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GRO/EGRET Data Analysis Software: An Integrated System of Custom and Commercial Software Using Standard Interfaces 2-1

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The Energetic Gamma Ray Telescope Experiment (EGRET) on the Compton Gamma Ray Observatory has been in orbit for more than a year and is being used to map the full sky for gamma rays in a wide energy range from 30 to 20,000 MeV. Already these measurements have resulted in a wide range of exciting new information on quasars, pulsars, galactic sources, and diffuse gamma ray emission.

The central part of the analysis is done with skymaps that typically cover an 80 x 80 degree section of the sky for an exposure time of several days. Specific software developed for this program generates the counts, exposure and intensity maps. The analysis is done on a network of UNIX based workstations and takes full advantage of a custom-built user interface called X-dialog. The maps that are generated are stored in the FITS format for a collection of energies. These, along with similar diffuse emission background maps generated from a model calculation, serve as input to a maximum likelihood program that produces maps of likelihood with optional contours that are used to evaluate regions for sources. Likelihood also evaluates the background corrected intensity at each location for each energy interval from which spectra can be generated.

Being in a standard FITS format permits all of the maps to be easily accessed by the full complement of tools available in several commercial astronomical analysis systems. In the EGRET case, IDL is used to produce graphics plots in two and three dimensions, and to quickly implement any special evaluation that might be desired.

Other custom-built software, such as the spectral and pulsar analyses, take advantage of the XView toolkit for display and Postscript output for the color hardcopy.

This poster paper outlines the data flow and provides examples of the user interfaces and output products. It stresses the advantages that are derived from the integration of the specific instrument-unique software and powerful commercial tools for graphics and statistical evaluation. This approach has several proven advantages including flexibility, a minimum of development effort, ease of use, and portability.