Generating time series with `glred`

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

sh_glred

- *glred* is just a way of invoking *globk* to process one day at a time; *sh_glred* is a script to invoke glred easily for a sequence of days

- Once you've run *sh_gamit* for a sequence of days, you will have on each day an h-file of loosely constrained parameter estimates and covariances. If you have in [expt]/gsoln appropriately constructed command files for globk (globk_comb.cmd) and glorg (glorg_comb.cmd), you can obtain time series using

    sh_glred –expt [expt] –s [start yr] [start_doy] [stop yr] [stop doy] –opt H G E

        which will translate the GAMIT ascii h-files into GLOBK binary h-files (H), run   GLOBK (G), and run sh_plotcrd (E)

- The lectures on GLOBK, references frames, and survey-mode GPS will guide you in constructing the command files, and there are self-guided templates to make this easy

Manual sequence

- htoglb
  - Converts ASCII h-files output from GAMIT to binary h-files (in glbf/) for input to GLOBK
- ls
  - Create list of binary h-files to process (in gsoln/)
- glist
  - Create chronological list of h-files to process and associated information
- glred
  - Create ".org"-file(s) with individual solutions
- sh_plot_pos
  - Create ".pos" (time series) file(s) and time series plots
- globk
  - Create combined (or velocity) solution
- glorg
  - Additional glorg runs for different reference frames

htoglb

- Creates binary h-files for input to GLOBK
  - All metadata, etc. carried forward from GAMIT
- Not restricted to ASCII h-files from GAMIT
  - May also use SINEX (Software INdependent EXchange format), GIPSY's "stacov" files, etc.
  - But beware of constraints implicit in solutions from other software/processing runs!
- For example, from glbf/
  - `htoglb . /dev/null ../[0-3][0-9][0-9]/h*a.*`

GLOBK checks

- List files to be processed by GLOBK, e.g. from gsoln/
  - `ls ../glbf/h*.glx > expt.glx.gdl`
- Run pre-processing checks using glist
  - glist expt.glx.gdl 201407_NSFBay.sum +1
  - This will also calculate if any over-lapping h-files should be combined with glred (e.g. multiple networks on the same day)
- Inspect any errors (e.g. site name clashes)

Create time series

- glred runs globk once per interval (e.g. daily) to combine data over that interval into one solution and one effective time series point
  - Assess solution by looking at "POS STATISTICS" lines
- Current example (using sh_glred) creates:
  - "mb"-files (time series) with multibase
  - "psbase"-files (Postscript) with sh_baseline
- Updated, preferred method is to use
  - tssum to create ".pos"-files (time series)
  - sh_plot_pos to create Postscript plots
    - ".org"-file may be input to sh_plot_pos, which will run tssum for you
    - `sh_plot_pos -f glred_YYYYMMDD.org -d figs ...`

