

Science Tools Update, October 25, 2007

Science Tools Working Group

Did not meet this week.

On Wednesday, Jim released **v9r3** of the Science Tools. [Here](#) are the differences from v9r2p2. The biggest news is that the new versions of the pulsar tools have been included (see below), but the release also includes important fixes (e.g., in **gtburstfit**) and enhancements (e.g., speed of **gtselect** - see below).

Emmanuel will make a MacOSX build (by hand) of v9r3.

Data products: No new news.

Databases and related utilities

No development news.

Likelihood analysis

Jim has worked out a filtering expression for **gtselect** and **gtmktime** that applies "zenith angle cuts to FT1 data without incurring additional excessive computational cost in the likelihood analysis." In general this is a combination of applying zenith angle cuts on FT1 files and also creating GTIs to remove time intervals when the horizon would cross the ROI (or source region). Depending on the pointing history and the zenith angle range of the ROI, the time ranges actually removed can be very small. Jim is working on evaluating and refining the approach.

GRB tools

James resolved 2 of the 3 the [JIRA issues](#) relating to GRB tools that were opened during the Ops Sim and these fixes are in the new release of the Science Tools

Pulsar tools

This week Masa and James released the extensively updated pulsar tools that they have been preparing for some time. This is a major milestone. Among other changes, the tools include barycentering on-the-fly, although **gtbary** remains available. As mentioned last week, alternative solar system ephemerides can now also be specified. Masa plans to start work on updating the reference pages and tutorials in the Workbook. If you can't wait, he has already updated the [Doxygen documentation](#).

Marianne traced the unexpected phase shifts of the light curves of the bright pulsars in the Ops Sim data to what turned out to be a bug in **gtpphase**. Masa describes the issue and a workaround in the JIRA issue [PULS-41](#) he opened for it.

Observation simulation

Jim reports that he has "implemented a **RadialSource** source object that allows for diffuse sources with azimuthal symmetry to be easily modeled. This will be used to model dark matter sources for **Gleam** and **gtobssim** simulations." This will sure beat using FITS images to define the source extents and profiles.

Jim also "made minor modifications to the **SpectralTransient** source class to allow for neutron components to be modeled in Solar Flare simulations."

And he "modified gtobssim to allow for the SAA to be disabled to support GRB sensitivity studies." This uses an environment variable `DISABLE_SAA`.

Max R. reports that he is working on the code for **PulsarSpectrum** to make it faster and more readable, and he is also extensively testing the code.

User interface and infrastructure (& utilities)

Jim "added a function that calls `cfitsio` directly to enable efficient copying of FITS files that are filtered by standard extended filename expressions. This function is now used by **gtselect** and **gtmktime** and has improved execution speed for FT1 files of size >2 M events by factors of **>30**."

James reports that he "met with Bryan Irby and Eric Winter to discuss the status of the Science Tools port into the HEADAS build system. They determined a way forward in which the Science Tools would be treated architecturally exactly like all other current missions (Swift and Suzaku). The plan is still to distribute the Science Tools independently of the rest of HEADAS for the time being."

Source Catalog

Met this week. Jean presented results from comparisons of source lists from different source detection algorithms applied to the obssim2 data. Depending on region of the sky (low vs. high) and probably also the duration of the data set different algorithms perform best.

We started a discussion about updating the concept of the data flow to the Catalog analysis and on the timeline early in the mission for producing successively refined source lists and preliminary source catalogs. The principal issue discussed was the role of ASP. Iteration of the catalog analysis with the refinement of the diffuse emission model also needs some more specific attention, but that is a topic for another meeting.

Not sure where else this belongs: Juergen has made significant updates to **gtsrcid** in the current release - simplifying access to external catalogs and allowing for elliptical confidence regions. The documentation in the Workbook is now somewhat out of date for this tool.