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An IDL-based Analysis Package for COBE and Other Skycube-Formatted Astronomical Data

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UIMAGE is a data analysis package written in IDL for the Cosmic Background Explorer (COBE) project. COBE has extraordinarily stringent accuracy requirements: 1% mid-infrared absolute photometry, 0.01% submillimeter absolute spectrometry, and 0.0001% submillimeter relative photometry. Thus, many of the transformations and image enhancements common to analysis of large data sets must be done with special care. UIMAGE is unusual in this sense in that it performs as many of its operations as possible on the data in its native format and projection, which in the case of COBE is the quadrilateralized spherical cube ("skycube"). That is, after reprojecting the data, e.g., onto an Aitoff map, the user who performs an operation such as taking a crosscut or extracting data from a pixel is transparently acting upon the skycube data from which the projection was made, thereby preserving the accuracy of the result.

Current plans call for formatting external data bases such as CO maps into the skycube format with a high-accuracy transformation, thereby allowing Guest Investigators to use UIMAGE for direct comparison of the COBE maps with those at other wavelengths from other instruments. It is completely menu-driven so that its use requires no knowledge of IDL. Its functionality includes I/O from the COBE archives, FITS files, and IDL save sets as well as standard analysis operations such as smoothing, reprojection, zooming, statistics of areas, spectral analysis, etc.

One of UIMAGE's more advanced and attractive features is its terminal independence. Most of the operations (e.g., menu-item selection or pixel selection) that are driven by the mouse on an X-windows terminal are also available using arrow keys and keyboard entry (e.g., pixel coordinates) on VT200 and Tektronix-class terminals. Even limited grey scales of images are available this way. Obviously, image processing is very limited on this type of terminal, but it is nonetheless surprising how much analysis can be done on that medium. Such flexibility has the virtue of expanding the user community to those who must work remotely on non-image terminals, e.g., via modem.

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