sh_plot_pos

- Many features including options to:
  - Read in ".org"-files, ".pos"-files (output of tssum) and ".res"-files (output of tsfit)
  - Run tsfit (GLOBK's curve-fitting module) on input ".pos"-files
  - Calculate basic statistics (e.g. WRMS, NRMS)
  - Add vertical lines at epochs specified by renames, earthquakes or user
  - Specify fixed start and end times of time series
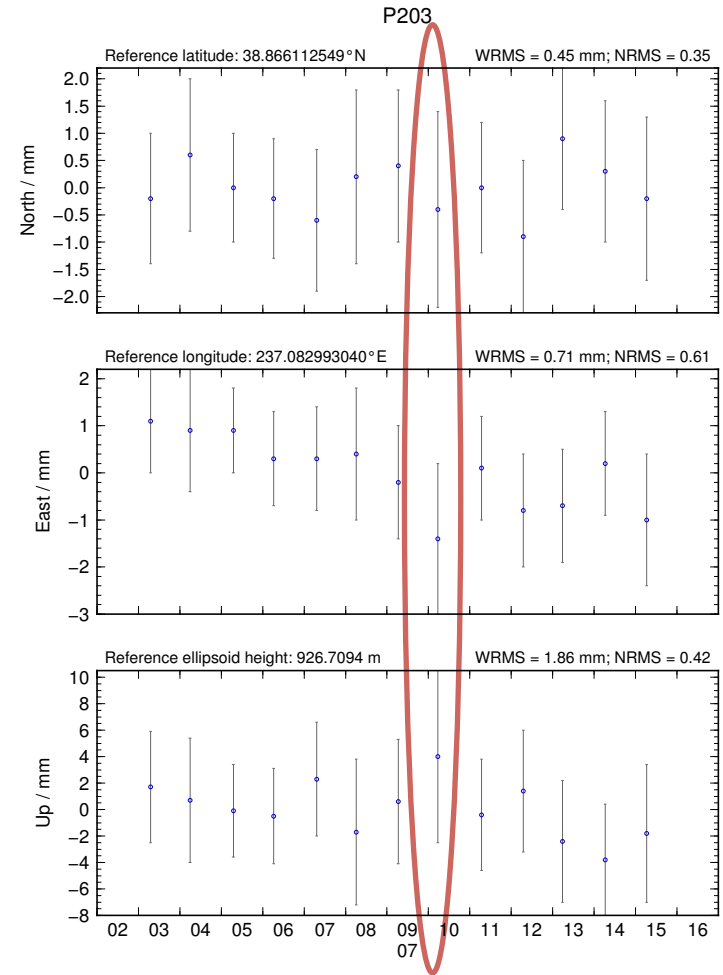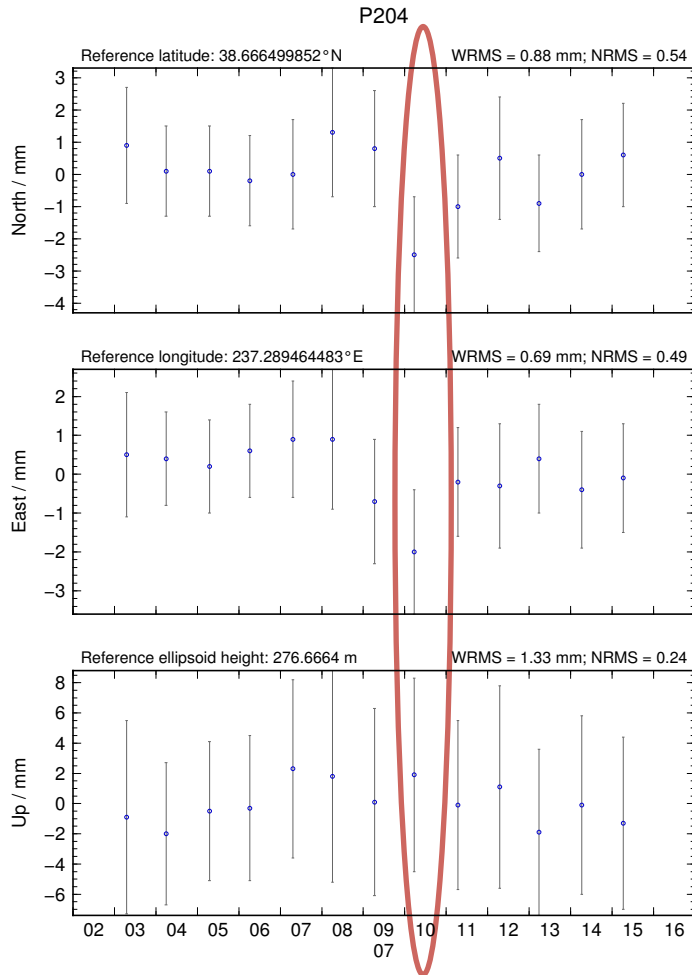 - etc.

