Draft

Content Standards for Spatial Metadata

Federal Geographic Data Committee

November 3, 1992

Federal Geographic Data Committee
Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
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Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. The Departments of Education, Health and Human Services, Justice, and Labor; the General Services Administration; the National Capital Planning Commission; and the Smithsonian Institution also participate on FGDC subcommittees and working groups. The U.S. Geological Survey chairs the committee on the behalf of the Secretary of the Interior.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups have been established for standards, technology, and liaison with the non-Federal community.

For more information about the committee, or to be added to the newsletter mailing list, please contact:

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Contents

Page

Illustrations

Tables

Definition of Metadata

Metadata are "data about data." They provide such information as the characteristics of a data set, the history of a data set, and organizations to contact to obtain a data set. Standardized metadata elements would provide a means to document data sets within an organization, to contribute to catalogs of data to help persons find and use existing data, and to aid users to understand the contents of data sets that they receive from others.

Development of the Draft Standard

In June 1992, the Federal Geographic Data Committee (FGDC) sponsored an Information Exchange Forum on Spatial Metadata. One issue discussed by the participants was the need for a common set of metadata elements for use in geographic information systems (GIS), in catalogs of data, and for data transfer. Douglas Nebert of the U.S. Geological Survey offered to convene an ad hoc work group under the auspices of the ASTM (formerly the American Society for Testing Materials) to develop preliminary definitions of metadata elements. The set would be provided to the FGDC for consideration as a standard.

Several participants at the forum, and other interested parties including several ASTM Mapping and GIS Section members, offered to assist in this task. Metadata element definitions and examples of systems were provided by a variety of agencies, mostly State geographic data clearinghouse operations. The examples were reviewed, and a preliminary draft standard was compiled. The preliminary draft was reviewed by the ad hoc group and elements of the FGDC, and changes were made based on their comments.

The final draft was submitted to the FGDC. The FGDC is sponsoring a six-month public test and comment period so that the spatial data user and vendor communities can review and refine the standard. The FGDC intends that the resulting content standard for spatial metadata will be used within the Federal community, at a minimum. This standard will be submitted to the National Institute of Standards and Technology for consideration as an amendment to, or extension of, the metadata capability within Federal Information Processing Standard 173, the Spatial Data Transfer Standard. These definitions and examples also are being promoted through an ASTM standards process to define a metadata content standard.

Overview of the Draft Data Elements for Metadata

The data elements in the draft standard provide for information about the several characteristics of the data. These characteristics are listed below:

- Identification Section - describes the general data content, spatial extent, and use of the data.

- Projection Information - describes the horizontal and vertical coordinate systems used for the spatial data.

- Data Custodian Information - provides points-of-contact for the data.
- Access Information - provides details about the means of and conditions for accessing the data.
- Status Information - describes the state of, maintenance cycles for, and policies on availability of the data.
- Table Definitions Portion of the Data Dictionary/Schema - describes the thematic content of features portrayed in the data.
- Table Attributes Portion of the Data Dictionary/Schema - describes the thematic content of characteristics of the features portrayed in the data.
- Source Information - describes documents used to compile the data.
- Processing Steps - describes the procedures and parameters used to convert the source materials to the final data.
- Data Quality - describes the quality of the data to assist potential users to determine if the data is suitable for an application.
- Metadata Reference Section - describes the currentness of and contacts for the metadata.

Figure 1 is a logical diagram of the metadata elements. The groups of information "Data Set Identification," "Projection," "Status," "Data Quality," and "Metadata Entry" have a one-to-one correspondence with respect to a specific described spatial data set for which metadata are collected. A given metadata entry would reference one or more sources, processing steps, related attribute tables, access information entries, and custodian references as depicted by the forked end of the connecting line. The information stored in entities depicted on the right side of the diagram may be shared with other metadata entries where appropriate. For example, a given "Custodian" entry in a local data base of metadata could be shared by more than one data set and, for efficiency, be stored once at the local site.

Figure 2 provides another view of the relationship of metadata elements to each other, illustrating a hierarchy of shared information. For example, although "Custodian" information may be duplicated in metadata files for transfer or cataloging purposes, software that manages the metadata in a geographic information system could manage and link references between "Custodian," "Data Set," and "Data Set Boundary" information so that the information is only stored once and is reused or referenced. A given custodian (with an address, contact name, and contact instructions) may be the custodian of several data sets. Each data set, in turn, would point to specific processing steps, sources, and data dictionary elements. A given data set, in turn, may reference a series of specific data set boundaries within which data are collected.

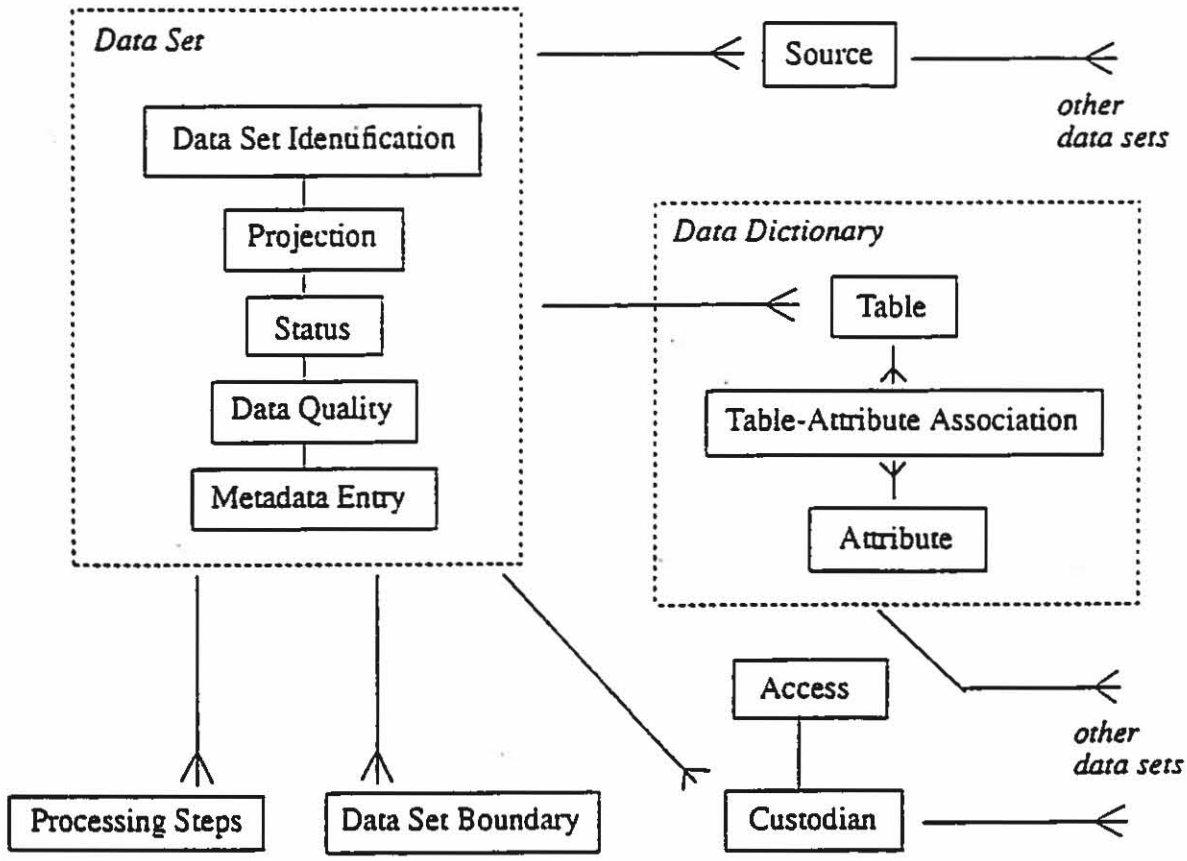

Figure 1. Suggested entity-relationship diagram for spatial metadata.

