

Discussion II—Standardization of Remote Sensing Data Collection and Transmission*

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Rationale for a Standard

There are many different formats for magnetic tapes that contain data useful to remote sensing specialists. Many different types of data are written in different formats, and the result is that much time must be spent by the average researcher to extract data that are useful to him. This confusion of formats occurs also in other areas in which spatial data are involved, such as digital maps for use in geographic information systems, or in areas relating to nonspatial data, such as data base systems and word processing.

There are basically two ways to cope with such a situation: (1) develop the necessary translation software, so that translation and extraction become much easier for the user (this is analogous to publishing instructions on how to use magnetic tapes for all remote sensing data formats), or (2) develop a standard format to facilitate data exchange (related to the alternative suggestion that ASTM develop a standard tape format to be followed by all organizations that make available remotely sensed data). Without examining all of the advantages and disadvantages of these two alternatives, it is not difficult to see that the second method is probably preferable because it divides the data translation problem more equally between the producer and the user: the producer is forced to output data from his system into a specified standard form, and the user must translate from the standard form to his system. More significant, however, is the fact that the use of a standard reduces the translation effort between N systems to be proportional to N rather than N^2 .

However, for a standard to be effective, it must be widely used and have the effect of reducing the number of other formats in use; otherwise, it merely adds to the confusion. With other standards efforts under way in remote sensing and geographic information systems, it would not seem advisable for ASTM to embark on yet another standardization effort. Rather, ASTM's effort could be better directed at providing critical input to other ongoing efforts. Current standards and efforts are, therefore, briefly reviewed.

Landsat Ground Station Operators Working Group Format

One standard format for remotely sensed data has resulted from the efforts of the Landsat Ground Station Operator's Working Group (LGSOWG). This standard embraces the concept of a family of formats. With this concept, an outer shell is standardized, but within this outer shell there is freedom for a participating organization to insert its own data formats. Currently, many countries supplying Landsat data, such as Canada, Japan, Brazil, the United States, and

*This material was developed in response to discussions that took place at the symposium upon which this publication is based. The information has been reviewed by the technical editors of this Special Technical Publication, Johnson and Pettersson.

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European countries represented by the European Space Agency, are providing data in this format. In Canada most remote sensing data are cast in the LGSOWG format.

Spatial Data Exchange Standard (SDES)

The National Committee for Digital Cartographic Data Standards (NCDCCDS), which was founded in 1982, has a mandate to facilitate data exchange for earth sciences information. The committee is supported by the U.S. Geological Survey (USGS) through the American Congress on Surveying and Mapping (ACSM). The committee has 850 corresponding members and 150 organization members. It is currently in the fifth cycle of a multicycle effort, consisting of review of the issues, selection of alternatives, construction of an interim proposed standard, testing of the interim standard, and generation of the final proposed standard. The proposed standard has been issued as Report No. 8, "A Draft Proposed Standard for Digital Cartographic Data Standards: A Report on Evaluation and Empirical Testing."

The current form of this draft standard bears little resemblance to the interim proposed standard published in Report No. 7. The interim standard reflected mostly an encoding method based on the International Organization for Standardization (ISO) Standard 8211, "Specification for a Data Descriptive File for Information Interchange," which is analogous to the family of formats philosophy; however, since then the emphasis has been on the contents of the exchange and has been divorced from the encoding methodology, although three different encoding methods (ISO Standard 8211 is one) have been identified but will not be a part of the proposed standard.

Federal Geographic Exchange Format

A parallel standards effort has been made through the Federal Interagency Committee for Digital Cartography (FICDC), which has a working group on standards. A memorandum from the Office of Management and Budget (OMB) by its former director, David Stockman (21 April 1983), was the basis of the formation of the FICDC. The committee is responsible for data production and data standards within the federal government. The standards working group of this committee has completed a proposed standard, the Federal Geographic Exchange Format (FGEF), which has been tested by participating agencies. The approach taken by this working group is based on a practical viewpoint of working from the bottom up, whereas the NCDCCDS committee approached the problem from the top down, beginning with the encoding methods.

Exchange of Image and Gridded Data

The NCDCCDS standard SDDES, in its contents, allows the exchange of gridded data in two ways. Two exchange modules have been designed for the exchange of gridded data in the context of a geographic information system (GIS), and three other modules have been incorporated for use in the exchange of raster image data. (An exchange module is the standard's logical equivalent of a file or file type.) The FGEF format, on the other hand, only has one grid section, which is very similar to the SDDES grid exchange modules; however, the grid section is quite flexible and could also be used for the exchange of image and other remote sensing data.

Moving Toward a Single Standard

With the completion of the fifth cycle of the NCDCCDS and the testing of FGEF, the need for reconciling the two proposed standards and creating one single standard became obvious. The Digital Cartographic Data Standards Task Force (DCDSTF), under the leadership of the U.S. Geological Survey, was created for this purpose. This task force is mostly composed of represen-

tatives of federal agencies and has as its objective the creation of a single Federal Information Processing Standard (FIPS) by 1990. This standard will be designated the Spatial Data Transfer Specification (SDTF). An initial version will be published in the *American Cartographer*. There will need to be another round of testing before it is submitted to the FIPS process.

A data format becomes a standard in several ways. One way is for a popular format to become widely accepted, so that it becomes a de facto standard. Another path is through the endorsement of some standards organization, such as the International Organization for Standardization (ISO), the American National Standards Institute (ANSI), or ASTM; even though a standard still has to become publicly accepted, such endorsement generates support, especially from hardware and software vendors. The NCDCDS effort currently does not pursue such an avenue, but the FICDC would be the logical organization to promote a standard, first into a federal information processing standard (FIPS) and subsequently as an ANSI or ISO standard. Hopefully, such a course will be taken with a joint NCDCDS/FICDC standard (with FGEF a subset of SDES).

The SDTF is still in a state of flux, but comments and criticism are always extremely welcome. A current version of SDES can be obtained by writing to:

Dr. Harold Moellering
NCDCDS
Numerical Cartography Laboratory
Ohio State University
158 Derby Hall
154 North Oval Mall
Columbus, OH 43210-1318

and a current version of FGEF may be obtained from:

Mr. Gale TeSelle
Director, Cartography and Geographic Information Systems Division
USGS/Department of Agriculture
P.O. Box 2890, Room 6243
Washington, DC 20013

Comments on these standards for consideration by the DCDSTF should be directed to:

Dr. Joel L. Morrison, Chairman
Digital Cartographic Data Standards Task Force
U.S. Geological Survey
WGS-Mail Stop 519
Reston, VA 22092

Acknowledgment

This report is based on work performed under U.S. Geological Survey Contract No. 14-08-0001-20129.