INFRARED ASTRONOMICAL DATA BASE AND CATALOG OF INFRARED OBSERVATIONS

Marion Schmitz*, Daniel Y. Gezari, Jaylee M. Mead
NASA/Goddard Space Flight Center, Greenbelt, Maryland 20771

Abstract

A computer data base of infrared astronomical observations has been established at NASA/Goddard Space Flight Center. It contains a summary of all infrared (1μm–1000μm) observations of celestial sources outside the solar system, published in the major scientific journals since 1960, as well as the contents of infrared surveys and catalogs. A Catalog of Infrared Observations (CIO) has been developed from the data base in printed and magnetic tape versions. A bibliographic Guide to the Infrared Astronomical Literature, and an Atlas of Infrared Source Names and Positions will be published in conjunction with the catalog. Future plans include development of an interactive data system at Goddard which will give a user direct access to the computerized data.

Infrared Data Base and Literature Search

The Infrared Astronomical Data Base is located at NASA/Goddard Space Flight Center (GSFC). It represents a machine-readable library of infrared (1μm to 1000μm) observational data published in the relevant scientific literature for celestial sources outside the solar system. Catalogs derived from the data base will be published periodically for distribution to interested researchers. To date, over 1100 journal articles and 10 major survey catalogs have been included in this data set, which contains about 70,000 individual observations of 10,000 different infrared sources. Of these, about 8,000 sources have been identified with visible objects and 2,000 do not have known visual counterparts.

The Infrared Astronomical Data Base has been constructed through an extensive search of the appropriate scientific journals and published infrared survey catalogs. This material has been cross-checked with the NASA/GSFC library RECON computer system and the Astronomy and Astrophysics Abstracts under applicable keywords. The infrared literature search presently covers 20 scientific journals for the years 1976-1979

C. Jaschek and W. Heintz (eds.), Automated Data Retrieval in Astronomy, 33–35.

and for several of the most popular journals from 1979-1966. It is expected that completion of the literature search for the present journals as far back as 1960 will increase the number of observations in the data base by about 15%. The data base uses the NASA/GSFC IBM S-360/75 and S-360/91 computers. The format of the current data base is designed to facilitate the data acquisition and verification process, and provides a vehicle for development of future improvements.

Catalog of Infrared Observations

The first product of the infrared data base was the Merged Infrared Catalogue (MIRC) (Schmitz et al. 1978), a compilation of five other infrared catalogs. The 13,588 observations in the MIRC from 2.2μm to 27.4μm are listed in both magnitude and flux units. The next catalog produced will be the Catalog of Infrared Observations (CIO), which contains observational infrared data published in the astronomical literature, in addition to the contents of the MIRC. The CIO contains the following information, as given in the original published reference:

SOURCE NAME
SOURCE POSITION (right ascension and declination at epoch 1950.0)
BEAM SIZE (or aperture)
WAVELENGTH OF OBSERVATION (microns)
INFRARED FLUX (units given in the original reference)
BIBLIOGRAPHIC REFERENCE NUMBER (of the original reference)
POSITION REFERENCE NUMBER (if position not in original reference)
COMMENTS (observational details and object identifications)

If the position of the infrared source is not explicitly given in the original reference, the position was obtained by the editors from other references. The beam size (or aperture) is presented as given in the original reference. The beam size column of the CIO contains a dash if no aperture information is given in the original reference. The beam size is useful in conjunction with observations listed, as an indication of positional accuracy, and as an aid in determining positional coincidences with other sources. The CIO lists the wavelength of each observation in microns, followed by the observed flux at that wavelength, in units as given in the original reference. To preserve the integrity of the data, no attempt has been made to convert the different systems into a standard set of intensity units. The CIO contains additional comments on observational data including spectroscopic information (indicated by the starting and ending wavelengths of the spectrum), source diameter measurements and polarimetry. Upper limit measurements are indicated.

Bibliographic Guide and Atlas of Names and Positions

The Guide to the Infrared Astronomical Literature, included as an appendix to the CIO, indexes the catalog entries to the original references and provides a complete bibliography of the published infrared astronomical literature. The 1,100 infrared journal articles and catalogs are listed in this appendix, with 49 additional references used for

position determinations or other data. The bibliographic Guide is arranged chronologically by reference number (which contains the year and month of publication) followed by the authors' last names and initials, journal name or document number, volume, page number, and full title of the reference. The bibliography is also listed alphabetically by author.

The Atlas of Infrared Source Names and Positions is a cross-index of object names, positions, name aliases, and identifications made in the literature or other catalogs. The Atlas is used for locating a source in the CIO by name rather than position, and for identifying observations of the same source which are listed in the catalog under different names. The Atlas is sorted alphabetically by all of the infrared source names in the CIO. Entries from over 100 catalogs are contained in the Atlas of Infrared Source Names and Positions.

Development of the Data Base and Catalogs

Concurrent with the completion of the literature search as far back as 1960 and the expansion of the data base, several improvements in the data base development program are planned. A positional coincidence analysis will be performed to determine which of the observations overlap in the sky. Two-dimensional graphical displays of the infrared data will be generated as overlays for photographic sky surveys. An attempt may be made to reduce the infrared fluxes to a standard system of units. A user-interactive data terminal system will be implemented at Goddard Space Flight Center to give individuals direct access to the computer data base. Results of these efforts may be combined to produce a homogeneous infrared sky catalog of standard source names, positions, and intensities.

Acknowledgments

This work developed out of an infrared catalog program started by Larry Brown in the Laboratory for Extraterrestrial Physics at Goddard, which produced the Merged Infrared Catalog (MIRC). We are grateful to Dr. M. Mumma and Dr. M. Hauser for their continuing support of our infrared catalog and data base research. We thank Dr. T. Nagy and Dr. W. Warren for their helpful contributions. This work is supported by NASA/Goddard Space Flight Center and by NASA contract NAS 5-24360.

References

Schmitz, M., Brown, L. W., Mead, J. M., Nagy, T. A.: 1978, Merged Infrared Catalogue, NASA TM-79683.

*Computer Sciences Corporation, Silver Spring, Maryland 20910