Unit 3 –GAMIT control tables and Q-file

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1) THE *sestbl.* CONTROL TABLE

The session control table *sestbl.* contains the GAMIT analysis command. A complete list and explanation of *sestbl*. line commands is in Ch. 5.2 and Table 5.1 of the GAMIT manual. In this chapter, we discuss some required and commonly used commands found in the standard *sestbl.* from the /templates directory.

```
Session Table for regional + global analysis
```

User defined a priori constrains. SOLVE will perform two set of solutions: one constrained or "tight" which uses directly the input constrains and one "loose" which uses hard-wired, loose constrains (10 ppm). The 'tight' solution (displayed in the q-files) is used to update the L-(station coordinates) and the G-(orbits) files and for writing the M-file of parameters adjustment that is used for scanning and manually editing the post-fit residuals

```
Processing Agency = MIT       required to identify h solutions
Station Number = *            required, but serve no useful function
Station Constraint = Y applied to all stations, set in the sittbl. file
Satellite Number =  *  required, but serve no useful function
Satellite Constraint = Y;     satellite constrains (a … M in ppm, rad1 … rad9 in %)
 all    a     e     i     node   arg per    M    rad1   rad2  rad3  rad4 … rad9
      0.01  0.01   0.01   0.01    0.01    0.01   0.01   0.01  0.01  0.01 … 0.01
```

Analysis control commands establish the basic structure of the batch run.

```
Type of Analysis = 0-ITER        ; number of iterations actually controlled by AUTCLN postfit
Data Status = RAW                ; input data not cleaned, cycle slips not removed
Choice of Observable = LC_HELP   ; use the ionosphere-free combination, resolve phase ambiguities using
                                     both an ionospheric constraint and pseudorange data
Choice of Experiment = RELAX.    ; solve for both station and orbital parameters
```

Atmospheric parameters define the model used to estimate the atmospheric (tropospheric) propagation delay (APD). GAMIT implements the the APD in the following manner (see Ch. 8 for a comprehensive explanation)

$$ATDEL(EL) = DRYZEN*DRYMAP(EL) + WETZEN*WETMAP(EL)$$

where EL is the satellite elevation angle, DRYZEN and DRYMAP are the dry propagation delay term and mapping function, while WETZEN and WETMAP the wet propagation delay term and mapping function. The model used by GAMIT for any of the four terms is specified by keywords in the sitbl. file.

```
Zenith Delay Estimation = YES   ; estimate a single zenith delay for each station
Number Zen = 13                 ; number of zenith-delay parameters
Zenith Constraints = 0.50       ; zenith-delay a priori constraint in meters (default 0.5)
Zenith Model = PWL              ; PWL (piecewise linear)/CON (step)
Zenith Variation = 0.02 100.    ; zenith-delay variation, tau in meters/sqrt(hr), hrs
Elevation cutoff = 15.          ; Elevation angle cutoff for postfit solution
Atmospheric gradients = YES     ; YES/NO  (default no)
Gradient Constraints = 0.01     ; gradient at 10 deg elevation in meters
```

Ambiguity resolution defines the criteria used to resolve phase ambiguities. The procedure used by GAMIT involves six steps:

1) Use the LC observables to estimate all parameters. This solution is the “bias-free” (ambiguities not resolved) solution recorded in the Q-file.
2) Held the geodetic parameters fixed and evaluate the “wide-lane” (L1-L2) ambiguitie(WL)
3) Fix as many WL as possible to integer values
4) Held the WL ambiguities fixed, use LC to determine geodetic parameters and narrow lane (L1) ambiguities (NL)
5) Fix as many NL as possible to integer values
6) Held the NL fixed, use the LC observations to estimate the geodetic parameters. This solution is the “bias-fixed” (ambiguities resolved) solution recorded in the Q-file.

```
Ionospheric Constraints =  0.0 mm + 8.00 ppm ;
Ambiguity resolution WL = 0.15 0.15 1000. 99. 1000.; deviation, sigma, decision func., ratio
Ambiguity resolution NL = 0.15 0.15 1000. 99. 1000.;
```

Deviation (deviation from an integer) and sigma (standard deviation) define the biases rounding range. Decision func. is the inverse of the probability for fixing the ambiguity at the wrong integer value. Ratio is the cut-off ratio for the chi-square searching algorithm that is invoked after rounding.