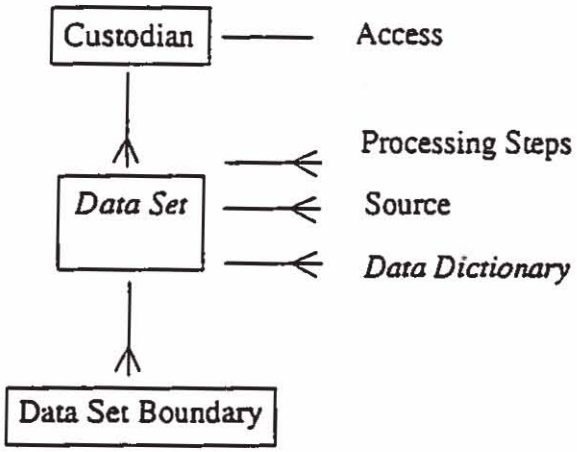

Figure 2. Hierarchy of shared metadata.

The standard also specifies metadata elements or groups of elements that may be repeated when multiple entries are needed.

Issues

The ad hoc working group identified several issues for which additional guidance from the spatial data community is needed. Reviewers are invited to provide their views on these issues in addition to comments on the metadata elements. Other issues related to systems with which the draft standard would be implemented also were discussed. While these related issues may not cause the standard to change, they may be of interest to those planning to test the standard.

Scope of the Standard

Much of the standard concentrates on metadata required for digital spatial data. Some reviewers have noted that much, if not most, spatial data are in analog form -- maps, aerial photographs, gazetteers, and other documents -- and have urged that the standard also address spatial data encoded using these media. This approach would provide users with a common set of information on a wider array of data. Additional metadata elements may be needed to encompass unique characteristics of these forms of spatial data.

Mandatory Metadata Elements

Several contributors and reviewers urged that a subset of mandatory data elements be defined as part of the standard. The ad hoc working group agreed, but did not reach consensus on which elements should be mandatory.

Tables 1 and 2 provide suggestions of data elements that should be mandatory for two major uses of metadata: catalogs of data and data transfer. Table 1 lists the suggested mandatory elements for entry into a catalog. Table 2 lists the suggested mandatory elements to accompany data during transfer.

Table 1. Suggested mandatory elements for data catalog entries

Identification Section
- Data Set Identity
- Theme Keywords
- Representation Model
- Transfer Format
- Transfer Size
- Data Set Description
- Intended Use
- Data Set Extent
- Intended Scale(s) of Use
- Resolution of Data

Projection Information
- Projection Name
- Horizontal Datum or Ellipsoid

Data Custodian Information
- Contact Type
- Contact Organization
- Contact Person and Title
- Contact Mailing Address
- Contact Telephone
- Contact Instructions

Access Information
- Transfer Mode
- Transfer Instructions

Status Information
- Degree of Digital Completion
- Completion Status
- Completion Date
- Percentage Complete
- Degree of Availability
- Policy Status
- Copyright Status
- Custodial Liability

Source Information
- Source Name
- Bibliographic Reference
- Source Scale
- Creator of Source
- Date(s) of Source Materials

Metadata Reference Section
- Metadata Revision Date
- Metadata Contact

Standardizing Metadata Content versus Content and Format for Use

Two views regarding the content of a metadata standard developed among members of the ad hoc working group. One view was that the standard should only define the metadata elements. Persons implementing the standard would decide how to store, query, and report the metadata. The other view was that the standard should define the metadata elements and a narrative, outline format amenable to presenting and comparing metadata for different data sets. The

Table 2. Suggested mandatory elements for data transfer

Identification Section
- Data Set Identity
- Theme Keywords
- Representation Model
- Data Set Description
- Intended Use
- Data Set Extent
- Intended Scale(s) of Use
- Resolution of Data

Projection Information
- Projection Name
- Horizontal Datum or Ellipsoid
- Vertical Datum
- Projection Units
- Standard Parallel
- Longitude of Central Meridian
- Latitude of Projection's Origin
- Zone Number
- Coordinate Precision

Data Custodian Information
- Contact Type
- Contact Organization
- Contact Person and Title
- Contact Mailing Address
- Contact Telephone
- Contact Instructions

Status Information
- Completion Date
- Copyright Status
- Custodial Liability

Table Definitions Portion of Data Dictionary/Schema
- Table Identity
- Table Definition
- Table Definition Source

Table Attributes Portion of Data Dictionary/Schema
- Attribute Identity
- Attribute Definition
- Attribute Definition Source
- Attribute Table Identity
- Attribute Domain Value
- Attribute Domain Value Definition
- Attribute Format Type
- Attribute Format Length

Source Information
- Source Name
- Bibliographic Reference
- Source Scale
- Creator of Source
- Date(s) of Source Materials

Processing Steps
- Procedure
- Procedure Tolerances

Data Quality
- Positional Accuracy
- Positional Accuracy Method
- Attribute Accuracy
- Attribute Accuracy Method
- Data Model Integrity
- Completeness

Metadata Reference Section
- Metadata Revision Date
- Metadata Contact

majority opinion was that the structured metadata elements could be organized to produce custom, presentation-quality reports easily. The generation of such a report should be an application of the metadata or data base software. The ad hoc working group acknowledged the need for presentation templates for reporting spatial metadata on paper after agreement is reached on content.

Implementing the Standard

In reviewing the metadata elements, one can interpret how the various elements may be associated or managed in related groups. One could encode these data and associations using relational or hierarchical structures available in data base management software. The choice of a data structure should not matter as long as the content and dependencies described by this document are adhered to by those implementing the standard.

An alternative to this approach is software that stores and indexes unstructured text files, and supports field searching as one would do through a conventional data base. One example of such software is the public-domain Wide Area Information Server (WAIS) software. This software would operate on ASCII files that could be output by a metadata generator or GIS package. By defining specific metadata fields and allowing them to be written into an ASCII text file, the software would be able to perform random text searching and more sophisticated, structured queries. For example, the WAIS-like indexer could allow access to phrases like "Carolina" anywhere in the file as well as a specific query of "'Geographic area' is 'North Carolina'". The Directory Interchange Format (DIF) developed by National Aeronautics and Space Administration for global data bases is a good example of such a flexible structure.