Inspect time series

Good repeatability

MADI
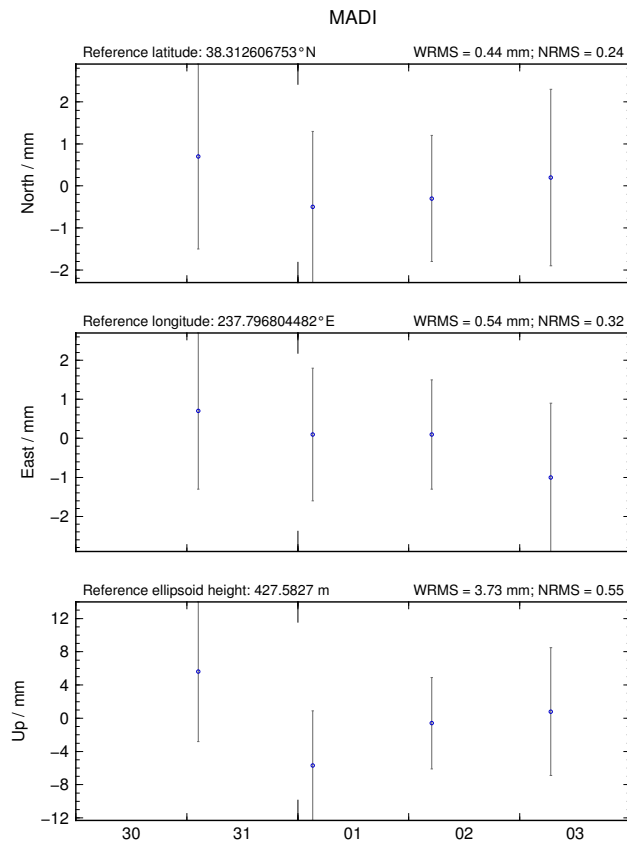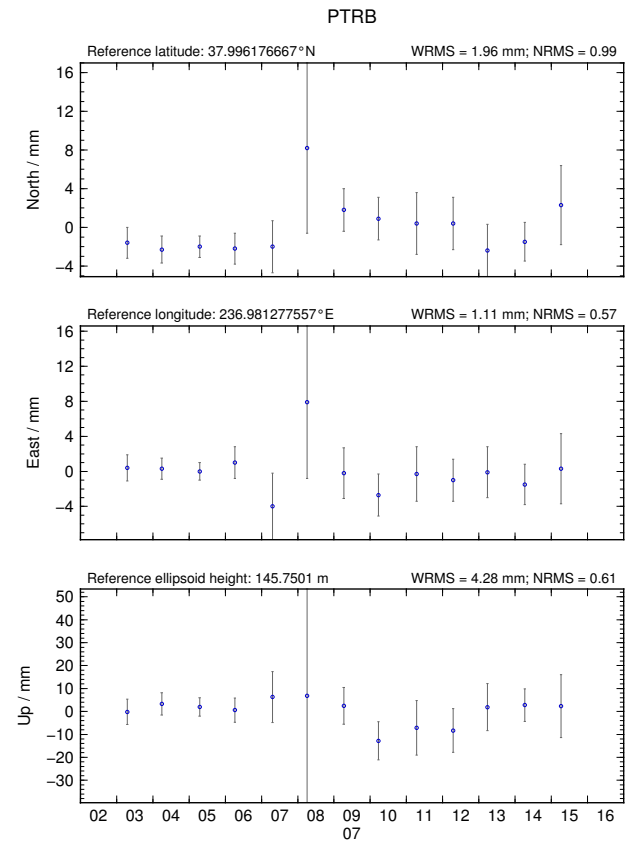
Outlier

PTRB

Some "outliers" are not outliers

Excluding outliers or segments of data

- Create "rename" file records and add to GLOBK command file's "eq_file" option, e.g.
  - `rename PTRB        PTRB_XPS h1407080610_nb4a`
  - `rename PTRB        PTRB_XPS 2014 07 07 18 00 2014 07 08 18 30`
  - `rename ABCD        ABCD_XCL 2013 07 08 00 00`
- "XPS" will not exclude data from glred (so still visible in time series) but will exclude data from globk (combination or velocity solution)
- "XCL" will exclude data from all glred or globk runs