution. For example, the complete data set for the 2001 USGS survey was processed using a single line

```
sh_gamit -d 2001 008 009 010 011 012 016 017 018 025 038 039 086 087
        -expt nbay -orbit IGSF > sh_gamit.log
```

The only preparation required is setting up the control files and, most of which are common to all analysis of a particular survey, and assembling the data that are not available on public FTP sites in one or more directories in your system. For example, while RINEX files for the IGS or BARD continuous stations may be downloaded from the SOPAC ftp site, the RINEX files for your GPS survey should be available on a local directory.

Sh\_gamit will

- sets up a directory structure for GAMIT
- gets tables and data from various archives around the world
- converts raw to RINEX if necessary
- runs GAMIT and saves phase sky-plots to check daily quality

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**FIRST STEP** - Create an experiment directory, then copy the /templates directory from the GAMIT/GLOBK source directory.  
(Or copy the /templates directory from [/data/gps8/wrkshp/unit4.dir](#)).

/expt			
/expt/templates			

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**SECOND STEP** - You will need to edit (or update) one or more of the following files in the /templates directory to tailor the processing to the configuration of your computer system, GPS network and the type of analysis you are running:

**process.defaults:** Edit to specify your computation environment, source for internal and external data and orbit files, start time and sampling interval, and instructions for archiving the results

**sites.defaults:** Edit to specify which sites to ftp from RINEX data archives, to search for rinex files on your local system, and to exclude from automatic station.info updating.

**station.info:** Make sure that the file is current for all continuous stations (latest **station.info.db** file available from SOPAC). Include in the file the information for your local network. Use the **xstnfo** option in **sites.defaults** to exclude the automatic update of the site entry.

You can use:

- **sh\_get\_stinfo** to get latest station.info from the SOPAC archive
- **sh\_upd\_stinfo** to update station.info using header information from RINEX file. NOTE: use with caution because it is not consistent with RINEX standard header

**lfile.:** Make sure that the **lfile.** is update and with accurate initial coordinates. You may think about running a preliminary solution to improve the initial coordinates for your local network.

**sestbl.:** Edit the **AUTCLN postfit** command to suit your processing strategy

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## 2. TEMPLATES FILES

### Process.defaults

# Do not remove any of these entries. To by-pass a function, set the value to # null:  
""

Note: **sh\_gamit** creates all the working directories defined below

Note: see **STEP 4** for definition of \$procdir using the **-dir** option in **sh\_gamit**

```
## LOCAL DIRECTORIES
# Directory for translation of raw data
set rawpth = "$procdir/raw"
# Directory path for raw archives (search all levels); e.g. /data18/simon
set rawfnd = ""
# Input files for RINEX translators
set mpth = "$procdir/mkrinex"
# RINEX files directory
set rpth = "$procdir/rinex"
```

Note: **sh\_gamit** use **teqc** to transform raw GPS data files into RINEX files. The procedure is complex, and is safer to running it independently from the automatic processing.

```
# Directory path for RINEX archives (search all levels); e.g. /data18/simon
set rnxfnd = ""
```

Note: the path to the local archive can be include here: /data/sam/gps

```
# Broadcast orbit directory
set bpth = "$procdir/brdc"
# IGS files directory
set ipth = "$procdir/igs"
# G-files directory
set gpth = "$procdir/gfiles"
# GAMIT and GLOBK tables directory
set tpth = "$procdir/tables"
```

```

# Output gifs directory
set gifpth = "$procdir/gifs"
# Globk solution directory (needed but not yet used)
set glbpth = "$procdir/gsoln"
# Globk binary h-file directory (needed but not yet used)
set glfpth = "$procdir/glbf"
# Template files
set templatepth = "$procdir/templates"
# Place to store temporary control files
set cpth = "$procdir/control"
# Archive root directory (cannot be null)
set archivepth = "$procdir/archive"

## FTP INFO FOR REMOTE FILES
# Raw data archive
# set rawarchive = 'chandler.mit.edu'
# set rawdir = 'pub/continuous/mitnet'
# set rawlogin = "anonymous simon@chandler.mit.edu"
# Addresses for CDDSI, SOPAC, IGSCB, and USNO are given in /com/ftp_addresses
Note: actually controlled by sh_get_ftp_info

##GAMIT
# Set sampling interval, number of epochs, and start time for processing
set sint = '30'
set nepc = '2880'
set stime = '0 0'
# Variables for updating station.info tables (see sh_upd_stnfo)
set stinf_unique = "-u"
set stinf_nosort = "-nosort"
set stinf_slthgt = "2.00"
# Set "Y" to use RINEX header coordinates not in lfile or apr file
set use_rxc = "N"
# Broadcast orbits
set brdc = 'brdc'
# Minimum x-file size to be processed (Def. 300 blocks; most OS use 1 Kb blocks)
set minxf = '300'
# Set search window for RINEX files which might contain data for day
set rx_doy_plus = 0
set rx_doy_minus = 0
# Default globk .apr file (actually controlled by the globk_xxxx.cmd command files)
set aprf = itr97.apr

## RESOURCES
# Minimum raw disk space in Kbytes
set minraw = '30000'
# Minimum rinex disk space in Kbytes
set minrinex = '30000'
# Minimum archive disk space in Kbytes
set minarchive = '20000'
# Minimum working disk space in Kbytes
set minwork = '200000'

## SYSTEM-DEPENDENT SETTINGS
# UNIX df command must be set to return the correct form
set udf = 'df -k'
# UNIX mail command
# Most machines