Content Standard for Spatial Metadata

Form Used for Metadata Entries

Data Element -- element definition, followed by statement indicating if the data element is mandatory for cataloging or data transfer, and if the data element can particpate in a repeating group (that is, more than one response per data set).

Type: encoding type for the value from choice of "text" "integer" "real" "date" "time"
Domain: restrictions on the values that can be assigned to the element.
Form: guidelines on the form in which the values should be encoded.
Example(s): examples of values.
Cross-reference: Analogous terms used in other systems that can store metadata. These sources include:

- EPA - Environmental Protection Agency Region 5 documentation
- Florida - Florida Spatial Data Directory
- LCGISN - Louisiana Coastal GIS Network
- NASA-DIF - National Aeronautics and Space Administration Directory Interchange Format
- SDTS - Spatial Data Transfer Standard (Federal Information Processing Standard 173
- USGS-DOCUMENT - Documentation program used by the U.S. Geological Survey Water Resources Division
- USMARC - Library of Congress MAchine Readable Catalog

Notes: Other notes about the data element

Where it may be appropriate for an entire section to be repeated for an entry, the notation is made at the section level.

Identification Section

Data Set Identity -- user-defined data set identity, usually unique to the owner; data set name assigned by the custodian. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Examples: "Transportation, Wind Mt. Quad" "Ground Water Wells, Pierce, Co, WA"
Cross-references: Data ID (IDEN/DAID) (SDTS)
Entry_ID and or Entry_title (NASA-DIF)
COVER (USGS-DOCUMENT)
Coverage Name COVER (EPA)
001 - Control number (USMARC)
mp_title, ph_title, im_title (LCGISN)

Theme Keywords -- common-use terms used to describe the thematic content of a spatial data set that would be useful in searching for candidate data. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: preferably selected from a standard lexicon of map themes, potentially multiple words, which would also support wildcarding of word forms (for example hydrog* = hydrography, hydrographic, hydrographer)
Examples: "Transportation" "Roads and Trails" "Highways" "Hydrography" "Geology"
Cross-references: Theme (CATS/THEM) (SDTS)
Parameter, Keyword (NASA-DIF)
THEME (USGS-DOCUMENT)
6xx - Subject Heading (USMARC)
subject (LCGISN)

Representation Model -- the data structure or mechanism used to represent mapped features in the product. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: "Vector-topologic" "Raster" "Quad-tree" "Paper Topographic Map" "Thematic Map"
Example: [see domain]
Cross-references: Data structure (IDEN/DAST) (SDTS)
structure (LCGISN)

Spatial Object Types -- the name of a spatial object type included in the data set. (Repeatable)

Type: text
Domain: "Point" "Chain" "Arc" "G-polygon" "GT-polygon" "Node" "Grid Cell" The full domain can be found in "Spatial Data Transfer Standard," Federal Information Processing Standard 173.
Example: [see domain]
Cross-references: NUM-ARCS, NUM-SEGS, NUM-POLYS, NUM-POINTS, NUM-TICS, NUM-ANNOS (USGS-DOCUMENT)
TYPE (EPA)
76 - Type of File or Data Note (USMARC)

type (LCGISN)

Spatial Object Count -- the number of a specific type of spatial objects included in the data set. (Repeatable)

Type: integer
Domain: Spatial Object Count >= 0
Examples: "1" "4000" "2096"
Cross-references: Spatial Address Count (STAT/NSAD) (SDTS)
NUM-ARCS, NUM-SEGS, NUM-POLYS, NUM-POINTS, NUM-TICS, NUM-ANNOS (USGS-DOCUMENT)
ditto in (EPA)
numpoly, numline, numpt, numbits (LCGISN)

Native Data Set Size -- the size in megabytes of the data set in its native form (digital data only).

Type: real
Domain: Native Data Set Size > 0.0.
Form: values entered with one decimal place
Examples: "300.0" "0.4" "1042.2"
Cross-references: filesize (LCGISN)

Transfer Format -- the name of data transfer format to be associated with a data transfer size (digital data only). (Mandatory - Catalog) (Repeatable)

Type: text
Form: names or acronyms describing transfer format such as "SDTS Vector Profile" "DLG-3 Standard" "DIME" "MOSS Exchange"
Example: [see form]
Cross-references: Storage_medium (NASA-DIF)
256 - File Characteristics (USMARC)
vendor (LCGISN)

Transfer Size -- the size in megabytes of the data set in a specified transfer format (digital data only). (Mandatory - Catalog) (Repeatable)

Type: real
Domain: Transfer Size > 0.0.
Form: values entered with one decimal place
Examples: "300.0" "0.4" "1042.2"
Cross-references: [none]

Dimensions of Data Set -- the x and y dimensions of an analog data set from which a digital data set was derived or for which a catalog entry is being made (analog data only).

Type: text
Form: two dimensions and a reference to a unit of measure
Examples: "28 by 38 inches" "70 by 120 centimeters"
Cross-references: 300 subfield c - Dimensions (height by width) (USMARC)
sizecat (sheet size A, E, etc.) size (dimensions) (LCGISN)

Data Set Description -- a text description of the spatial data set, provided by author or custodian. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: several sentences describing source and content
Example: "Land Use and Land Cover derived from the USGS-NMD GIRAS data sets at 1:250,000- and 1:100,000-scale."
Cross-references: Comment (IDEN/COMT) (SDTS)
Summary (NASA-DIF)
DESCRIPTION (USGS-DOCUMENT)
DESCRIPTION (EPA)
500 - General note (USMARC)
map-source, imagery-source, photo-source, map-history (LCGISN)

Intended Use -- Synopsis of the purpose(s) or application(s) for which a data set was created. The definition can also reference other metadata elements that will aid the user in determining the suitability of the data set for their own application. Of equal importance, the definition should summarize or reference metadata elements that will aid the user in determining limitations of the data set that might result in misuse of the data. A reference could also be made to a publication or contact person that would further aid the user in determining suitability of use. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: several sentences describing intended use
Example: "This information is intended to be used primarily for river basin, state, and multicounty resource planning, management, and monitoring. This information should not be used for site specific land use planning or management. For more information contact USDA Soil Conservation Service, address/phone#."
Cross-references: Discipline (NASA-DIF)
500 - General note (USMARC)
mp_disclaim (LCGISN)

Data Set Extent - the limits of coverage or spatial domain of a specific data set expressed in a minimum latitude and longitude bounding rectangle. (Note that, when portrayed on the surface of the earth, this "rectangle" may form a triangle, a band, a closed surface bounded by a great or small circle, or the

entire surface of the spheroid/ellipsoid.) (Mandatory - Catalog) (Mandatory - Transfer)

