

Basics of GPS processing workflow

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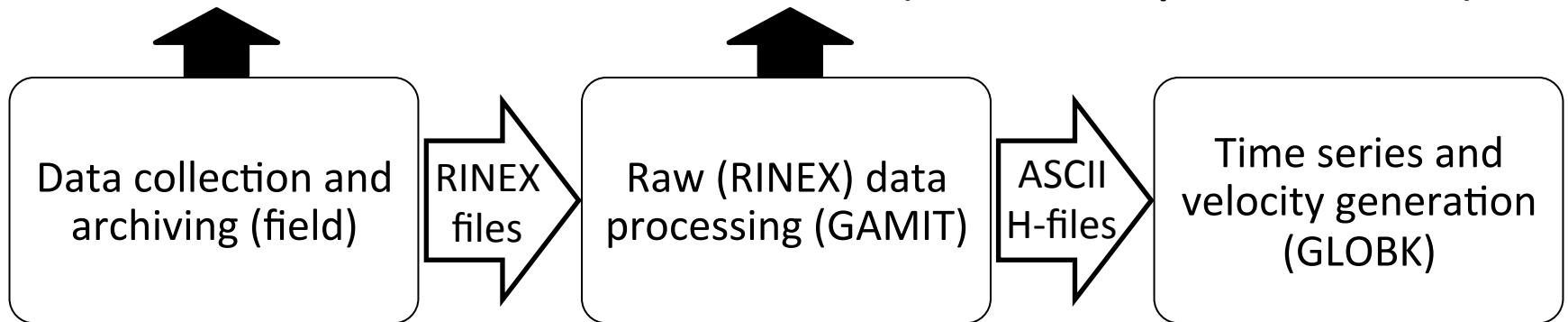
Material from R. King, T. Herring, M. Floyd (MIT) and S. McClusky (now ANU)

Basic stages of GPS for geoscience

- runpkr00
- teqc
- etc.



- MODEL (model observations)
- AUTCLN (cleans data)
- SOLVE (solve for parameters)



- glred (time series)
- globk (velocities)

Structure

- The scripts that control gamit and globk all have built in help which can be evoked by typing name
 - ~/gg/com contains all of the scripts used
 - ~/gg/gamit/bin and ~/gg/kf/bin contain the program executables
 - kf programs also have help output
 - (gg is a link in your home directory that points to the directory with the gamit/globk software installed)
- Once the software is installed; user selects data to be processed over some interval of time and uses sh_gamit for the processing
- GLOBK is used after the daily processing to combine results and set the reference frame.
- Everyone should have completed the installation of the software at this point
- Running the example case is a good idea to make sure the installation is OK

Basic inputs and outputs

- RINEX data must be prepared for input to GAMIT
- Output for GAMIT and input to GLOBK are ASCII “h-files”
 - Loosely constrained solutions with a priori parameter information, parameters adjustments and full covariance matrices
- Final output of GLOBK is “.org”-file
 - Time series (“.pos”-files)
 - Velocities (“.vel”-files)

GAMIT

1. Run `sh_setup`
 - Check all links, especially to grid files (`otl.grid`, `atl.grid`, `map.grid`, `met.grid`; see `sestbl`. for what is “switched on”)
2. Place RINEX data to be processed in `rinex/`
 - Except any publicly-available RINEX files one has set to be FTP’d in `sites.defaults`
3. Prepare *and verify* `station.info`, e.g. `sh_upd_stnfo`
4. Prepare *and verify* apr-file, e.g. `sh_rx2apr`
5. Run `sh_gamit`

sh_gamit

- `sh_gamit` is the master script for running GAMIT
- The following files are important to verify and/or edit (e.g. after `sh_setup`)
 - `autcln.cmd` (probably unnecessary to edit)
 - `process.defaults` (not necessary to edit much, if anything)
 - `sestbl.` (controls experiment observations and models; defaults OK but may want to edit)
 - `sites.defaults` (list of sites to process in experiment)
 - `sittbl.` (controls a priori constraints on sites; probably unnecessary to edit)
 - `station.info` (*very* important file to get right)
 - `.apr-file` (*very* important file to get right)
- More detail in next lecture

Processing: GAMIT

- Preprocessing
 - Download (sh_get_orbits) and prepare (sh_sp3fit) orbits
 - Make clock files (MAKEJ)
 - Download (sh_get_rinex) publicly available sites and convert RINEX files to GAMIT internal format (MAKEX)
 - Write batch (“b”) files
- Iterative solution (run b-files)
 - Calculate synthetic observations from a priori parameters and models (MODEL)
 - Create observables (LC, L1+L2, etc.), clean data (AUTCLN)
 - Fit calculated to observed by solving for parameter estimates (SOLVE)
 - Update a priori information if large adjustments



Post-processing: GLOBK

- Convert ASCII h-files to binary h-files (htoglb in glbf/)
- Generate and chronological list of binary h-files (glist in gsoln/)
- At this point, diverge in approach depending on solution sought...

GLOBK short-term combinations

- Combine days from a period over which velocities are negligible, e.g. a 10-day survey, bi-weekly or monthly combinations for continuous GPS
 - Reduces short-term scatter
 - Reduces number of files to be carried forward to velocity solution
- Run glred to generate time series
- Plot time series (sh_plot_pos)
- Inspect time series to identify (and remove) outliers
- Run globk to form one solution file for survey (".org"-file) *without estimating velocities*
 - apr_site 10 10 10 0 0 0
 - or
 - apr_neu 10 10 10 0 0 0

GLOBK long-term velocities

- Combine daily (continuous) or short-term combined h-files (e.g. surveys; see last slide)
- Run glred to generate time series
- Plot time series (sh_plot_pos)
- Inspect time series to identify (and remove) outliers
- Run globk to form final solution file for all data (".org"-file) *with estimating velocities*

```
– apr_site 10 10 10 1 1 1
```

or

```
– apr_neu 10 10 10 1 1 1
```