

RESPONSIBILITIES AND PRACTICAL LIMITATIONS IN THE OPERATION OF AN ASTRONOMICAL DATA CENTER

Wayne H. Warren Jr.
National Space Science Data Center (NSSDC)
NASA/Goddard Space Flight Center (GSFC)

Jaylee M. Mead
Laboratory for Astronomy and Solar Physics, NASA/GSFC

Theresa A. Nagy
Systems and Applied Sciences Corporation

ABSTRACT

The operation of an astronomical data center requires that many decisions be made concerning the handling of the astronomical catalogs and data distributed. Should a data center be, as Wilkins (1977) described it, passive, in that catalogs and data are collected and distributed blackbox-wise upon request, or should a data center be active and have experts in various fields to scrutinize, correct, reformat, and document data where necessary? These questions will be addressed and illustrated by describing the current operations and future goals of the Astronomical Data Center at NASA/GSFC.

I. INTRODUCTION

The large and rapidly growing number of machine-readable astronomical catalogs in diverse fields of astronomy has made the operation of an astronomical data center more demanding than it was when only a few computerized data sets were available. Although an astronomical (or any other) data center has the responsibility to disseminate properly identified data, there are limitations as to how far toward having *completely* reliable, adequately checked and documented data, providing associated software support, search, retrieval and plot capabilities, and generating microform listings, any one data center can go when faced with these tasks for hundreds of individual data sets. Based on eight years of experience in operating the Astronomical Data Center (ADC) at GSFC, where our emphasis has been toward the development of a large data base of astronomical catalogs, related software, support services, and secondary data products, we would like to discuss developments which we feel increase the efficiency of our operations and provide more reliable and faster service to the astronomical community.

II. DATA SET MODIFICATIONS, ADDITIONS AND PROCESSING

The basic procedures used for verifying and checking data in newly acquired and produced catalogs have been described by Underhill *et al.* (1977) and Hill (1981). Although certain errors can be discovered by the computer checking of data for consistency, many potential problems for data processing and application can only be uncovered by actually working with and having a basic familiarity with the data.

Many older catalogs, which were computerized prior to the development of sophisticated data processing techniques, were produced with very restricted formats, or certain data fields were omitted to confine the data records to 80-column computer card images. For such catalogs, we usually add missing data fields to complete the records as published, and add remarks or reference files where necessary. Data received in print rather than processing format are converted to structures more appropriate for analysis and plotting.

III. ASTRONOMICAL DATA CENTER OPERATIONS

It is found extremely important, although time consuming, to create and maintain detailed records on all facilities required and every product distributed with each requested catalog. In addition to providing information necessary for cost evaluation and funding purposes, these detailed records are often referred to later as new editions of particular catalogs are received or additional related information becomes available, since all recipients of a catalog should be notified as new products are introduced. The distribution of catalogs from the NSSDC is a great advantage in this regard, since existing data management systems provide monitoring for all request activity. Upon receipt of a request for a specific catalog, a record is entered into the system, a projected completion date is registered, and the request is monitored via monthly reports until completed. At the completion of a request, all computer time used and each product distributed are coded on completion forms and entered into the system. This system also produces annual reports of all request activity and products disseminated. A separate file contains records of all forms of data products associated with each catalog and all related materials to be distributed with a tape or microform version of a data set, such as information pages, error lists, related papers from the literature, and special documentation.

IV. DOCUMENTATION, STATUS REPORT AND SPECIAL SERVICES

Since the initiation of our work with astronomical catalogs, detailed documentation has been a very important aspect of our activities, and it continues to demand a substantial amount of time. A standard format has been used for all documents with only minor modifications depending upon the catalog being described. Each document contains five sections designed to present a general description of a

catalog, the record format, the tape characteristics, remarks, modifications and references, and a sample listing of data exactly as they appear on the tape. We consider the section on remarks and modifications to be extremely important and attempt therein to give a complete history of all changes made with respect to the original published catalog, plus the source of the initial machine-readable version.

It is important to provide information concerning the status of each catalog on file. We maintain a disk file containing current status information on every catalog, so that users know not only which data sets are in revision and/or are not available at any given time, but also the data quality and reliability of any catalog that they request. The above data set is also used to produce status reports which are published in the *Astronomical Data Center Bulletin*.

If resources permit, a data center should provide special services to the user community. These services involve mainly the development of software to process various catalogs to generate specialized output. We have developed a variety of services such as computerized searches of data and bibliographic catalogs (Mead *et al.*, this volume), preparation of subsets of and specially sorted catalogs, and generation of plotted output for finder charts and overlays (Nagy *et al.* 1980).

V. SUMMARY

A data center should be active in attempting to improve the quality and homogeneity of data distributed. For the archiving and distribution of astronomical catalogs, this requires the employment of several astronomers expert in the area of data processing and at least basically familiar with most of the data disseminated. Detailed documentation containing a byte-by-byte format description, correction history, and sample listing should be prepared where necessary. Special services for data searches and processing should be provided for users not having those capabilities. The standardization of data structures and formats for groups of related catalogs would greatly facilitate the development of data services and special processing software.

REFERENCES

- Hill, R.S. 1981, *Astron. Data Center Bull.* 1, 69.
Mead, J.M., Nagy, T.A., Hill, R.S. and Warren, W.H. Jr., this volume, 9.
Nagy, T.A., Mead, J.M. and Warren, W.H. Jr. 1980, *Astron. Data Center Bull.* 1, 3.
Underhill, A.B., Mead, J.M. and Nagy, T.A. 1977, in *IAU Colloquium No. 35, Compilation, Critical Evaluation and Distribution of Stellar Data*, ed. C. Jaschek and G.A. Wilkins (Dordrecht: Reidel), p. 105.
Wilkins, G.A. 1977, in *IAU Colloquium No. 35, Compilation, Critical Evaluation and Distribution of Stellar Data*, ed. C. Jaschek and G.A. Wilkins (Dordrecht: Reidel), p. 287.