Type: real and text
Domain: -90.0 <= latitude <= 90.0; -180.0 <= longitude < 180.0; horizontal datum from Horizontal Datum or Ellipsoid element (see page 8).
Form: Two points located by latitude-longitude pairs, followed by the identification of the horizontal datum. The first point identified the southmost latitude and westmost longitude in the data set. The second point identified the northmost latitude and eastmost longitude in the data set. The numbers in the latitude-longitude pairs shall be separated by commas (','). Latitude and longitude values shall be expressed in decimal degrees with positive values to express north latitude and east longitude, and negative values to express south latitude and west longitude. The form for latitude and longitude values shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Example: "37.3092,- 95.9291 42.7716,- 90.0200 NAS"
Cross-references: Spatial Domain Type MINMAX (SPDM/DTYP) (SDTS)
Coverage (NASA-DIF)
EXTENT (USGS-DOCUMENT)
COVER-EXTENT (EPA)
255 subfield c - Coordinates (USMARC)
mbrwx, mbrex, mbrny, mbrsy, mbrunits (LCGISN)

Data Set Boundary -- the detailed limits of coverage or spatial domain of a specific data set expressed as a series of latitude and longitude coordinate pairs in either clockwise or counterclockwise order. (Repeatable)

Type: real and text
Domain: -90.0 <= latitude <= 90.0; -180.0 <= longitude < 180.0; horizontal datum from Horizontal Datum or Ellipsoid element (see page 8).
Form: Three or more points located by latitude-longitude pairs followed by the identification of the horizontal datum. The numbers in the latitude-longitude pairs shall be separated by commas (','). Latitude and longitude values shall be expressed in decimal degrees with positive values to express north latitude and east longitude, and negative values to express south latitude and west longitude. A line segment between the first and last point will close the domain. The form for latitude and longitude values shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Example: "42.0204,-100.2438 46.8874,-100.552 48.0333,-110.5292 43.6636,-102.3582 NAS"

Cross-references: Spatial Domain Type RING (SPDM/DTYP) (SDTS)

Data Set Exclusion Boundary -- bounded areas within the data set boundary expressed as a series of latitude and longitude coordinate pairs that are areas of 'no data' or lack of coverage. (Repeatable)

Type: real and text
Domain: -90.0 <= latitude <= 90.0; -180.0 <= longitude < 180.0; horizontal datum from Horizontal Datum or Ellipsoid element (see page 8).
Form: Three or more points located by latitude-longitude pairs followed by the identification of the horizontal datum. The numbers in the latitude-longitude pairs shall be separated by commas (','). Latitude and longitude values shall be expressed in decimal degrees with positive values to express north latitude and east longitude, and negative values to express south latitude and west longitude. A line segment between the first and last point will close the domain. The form for latitude and longitude values shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Example: "45.,-105. 45.5,-105. 45.5,-106. 45.,-105. NAS"
Cross-references: [none]

Geographic Area -- the names of significant areas and or places that fall within the extent of the spatial data set. (Repeatable)

Type: text
Form: name(s) from one or more of four categories (jurisdictional, mapping reference, geomorphic, or cultural). Each category may include more than one entry and all significant and hierarchical areas should be noted. The four categories are:
- Jurisdictional - areas that are characterized by their jurisdictional affiliation. These may include political boundaries (State, City, County, school district, voting district), and ownership boundaries (private lands, airports, national parks).
- Mapping Reference - areas that are characterized by some form of mapping reference system such as USGS quadrangle name, Census tract, plat number, TOBAN code, or NOAA navigational chart reference.
- Geomorphic - areas that are characterized by their geomorphic character. These may include mountain names, deltaic formation, water bodies, aquifers, valleys, basins, and deserts.
- Cultural - areas that are characterized by their cultural heritage.

Example: [none]
Cross-references: Location (NASA-DIF)

LOCATION (USGS-DOCUMENT)
AREAL-EXTENT (EPA)
522 - Geographic Coverage Note (USMARC)
052 - Geographic Classification Code (USMARC)
043 - Geographic Area Code (USMARC)
quad, country, state, parish, otherref, placenam (LCGISN)

Intended Scale(s) of Use -- the scale, or range of scales, at which the data can most accurately be applied. The determination of intended use should be based upon the scale or resolution of the source data used to generate the data set. (Mandatory - Catalog) (Mandatory - Transfer)

Type: integer
Domain: Intended Scale(s) of Use > 0
Form: One or two denominators of the representative fraction describing the scale. Where two values are provided, the first shall be the denominator of the largest intended scale of use and the second shall be the denominator of the smallest intended scale of use. The numerator of the representative fraction is assumed to be one.
Examples: "24000 100000" "125000"
Cross-references: Scale (IDEN/SCAL) (SDTS)
SCALE (USGS-DOCUMENT)
255 subfield a - Scale Statement (USMARC)
source_scale (LCGISN)

Resolution of Data -- the dimension of the smallest resolvable object in the data set. Resolution is commonly determined by the source media or monitor platform. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Examples: For a vector data set -- "Resolution is 20 hectares"
For a photograph -- "five lines per mm recorded on film"
For an image or raster data set -- "image pixel size is 20 meters on the ground"
For a sampling device -- "100 parts per billion"
Cross-references: RESOLUTION (USGS-DOCUMENT)
resolution, pixelx, pixely (LCGISN)

Disk Location -- the identity of the pathname of the data set on disk. These may include the identity of the computer or the name of a disk library.

Type: text
Examples: "MASTER>TEXAS" "server1:/data/"
Cross-references: WORKSPACE (EPA)

Summary -- Information in narrative form about the data set.

Type: text
Example: [none]
Cross-references: Summary (NASA-DIF)
Narrative file .NAR (USGS-DOCUMENT)

Projection Information

Projection Name -- the name of the projection coordinate system in which the source was mapped. (Mandatory-Catalog) (Mandatory - Transfer)

Type: text
Domain: "Geographic" is used for latitude-longitude.
Examples: "Albers Equal Area" "Polyconic"
Cross-references: Projection (XREF/PROJ) (SDTS)
255 subfield b - Projection Statement (USMARC)
projection (LCGISN)

Horizontal Datum or Ellipsoid -- the name of a specific set of constants specifying the coordinate systems used for geodetic control, i.e. for calculating (x,y) coordinates of points on the Earth's surface (National Geodetic Survey). (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: For North American 1927 - "NAS"
For North American 1983 -- "NAX"
For World Geodetic System 1960 -- "WGA"
For World Geodetic System 1966 -- "WGB"
For World Geodetic System 1972 -- "WGC"
For World Geodetic System 1984 -- "WGE"
For other -- text (for example "Clarke 1866")
[The domain is from "Spatial Data Transfer Standard," Federal Information Processing Standard 173.]
Example: [see domain]
Cross-references: Horizontal Datum (XREF/HDAT) (SDTS)
Spheroid (USGS-GCTP)
500 - General Note (USMARC)
hdatum (LCGISN)
ellipsoid (LCGISN)

Vertical Datum -- reference surface for the third (Z) component of spatial coordinates. (Mandatory - Transfer)

Type: text
Domain: For National Geodetic Vertical Datum of 1929 -- "NGVD"
For North American Vertical Datum of 1988 -- "NAVD"

Where all altitudes are referenced to the ellipsoid of the specified datum -- "GEODETIC"
For other -- text
[The domain is from "Spatial Data Transfer Standard," Federal Information Processing Standard 173.]

