

Basics of processing workflow for GAMIT/GLOBK

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GNSS Data Processing and Analysis with GAMIT/GLOBK and `track`

Virtual (online only) hosted by EarthScope

22–26 July 2024

http://geoweb.mit.edu/gg/courses/202407_EarthScope/

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

Structure

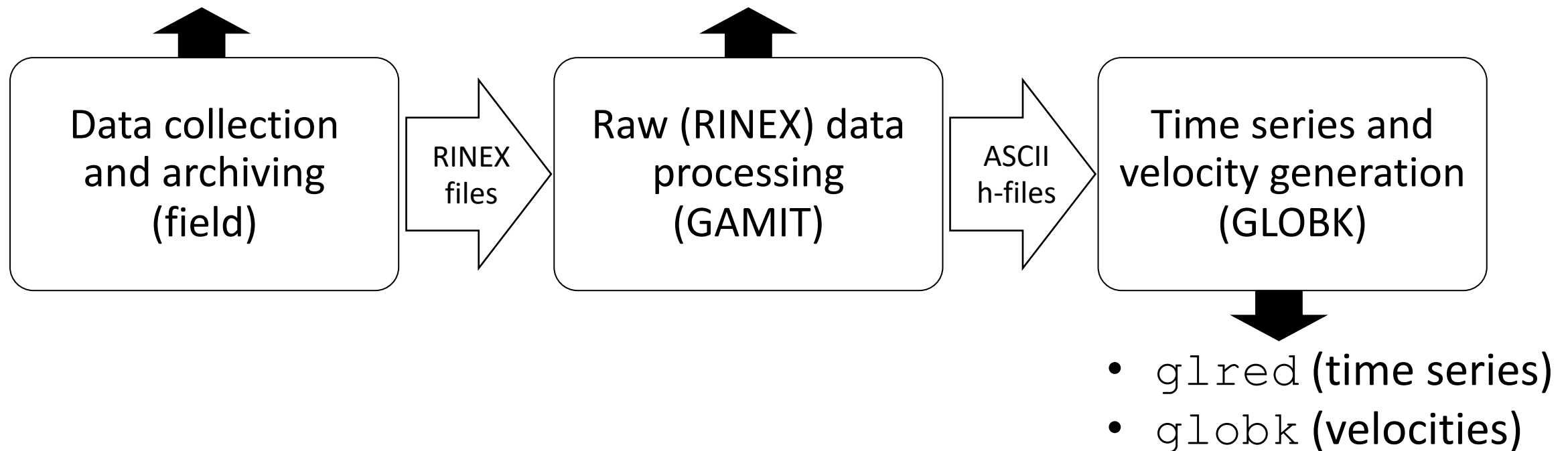
- The scripts that control GAMIT and GLOBK all have a built-in help page which can be evoked by entering command name only or looking in `~/gg/help/`
 - `~/gg/com/` contains all of the scripts used
 - `~/gg/gamit/bin/` and `~/gg/kf/bin/` contain the program executables
 - `gg` is a link in your home directory that points to the directory with the GAMIT/GLOBK software installed and should not be removed)
- 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 installation was successful

Basic stages of GAMIT/GLOBK for geoscience

- `runpkr00`
- `teqc`
- `etc.`



- `model` (model observations)
- `autcln` (cleans data)
- `solve` (solve for parameters)



Basic inputs and outputs

- RINEX data must be prepared for input to GAMIT
- Output from GAMIT are ASCII (text) “h”-files
 - Loosely constrained solutions with a priori parameter information, parameters adjustments and full covariance matrices
- Input to GLOBK are binary version of h-files
 - Convert from ASCII to binary h-files using `htoglb` (or “`-opt H`” option in `sh_glred`)
- Final output of GLOBK is “.org”-file, which contains all information for
 - Time series (“.pos”-files)
 - and/or
 - Velocities (“.vel”-files)

GAMIT

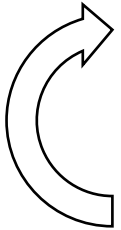
- Run `sh_setup`
 - Check all links, especially to grid files (`otl.grid`, `atl.grid`, `map.grid`, `met.grid`; see `sestbl`. for what is “switched on”)
- Place RINEX data to be processed in `rinex/` directory
 - Except any publicly-available RINEX files one has set to be downloaded in `sites.defaults`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

sh_gamit

- `sh_gamit` is the main 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 following lecture

Phase data processing: GAMIT

- Preprocessing
 - Download (`sh_get_orbits`) and prepare (`sh_sp3fit`) orbits
 - Make clock files (`makej`)
 - Download publicly available sites (`sh_get_rinex`) and convert RINEX files to GAMIT internal format for phase-and-pseudorange observations (`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
- All the above command steps are run for the user by `sh_gamit`
 - Although preparation of orbits (`sh_get_orbits/sh_sp3fit`) and RINEX files (`sh_get_rinex`) often done manually, depending on resources



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
 - More details about `glred`, `globk` and `glorg` in following lectures
- Similarly to `sh_gamit`, the batch script `sh_glred` will run all of the above command steps (and more, introduced in next slides)
 - User may just need to edit `globk` and/or `glorg` command files to achieve most desired types of solution

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 GNSS
 - 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 velocity estimation*, e.g. in `globk` command file:
`apr_site all 10 10 10 0 0 0`
or
`apr_neu all 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)
- Plot long-term time series from short-term combination “.org”-file(s) (`sh_plot_pos`)
- Inspect time series to identify (and remove) outliers
- Run `globk` to form final solution file for all data (another “.org”-file) *with velocity estimation*, e.g. in `globk` command file
`apr_site all 10 10 10 1 1 1`
or
`apr_neu all 10 10 10 1 1 1`
- `sh_glred` capable of running all these individual commands to produce time series, short-term combinations and long-term velocity solutions