```

```

set umail = 'mail -s'
# HP
# set umail = 'mailx -s'
# Mail address for the processing report
set mailto = 'battag'
# Host name for email and anonymous ftp password use
set machine = 'seismo.berkeley.edu'
# Ghostscript path
set gspath = '/usr/bin'
# ImageMagick path fir gif conversion
#set impath = '/usr/bin/X11'
set impath = '/usr/local/src/imagick/ImageMagick-4.0.7'
## Web interface .html file.
set htmlinfo = 'bardnet.html'

```

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sites.defaults

```

# File to control the use of stations in the processing
#
# Format: site expt keyword1 keyword2 ....
#
# where the first token is the 4- or 8-character site name (GAMIT uses only
# 4 characters, GLOBK allows only 4 unless there are earthquakes or renames),
# the second token is the 4-character experiment name, and the remaining
# tokens, read free-format, indicate how the site is to be used in the processing.
# All sites for which there are RINEX files in the local directory will be used
# automatically and do not need to be listed.
#
# GAMIT:
# ftprnx = sites to ftp from rinex data archives.
# ftpraw = sites to ftp from raw data archives.
# localrx = sites names used to search for rinex files on your local system.
#           (Used in conjunction with rnxwnd path variable set in process.defaults).
# xstinfo = sites to exclude from automatic station.info updating.
# GLOBK:
# glrepu = sites used in the GLRED repeatability solution
# glreps = sites used for reference frame definition (stabilization) in
#           GLORG for the GLRED repeatability solution
# glts   = sites to plot as time series from GLRED repeatability solution
# mate_gps tubi ftprnx xstinfo glrepu glreps
1395    nbay localrx xstinfo
adoo    nbay localrx xstinfo
airr    nbay localrx xstinfo
caml    nbay localrx xstinfo
cord    nbay localrx xstinfo
deal    nbay localrx xstinfo
game    nbay localrx xstinfo
gorr    nbay localrx xstinfo
hagg    nbay localrx xstinfo
henn    nbay localrx xstinfo
madi    nbay localrx xstinfo
nicc    nbay localrx xstinfo
prh2    nbay localrx xstinfo
prh3    nbay localrx xstinfo
prnc    nbay localrx xstinfo
vac3    nbay localrx xstinfo
vaca    nbay localrx xstinfo

```

```

vacx      nbay localrx xstinfo
brib      nbay localrx xstinfo
chab      nbay localrx xstinfo
diab      nbay localrx xstinfo
farb      nbay localrx xstinfo
ptrb      nbay localrx xstinfo
tibb      nbay localrx xstinfo
wint      nbay localrx xstinfo
algo      nbay localrx xstinfo
drao      nbay localrx xstinfo
fair      nbay localrx xstinfo
gol2      nbay localrx xstinfo
kokb      nbay localrx xstinfo

```

### Notes:

- You can write a single sites.defaults file for your experiment
- The expt name must be the same of station.info

### 3. USING SH\_GAMIT

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**STEP 3** - Before you start checklist:

1. Review all the entries in process.defaults carefully
    - 1.1. Is the data directory structure correct?
  2. Review all the entries in sites.defaults
    - 2.1. are all the station IDs spelled correctly?
    - 2.2. Is the expt ID the same used in station.info?
    - 2.3. Are the tokens correct?
  3. All the entries in station.info correct and update.
  4. Are the initial coordinates in lfile. update.
  5. Are the EOP tables (pole., ut1., ...) update.
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**STEP 4** - define the sh\_gamit options