Example: [see domain]

Cross-references: Vertical Datum (XREF/VDAT) (SDTS)
500 - General Note (USMARC)
vdatum (LCGISN)

Projection Units -- the units in which measurements on the map are given or in which a digital map is stored. (Mandatory - Transfer)

Type: text
Form: units of measurement
Examples: "feet" "meters" "decimal degrees"
Cross-references: Units (USGS-GCTP)
500 - General Note (USMARC)
vector_units, pixel_units (LCGISN)

Standard Parallel -- line(s) of latitude where the cone of projection is tangent to the spheroid of the projection. (Mandatory - Transfer) (Repeatable)

Type: real
Domain: -90.0 < Standard Parallel < 90.0
Form: A latitude value expressed in decimal degrees with positive values to express north latitude and negative values to express south latitude. The form for latitude shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Examples: "45.5" "29.5"
Cross-references: Standard Parallel (USGS-GCTP)

Longitude of Central Meridian -- the line of longitude that is in the center of the map from which coordinates to the right are positive and coordinates to the left are negative, typically the vertical line on a map drawn in a conic projection. (Mandatory - Transfer)

Type: real
Domain: -180.0 <= longitude < 180.0
Form: A longitude value expressed in decimal degrees with positive values to express east longitude and negative values to express west longitude. The form for latitude and longitude values shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Example: "- 96."
Cross-references: Central Meridian (USGS-GCTP)

Latitude of Projection's Origin -- the line of latitude in a conic projection at which 'y' coordinates are measured north from (i.e. where y = 0). (Mandatory - Transfer)

Type: real
Domain: -90.0 <= Latitude of Projection's Origin <= 90.0
Form: One or two latitude values expressed in decimal degrees with positive values to express north latitude and negative values to express south latitude. The form for latitude shall follow "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard Publication 70-1 (ANSI X3.61-1986).
Examples: "23."
Cross-references: Y Origin (IREF/YORG) (SDTS)
Latitude of Projection's Origin (USGS-GCTP)

Zone Number -- the number of the zone used in State Plane Coordinate System, Universal Transverse Mercator, and Universal Polar Stereographic grid systems. (Mandatory - Transfer)

Type: text and integer
Form: system identification and zone number
Domain: Universal Transverse Mercator:
System identification: "UTM"
Zone number: The first character shall be a plus sign ("+") to indicate the Northern Hemisphere and a minus sign ("-") to indicate the Southern Hemisphere. The sign shall be followed by the zone number ("01" "02" "03" . . . "60") indicating the 6 degree longitudinal band in which the point is located.
Universal Polar Stereographic:
System identification: "UPS"
Zone number: Grid zone letter designator "A" "B" "Y" "Z"
State Plane Coordinate System:
System identification: "SPSC"
Zone number: four digit numeric code. Codes for the State Plane Coordinate System based on the North American 1927 datum are found in "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard 70-1 (ANSI X3.61-1986). Codes for the State Plane Coordinate System based on the North American 1983 datum are found in "State Plane Coordinate System of 1983," National Oceanic and Atmospheric Administration Manual NOS NGS 5.
[The domain is drawn from "Representation of Geographic Point Locations for Information Interchange," Federal Information Processing Standard 70-1 (ANSI X3.61-1986); "Spatial Data Transfer Standard," Federal Information Processing Standard 173; and "State Plane Coordinate System of 1983," National Oceanic and Atmospheric Administration Manual NOS NGS 5.]

Examples: "SPSC 4901" "UTM +13" "UPS A"
Cross-references: Zone Number (XREF/ZONE) (SDTS)
mp_zone (LCGISN)

Coordinate Precision -- the precision with which object coordinates are managed or maintained in the native software system and which are to be expected in the transfer. (Mandatory - Transfer)

Type: text
Domain: "Single" "Double"
Example: [see domain]
Cross-references: PRECISION (USGS-DOCUMENT)
PRECISION (EPA)

Data Custodian Information (Repeatable)

Contact Type -- the type of contact individual and organization involved in the production or distribution of the current spatial data set, associated with the following eight data fields (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: "Author/Originator" "Maintenance/Update" "Availability" or "Distributor"
Example: [see domain]
Cross-references: Data_center, Investigator, Technical_contact, Author (NASA-DIF)

Contact Organization -- the name of the organization acting as custodian of the data. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Example: "U.S. Geological Survey, Eastern Mapping Center"
Cross-references: Originating_center, Data_center (NASA-DIF)
ORGANIZATION (EPA)
535 - Location of Originals Note (USMARC)
org_author, org_taker, org_publisher (LCGISN)

Contact Person and Title -- the name(s) and title(s) of individual(s) to contact. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: name and job title
Example: "Jane Doe, Cartographic Technician"
Cross-references: Data_center_contact (NASA-DIF)
First_name, Middle_name, Last_name (NASA-DIF)

CONTACT-PERSON (USGS-DOCUMENT)
CONTACT (EPA)
attention (LCGISN)

Contact Mailing Address -- the address of the contact identity. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Example: "12201 Sunrise Valley Drive, Mail Stop 567, Reston, VA 22092"
Cross-references: Address (NASA-DIF)
ADDRESS, CITY, STATE, ZIP (EPA)
265 - Source of Acquisitions (USMARC)
address, city, parish, state, zip (LCGISN)

Contact Physical Location -- the location of a contact if different from the mailing address.

Type: text
Example: "Fillmore Building, 3rd Floor"
Cross-references: OFFICE (EPA)
265 - Source of Acquisitions (USMARC)

Contact Telephone -- the telephone number of the contact person. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: three digit are code and seven character telephone number
Examples: "(800) USA-MAPS" "(555) 555-1212"
Cross-references: Phone (NASA-DIF)
PHONE (EPA)
535 - Location of Originals Note (USMARC)
phone (LCGISN)

Contact Fax Number -- the telephone number of a fax machine for a contact.

Type: text
Form: three-digit area code and seven character telephone number
Example: "(555) 555-1212"
Cross-references: FAX (EPA)
535 - Location of Originals Note (USMARC)
fax (LCGISN)

Contact Electronic Mail -- the address of the electronic mailbox to which correspondence may be sent to the contact.