Orbit parameters controlling the orbit computation.

```
Geodetic Datum = GEOCENTRIC     ; GEOCENTRIC/WGS84/NAD82/WGS72
Reference System for ARC = IGS92 ; WGS84/WGS72/MERIT/IGS92(default)
Initial ARC = YES               ; YES/NO  default = NO for BASELINE/KIINEMATIC, YES for RELAX/ORBIT
Final ARC = NO
Yaw Model = YES                   ; YES/NO  default = YES
Radiation Model for ARC = BERNE   ; SPHRC/BERNE/SRDYB/SVBDY  default = BERNE
Inertial frame = J2000            ; J2000/B1950
```

File handling allow some control over the file used or created during the batch run.

```
Update T/L files = L_ONLY       ; update the L-file
Delete AUTCLN input C-files = YES ; C-files are quite large, delete to save space
```

Cleaning parameters controlling the data cleaning.

```
AUTCLN Command File = autcln.cmd  ;
AUTCLN Postfit = Y                ; Run autcln for postfit run; R causes repeat run.
Delete eclipse data = NO          ; ALL/NO/POST (Default = NO); 30 mins post shadow removal is
                                  ; hardwired for ALL/POST
Quick-pre observable = LC_ONLY    ; For 1st iter or autcln pre, default same as Choice of
                              observable
Quick-pre decimation factor = 10  ; 1st iter or autcln pre, default same as Decimation Factor
SCANDD control = NONE             ; YES/NONE
```

Data weighting

```
Station Error = ELEVATION 10. 0.0001 ; 1-way L1 , a**2 + b**2/sin(elev)**2 in mm, default = 4.3 7.0
Use N-file = Y                    ; Y/N (default no): automatic procedure to reweight by station
```

MODEL parameters specify the models used for solid-Earth tides, Earth rotation, satellites yaw and receiver clock.

```
Earth Rotation = 7                ; Diurnal/Semidirunal terms: Binary coded: 1=pole 2=UT1 default=7
Tide Model = 3                    ; Binary coded: 1 earth  2 freq-dep  4 pole  8 ocean   default=7
Antenna Model = ELEV              ; NONE/ELEV/AZEL  default = NONE
```

SOLVE parameters

```
Estimate EOP = 15                 ; Binary coded: 1 wob   2 ut1   4 wob rate   8 ut1 rate
Wobble Con = 0.01 0.01            ; default = 3. 0.3  arcsec arcsec/day
UT1 Con = 0.00001 0.01            ; default = .2 0.02 sec sec/day
Decimation Factor = 4             ; Decimation factor in solve
```

2) THE *sittbl.* CONTROL TABLE

The table may contain any number of stations, whether used in the experiment or not.
The columns occupied by each entry are indicated by keywords.

```
SITE         FIX WFILE   COORD.CONSTR.    EPOCH   CUTOFF APHS CLK KLOCK CLKFT DZEN WZEN DMAP WMAP    MET. VALUE
NZEN ZCNSTR
       << DEFAULT >>
ALL          NNN NONE  100.0 100.0 100.0  001-  *  15.0  ELEV NNN   3         SAAS SAAS NMFH NMFW 1013.25 20.0 50.0
13   0.500
       << SOUTHERN CALIFORNIA PERMANENT GPS GEODETIC ARRAY (PGGA) -- ACTIVE>>
BLYT Blythe  NNN NONE  0.010 0.010 0.020  001-  *  15.0  ELEV NNN   3         SAAS SAAS NMFH NMFW 1013.25 20.0 50.0
13   0.500
```

STATION	Station 4 letter code
	12-letter descriptor
FIX	Absolute fixing of the station coordinates
WFILE	File with water vapor data
COORD. CONSTR.	A priori coordinate constraints
	If you plan to use GLOBK for final analysis avoid absolute fixing of coordinate stations, but use a priori constraints
EPOCH	Epoch range to processed
CUTOFF	Satellite elevation cutoff
CLK	Whether or not the offset, rate … is to be estimated by SOLVE
KLOCK	Select the ways clock are modeled
CLKFT	Order of clock polynomial to be used by FIXDRV
APHS	Model for variation s in the antenna phase center
DZEN	Model for hydrostatic (“dry”) zenith delay
WZEN	Model for water-vapor (“wet”) delay
DMAP	Mapping function for hydrostatic (“dry”) zenith delay
WMAP	Mapping function for water-vapor (“wet”) delay
MET. VALUE	Meteorological parameter
NZEN	Number of zenith-delay parameters
ZCNSTR	Zenith-delay a priori constraint in meters

3) EVALUATING THE SOLUTIONS

There are three criteria for determining if a solution is acceptable:

1) The uncertainties in the baseline components must have the same magnitude of the *a priori* constraints applied to station coordinates and orbital parameters

2) A good solution produces a “normalized rms” (nrms) of about 0.25. Anything larger then 0.5 indicates that there are problems (e.g., cycle slips that have not been removed, bad coordinates of the fixed stations, …)

3) The fractional part of the solution (Fract) must be smaller than 10.