Usage: sh\_gamit <options>

Where the following are some of the options available: (the most commonly used are in **bold**)

```

-dir          Experiment directory or root directory ($procdir of process.defaults) for
              experiment processing. This must be an absolute path. [Default pwd]
-d yr days   where yr and days are the data to be processed e.g. 1997 153 156 178
-s yr d1 d2  where d1 is start day and d2 is stop day to be processed e.g. 1997 153
              178
-r day       where day is number of days before current date.
-expt        4 char name of experiment/solution being run. [Default expt]
-orbit       Type of orbit to use. (IGSP IGSR IGSF SIOP SIOR SIOF) [Default SIOF]
              Optional second argument gives the day-of-year for the orbit if not
              the same as processing day
-orbt        4 char ID for orbit files. [Default 4 char extracted from the orbit
              selected]
-eops        Name of EOP series to use. (bull_b, bull_a, etc.) [Default usno]

```

```

-c          Do NOT compress rinex files and/or raw files when done. [Default Yes]
-h          Use Hatanaka RINEX compress algorithm. [Default No]
-remakex Y/C/N Y - Remake x-files without checking.
              C - Remake x-file if orbit and session.info are incompatible and all
RINEX available [Default C]
              N - Don't remake x-files under any circumstances
-renamek Y/C/N Y - Remove existing k-files and remake
              C - Do not remake k-files unless missing or X-files remade (default)
              N - Do not remake k-files -- stop if missing
-remakej Y/N  Y - Remake j-file (default)
              N - Do not remake j-file (used with epoch-by-epoch j-files for SA with
mismatched time tags)
-netext char add network suffix <char> to day directories. Ie 035r
-yrext      add year prefix to day directories. Ie 1997_053
-pres       Plot gamit residuals as skyplots <Y/N/E>. YES, NO, ELEV. [Default N]
-nogifs     Do NOT create skyplot gifs.
-sessinfo   Session - sampling interval, number of epochs, start time (default 30
2880 0 0)
-rx_doy_plus Search RINEX file names this many days into the future for current-day
data
-rx_doy_minus Search RINEX file names this many days into the past for current-day
data
-mailto     Name of user and machine to send results summary. (eg.
simon@wegener.mit.edu)
-snrres     Calculate theoretical phase residuals from SNR. (requires raw data or
rinex W/SNR)
-noacc      Do not exclude satellites base on accuracy codes in the .sp3 file.
[Default exclude]
-xsite list List of sites to be excluded from the processing. [format
site:yyyy_ddd-yyyy_ddd OR site]
-dopt opts  Types of files to be deleted from the day directory. [Default: c]
-copt opts  Types of files to be compressed in the day directory. [Default: x k ao
D]
-aopt opts  Types of files to be archived under -archivepth <dir>. [Default: h q
as]
Possible d-, c-, and a- opts: D, H, ao, ac, as, b, c, d, e, g, h, i, j, k, l, m, o,
p, q, t, x, ps, all
-archivepth dir Directory where files are to be archived [Default $procdir/archive]
-xver char   1-character x-file version (6th character of x-file). [Default is
single-digit year]
-noftp      Use this option if no ftp download connections are available.
-ftp_prog   Name of ftp program: ftp or ncftp [default is ftp]
-rinex_ftpsites List of ftp sites to be searched for rinex files [default sopac cdis
and unavco]
-aprfile     Name of xyz coordinate .apr file to be used. [Default is itr2000.apr]
=====
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```

**STEP 5** - Run `sh_gamit` (start the processing from within the `/expt` directory - NOT inside the `/templates` directory)

Example: `sh_gamit -d 2001 008 -expt nbay -orbit IGSF -nogifs > sh_gamit.log`

**NOTE:** before re-running a day after a previous failure, you need to

- check `sh_gamit.log` to see what did not work
- check the `*.fatal` files `/doy` directory
- update/fix/edit any control file (e.g., `sites.defaults`, `process.defaults`) and any table (e.g., `station.info`, `lfile.`, `utl.`, ...) in the `/templates` directory according to the error messages

- remove the /doy directory, the /tables directory and the sh\_gamit.log file (this will help in avoiding repeating the failure by simply deleting any "bad" file)

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**Note for those attending the UCB workshop:** a unit4.dir directory with templates of the control files appropriate to process the GPS data for UTC day 008 and 009 2001 of the USGS North Bay survey is available in /data/gps8/wrkshp. In the same directory you will find a copy of the sh\_gamit.log file.

**Note for those attending the workshop on-line:** a unit4.dir directory with templates of the control files appropriate to process the GPS data for the 2001 USGS North Bay survey is available in the class anonymous ftp site:  
ftp://quake.geo.berkeley.edu/outgoing/battag/. In the same directory you will find a copy of the sh\_gamit.log file.