Type: text
Form: name of system followed by the user ID and hostname

Example: "Internet: jdoe@usgs.gov"
Cross-references: Email (NASA-DIF)
EMAIL (EPA)
535 - Location of Originals Note (USMARC)
email (LCGISN)

Contact Instructions -- text instructions to end user on how or when to make contact with an individual contact person. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Example: "Call listed phone number between the hours of 7:00 am and 3:00 pm ET for ordering assistance."
Cross-references: CONTACT-INSTRUC (USGS-DOCUMENT)
500 - General Note (USMARC)
item_location, availability, sale_status, cost (LCGISN)

Access Information

Transfer Mode -- the mechanism by which users may acquire the data set in a transfer format. (Mandatory - Catalog) (Repeatable)

Type: text
Domain: "Modem" "Network" "Tape" "Disk"
Example: [see domain]
Cross-references: [none]

Transfer Instructions -- a specific description of each transfer mode available. (Mandatory - Catalog) (Repeatable)

Type: text
Form: For "Modem" -- phone number and setup instructions.
For "Network" -- the network type, host identity, and login instructions.
For "Tape" -- the type and density of tape and archiving instructions.
For "Disk" -- the type and density of disks and the computers that could use it.
Examples: For "Tape" -- "Cartridge tapes available in 150MB QIC tapes in UNIX tar format"
For "Network" -- "Internet access through gumby.tku.edu, anonymous ftp"
Cross-references: [none]

Computer Type and Operating System -- the brand name of computer and operating system from which these data sets are made available or through which can be provided to end users. (Repeatable)

Type: text
Examples: "IBM-compatible PC running DOS 5.0" "DG Aviion UNIX DG/UX 5.4"
Cross-references: 538 - Technical Details Note (USMARC)

Data Fee -- the fee and terms for retrieving the data set.

Type: text
Example: "One time charge of $7 per quadrangle, due by purchase order prior to delivery"
Cross-references: [none]

Media Fee -- a fee specifically assigned to cover the cost of the distribution medium as distinct from the data fee.

Type: text
Example: "There is a $15 charge per cartridge tape"
Cross-references: [none]

Delivery Fee -- a fee associated with the routine or expedited delivery of a data set.

Type: text
Example: "A $10 handling fee may be added for overnight delivery of tapes or disks"
Cross-references: [none]

Service Fee -- a fee associated with standard or specialized assistance.

Type: text
Examples: "Consulting on data conversion and usage is available at $30 per hour" "A $10 fee is added to orders of less than $500 for order processing"
Cross-references: [none]

Turnaround -- typical turnaround time, in days, for the filling of a non-custom order on standard media.

Type: integer
Examples: "1" "5" "30"
Cross-references: [none]

Status Information

Degree of Digital Completion -- the entire range of steps from data collection through conversion, edit, structuring, and review that have been accomplished for the entire spatial extent intended for the data set. It excludes analog data collection steps. Completion refers only to the initial development of an analog map or of a data set in digital form. Digital completion includes the conversion of analog data to digital form; updates or enhancements after completion of all or part of the initial creation/conversion are properly described in the next section under maintenance characteristics. (Mandatory - Catalog)

Type: text
Domain: "Complete" "Partial"
Example: [see domain]
Cross-references: STATUS (EPA)
500 - General Note (USMARC)
ancestry (LCGISN)

Completion Status -- the status of the completion of a specific data set. (Mandatory - Catalog)

Type: text
Domain: "Active" "Indefinitely Suspended" "Temporarily Suspended" "Permanently Suspended (Canceled)" "Planned" "Completed" "Archived"
Example: [see domain]
Cross-references: PUB-STATUS and ARCHIVE (USGS-DOCUMENT)
500 - General Note (USMARC)
progress (LCGISN)

Completion Date -- the date by which the processing of the spatial data set is expected to be or was completed in extent and processing. (Mandatory - Catalog) (Mandatory - Transfer)

Type: date
Form: YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the Gregorian calendar. DD may be dropped to reference the month only. MM may be dropped to reference the year only. Form follows "Calendar Date," Federal Information Processing Standard 4.
Examples: "19871001" "198810" "1989"
Cross-references: 500 - General Note (USMARC)
end_date_collection (LCGISN)

Geographic Area Completed -- spatial units, either standard or special, for which the data set is complete through final review stage and is ready for distribution.

Type: text
Form: [see Geographic Area element, page 6]
Examples: "Winchester, Johnson, and Madison Counties"
Cross-references: 505 - Contents Note (USMARC)
522 - Geographic Coverage Note (USMARC)

Geographic Area Not Completed -- spatial units, either standard or special, for which the data set is not complete through final review stage or is not ready for distribution.

Type: text
Form: [see Geographic Area element, page 6]
Examples: "Winchester, Johnson, and Madison Counties"
Cross-references: [none]

Percentage Complete -- a description of one or more levels of completion with an estimated percentage of coverage at each level of completion. See also Completeness in Data Quality section. (Mandatory - Catalog)

Type: text
Form: percentages to be provided with categories as "Final Review" "Edge Matched" "Final Edit" "Topological Structuring" "Initial Edit" "Digital Conversion" "Field Collection"
Examples: "70% of data set through final review and editing," "100% through initial edit"
Cross-references: Completeness (DQCG/COMT) (SDTS)

Maintenance and Update Frequency -- the frequency with which changes and additions are made to the data set after the initial data set is developed and available for distribution.

Type: text
Domain: "More often than weekly" "Weekly" "Less than weekly" "Once per month" "Four times per year" "Twice per year" "Once per year" "Less often than yearly" "No plans"
Example: [see domain]
Cross-references: 315 - Frequency (USMARC)

Degree of Availability -- the portion of the existing completed data which are available for distribution. (Mandatory - Catalog)

Type: text
Domain: "Fully available" "Partially available" "None available"
Example: [see domain]

Cross-references: availability (LCGISN)

Hardcopy Product Availability -- analog versions of the data set which are available from custodian. (Repeatable)

Type: text
Domain: "Litho or offset prints" "Diazo" "Xerographic" "Electrostatic plot" "Pen Plot" "Laser printer plot" "Stable base white opaque photo" "Stable base translucent photo" "Stable base transparent photo"
Example: [see domain]
Cross-references: 530 - Additional Physical Form Available (USMARC)

Policy Status -- a description of distribution and ownership policy as provided by custodian. (Mandatory - Catalog)

Type: text
Example: "Users are able to obtain these data free-of-charge but shall not duplicate the data for redistribution."
Cross-references: 500 - General Note (USMARC)

Copyright Status -- whether the data are in the public domain or are copyrighted with some type of restrictions on usage. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: "Public domain" "Copyrighted"
Example: [see domain]
Cross-references: PUB-STATUS (USGS-DOCUMENT)
500 - General Note (USMARC)

Custodial Liability -- the liability of the custodian related to the quality and use of the data set. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Domain: "No liability statement" "Custodian does not assume liability" "User must sign liability statement"
Example: [see domain]
Cross-references: 500 - General Note (USMARC)
disclaimer (LCGISN)

Table Definitions Portion of Data Dictionary/Schema (Repeatable)

Data Base Identity -- the identity of a data base to which the table belongs. In relational data bases, a given table is stored within a specified data base, or collection of tables.

Domain: text
Examples: "county" "maintenance"
Cross-references: [none]

Table Identity -- the identity or label associated with a table in a relational database or an entity in a logical data model, assigned by the owner. (Mandatory - Transfer)

Type: text
Form: user-defined data tables for entities; sometimes limited to 32 characters (SQL standard)
Examples: "datacenter" "soil_lookup" "documentation"
Cross-references: Entity/Attribute Label (DDDF/EALB) (SDTS)
FILENAME (USGS-DOCUMENT)
FILE (EPA)

Table Definition -- the definition of the attribute or entity denoted by the contents of the data field. (Mandatory - Transfer)

Type: text
Examples: "Lookup table for polygon feature symbolization"
Cross-references: Definition (DDDF/DFIN) (SDTS)
SHORTDEF (USGS-DOCUMENT)
DEFINITION (EPA)

Table Definition Source -- the source from which the definition was obtained. (Mandatory - Transfer)

Type: text
Form: list of source organizations or documents
Example: "USGS DLG-3 User Guide, 1987"
Cross-references: Source (DDDF/SRCE) (SDTS)
DATASOURCE (USGS-DOCUMENT)
ITEMSRC1-2 (EPA)

Table Authority -- the code of organization responsible for the attribute definition.

Type: text
Form: four characters or less
Examples: "USGS" "EPA"

Cross-references: Attribute Authority (DDDF/AUTH) (SDTS)
DATASOURCE (USGS-DOCUMENT)

Table Authority Description -- the description of the organization responsible for the attribute definition.

Type: text
Examples: "U.S. Geological Survey, National Mapping Division"
Cross-references: Attribute Authority Description (DDDF/ADSC) (SDTS)

Table Attributes Portion of Data Dictionary/Schema (Repeatable)

Attribute Identity -- the identity, label, or name associated with an attribute. (Mandatory - Transfer)

Type: text
Form: conform to SQL standard
Examples: "soil_code"
Cross-references: Attribute Label (DDOM/ATLB) (SDTS)
ITEMNAME (USGS-DOCUMENT)
ITEM (EPA)

Attribute Definition -- The definition of the attribute identity. (Mandatory - Transfer)

Type: text
Example: "Code for soil mapping unit, as shown on source map"
Cross-references: Definition (DDDF/DFIN) (SDTS)
SHORTDEF (USGS-DOCUMENT)
DEFINITION (EPA)

Attribute Definition Source -- the source from which the attribute definition was obtained. (Mandatory - Transfer)

Type: text
Example: "USGS DLG-3 User Guide, 1987"
Cross-references: Source (DDDF/SRCE) (SDTS)
DATASOURCE (USGS-DOCUMENT)
SOURCE (EPA)

Attribute Table Identity -- the identity of a table or multiple tables in which this attribute belongs. (Mandatory - Transfer) (Repeatable)

Type: text

Example: "soil_lookup" (could be implemented as tuples of entity/table and attribute identities to accommodate same attributes being in multiple tables)
Cross-references: Entity/Attribute Label (DDDF/EALB) (SDTS)
FILENAME and ITEMNAME (USGS-DOCUMENT)

Attribute Authority -- Organization responsible for the attribute definition

Type: text
Form: four-letter code
Examples: "USGS" "EPA"
Cross-references: Attribute Authority (DDOM/AUTH) (SDTS)
DATASOURCE (USGS-DOCUMENT)

Attribute Domain Value -- the valid values for a given attribute. (Mandatory - Transfer) (Repeatable)

Type: text
Form: codes or a reference a list of valid codes
Example: "positive integer between 1 and 14, inclusive"
Cross-references: Domain Value (DDOM/DVAL) (SDTS)
DATADOMAIN (USGS-DOCUMENT)

Attribute Domain Value Definition -- the definition of the valid values for a given attribute. (Mandatory - Transfer) (Repeatable)

Type: text
Example: "pH -- the measure of acidity or alkalinity based on hydrogen ions"
Cross-references: Domain Value Definition (DDOM/DVDF) (SDTS)

Attribute Format Type -- the computer representation of the attribute. (Mandatory - Transfer)

Type: text
Examples: "integer" "real" "character"
Cross-references: Character Type (Florida)
ITEMTYPE (USGS-DOCUMENT)

Attribute Format Length -- the maximum number of bytes used to represent the attribute. (Mandatory - Transfer)

Type: integer
Examples: "4" "12" "2000"
Cross-references: Length (Florida)
ITEMWIDTH, OUTPUTWIDTH (USGS-DOCUMENT)

Attribute Significant Digits -- the number of digits starting at the leftmost digit to which a given value of an attribute maintains accuracy.

Type: integer
Cross-references: Number of Significant Digits (Florida)
Notes: Three significant digits with respect to a number reported as 477,202 means the number is reported as accurate only to 477,000. Three significant digits on a real number such as 3.1416 would be accurately reported as 3.14.

Attribute Units of Measure -- the units of measure explicitly associated with all instances of this attribute.

Type: text
Domain: units such as dollars, feet, inches, meters, pounds
Examples: "meters" "hours"
Cross-references: Units of Measure (Florida)

Source Information (Repeatable)

Source Name -- brief descriptive name of the source material. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Examples: "Surficial Geology of Sugar Creek Quadrangle"
Cross-references: Description of source material(s) (Florida)
Source_name (NASA-DIF)
SOURCEI-5 (EPA)
537 - Source of Data Note (USMARC)

Bibliographic Reference -- the reference, in bibliographic form, of source or product. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: bibliographic references of published and unpublished materials
Example: "U.S. Geological Survey, 1990, Digital Line Graphs from 1:24,000-Scale Maps, Data Users Guide 1, Reston, VA"
Cross-references: CITATION-1 through 4 (USGS-DOCUMENT)
Reference (NASA-DIF)
PUBLISH-DATE (EPA)
510 - Citation Note (USMARC)

Source Scale -- ratio between the distance on a map, chart, photograph, or image and the corresponding distance on the surface of the Earth. (Mandatory - Catalog) (Mandatory - Transfer)

Type: integer
Domain: Source Scale > 0
Form: Denominator of the representative fraction describing the scale. The numerator of the representative fraction is assumed to be one.
Examples: "24000"
Cross-references: Scale (IDEN/SCAL) (SDTS)
SCALE (USGS-DOCUMENT)
SCALE (EPA)
034 subfield b - Coded Mathematical Data, Horizontal Scale Denominator (USMARC)
scale (LCGISN)

Source Medium -- the medium on which source was prepared or from which a digital spatial data set was digitized.

Type: text
Examples: "mylar" "paper" "electronic tape"
Cross-references: Media of Source (Florida)
Sensor_name (NASA-DIF)
MEDIUM (EPA)
500 - General Note (USMARC)

Medium Condition -- a qualitative statement regarding the condition of the medium.

Type: text
Examples: "folded map stored in map drawer in air conditioned environment"
Cross-references: Media Condition (Florida)
500 - General Note (USMARC)

Creator of Source -- identity of organization or author responsible for source material. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: list of source organizations or documents
Examples: "U.S. Forest Service"
Cross-references: Source (DDDF/SRCE) (SDTS)
500 - General Note (USMARC)

Date(s) of Source Materials -- date or date range for which the data represented in data set or series are valid. (Mandatory - Catalog) (Mandatory - Transfer)

Type: date
Form: YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the

Gregorian calendar. DD may be dropped to only reference the month. MM may be dropped to only reference the year. Form follows "Calendar Date," Federal Information Processing Standard 4.

Examples: "19871001" "198810" "1989" "1989 1992"

Cross-references: Map Date (IDEN/MPDT) (SDTS)
Date of Source Material (Florida)
Start_date, Stop_date (NASA-DIF)
COMPILE-DATE (EPA)
250 -Edition Statement (USMARC)
260 subfield c - Date of Publication (USMARC)

Source Projection -- the name and parameters of the projection of the source material.

Type: text

Example: "Albers Equal Area, units meters, standard parallels 29.5 and 45.5, central meridian -96, origin of projection 23 degrees north."

Cross-references: PROJECTION (EPA)
SUBCOMMANDS (EPA)
500 - General Note (USMARC)

Processing Steps (Repeatable)

Procedure -- a processing step such as the execution of a software command, a user-written program, or other task that may affect the content and or quality of the data prior to or during automation. If the processing step includes a transformation, then the type and error (root mean square error) shall be reported. (Mandatory - Transfer)

Type: text

Form: description of processing step completed, prefer use of generic terminology although specific GIS commands may be used for reference in addition to the general description

Example: "Mylar base map was registered to the CALCOMP 9100 digitizer using an affine transformation into the UTM coordinate system. Root mean square errors were 0.005 inches (map) or 10 meters (UTM). Digitizer resolution is to 0.001 inch"

Cross-references: Preautomation compilation (Florida)
Digitizing/scanning/transformations (Florida)
TXT-NARR (USGS-DOCUMENT)
COMMAND with LOG-COMMENT1-3 (EPA)
ancestry, method_of_classification, method_of_geocorrection (LCGISN)

Procedure Tolerances -- a description of any processing tolerances applied in this processing step. (Mandatory - Transfer)

Type: text
Examples: "Coordinates were thinned to the nearest 20 meters using the Douglas-Peucker algorithm"
Cross-references: TXT-NARR (USGS-DOCUMENT)
FUZZY-TOL (EPA)
DANGLE-TOL (EPA)

Procedure Date -- the date and time (optional) that a particular procedure was conducted.

Type: date and time (optional)
Form: date -- YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the Gregorian calendar. DD may be dropped to only reference the month. MM may be dropped to only reference the year.
time -- 24-hour timekeeping - HH:MM:SS where H is the hour (domain 00-24), MM is the minute (domain 00-59), and SS is the second (domain 00-59). Midnight is represented as 00:00:00 or 24:00:00.
-- 12-hour timekeeping - HH:MM:SSD where HH is the hour (domain: 00-12), MM is the minute (domain: 00-59), SS is the second (domain: 00-59), and D is the meridiem designator ('A' for ante meridiem (a.m.) and 'P' for post meridiem (p.m.)). Midnight is represented at '12:00:00A' and noon is represented at '12:00:00P'.
Form for date follows "Calendar Date," Federal Information Processing Standard 4. Form for time follows "Representations of Local Time of the Day for Information Interchange," Federal Information Processing Standard 58.
Examples: '19901020' '19910102 12:22:13A'
Cross-references: Date of Automation (Florida)
Data Set Creation Date (IDEN/DCDT) (SDTS)
TXT-NARR (USGS-DOCUMENT)
MOD-DATE (EPA)
COMMAND-DATE (EPA)

Procedure Contact -- the identity of an individual or organization responsible for the execution of the specified procedure, and related contact information.

Type: text
Form: name and organizational affiliation
Examples: "Joe Doe, USGS-WRD, Reston, VA"
Cross-references: UPDATE-PERSON, (USGS-DOCUMENT)
TXT-NARR (USGS-DOCUMENT)
INIT-OF-EXEC (EPA)

Data Set Version Number -- the unique version number of the data set that relates directly to the completion of a specified procedure.

Type: text
Form: usually a combination of numeric characters (0-9) and decimals
Examples: "2.0.2" "1.4" "20"
Cross-references: Data ID (IDEN/DAID) (SDTS)
COVER-REV (USGS-DOCUMENT)

Data Quality

Positional Accuracy -- the absolute measure of error referenced in the units of the coordinate system. (Mandatory - Transfer)

Type: text and real
Form: "+/-" followed by value of measure of error
Example: "+/- 20"
Cross-references: Positional Accuracy Value (Florida)
Positional Accuracy Comment (DQPA/COMT) (SDTS)
POS-QUALITY (EPA)

Positional Accuracy Method -- the method by which positional accuracy was determined. (Mandatory - Transfer)

Type: text
Domain: "Deductive estimate" "Internal evidence" "Comparison to source" "Independent source of higher accuracy"
Example: [see domain]
Cross-references: Positional Accuracy Comment (DQPA/COMT) (SDTS)

Positional Accuracy Explanation -- a text explanation of how the method was applied to determine an estimate positional accuracy

Type: text
Example: "Coordinates were compared between features on a 1:24,000-scale map and the image. At least 12 features were checked in every scene and all features were within one-half pixel of their map location, where one pixel is 30 meters wide."
Cross-references: Method of derivation (Florida)
Positional Accuracy Comment (DQPA/COMT) (SDTS)
Quality (NASA-DIF)
POS-DEFENSE (EPA)

Attribute Accuracy -- a measure of the confidence with which features are correctly portrayed in the data set, usually represented as a percentage. (Mandatory - Transfer)

Type: Integer
Examples: "95" "65"
Cross-references: Attribute Accuracy Comment (DQAA/COMT) (SDTS)
ATT-QUALITY (EPA)

Attribute Accuracy Method -- the method by which positional accuracy was determined. (Mandatory - Transfer)

Type: text
Domain: "Deductive estimate" "Internal evidence" "Comparison to source" "Independent source of higher accuracy"
Example: [see domain]
Cross-references: Attribute Accuracy Comment (DQAA/COMT) (SDTS)

Attribute Accuracy Explanation -- a text explanation of how the method was applied to determine an estimate of attribute accuracy.

Type: text
Example: "A misclassification matrix was prepared using land use data collected from field observations and the image classification."
Cross-references: Attribute Accuracy Comment (DQAA/COMT) (SDTS)
Quality (NASA-DIF)
ATT-DEFENSE1-2 (EPA)

Data Model Integrity -- a text explanation of the integrity of the relationships between geometric objects in the data set, and any topological tests run. (Mandatory - Transfer)

Type: text
Example: "Data set is topologically-structured polygon data with nodes at all intersections"
Cross-references: Logical Consistency Comment (DQLC/COMT) (SDTS)
Quality (NASA-DIF)
LOC-QUALITY and LOC-DEFENSE (EPA)

Completeness -- information about selection criteria, definitions used, and other relevant mapping rules that were used to derive the data set in analog or digital form. (Mandatory - Transfer)

Type: text
Example: "All land use classes whose areal extent exceeds 20 hectares were included. Features less than 100 meters wide were not included. Streams less than 500 meters long were not

included. All streams over 200 meters wide are represented as double-bank streams."
Cross-references: Completeness Comment (DQCG/COMT) (SDTS)
Quality (NASA-DIF)

Metadata Reference Section

Metadata Revision Date -- the date that the latest (current) version of metadata was compiled, or the original entry date if not revised. (Mandatory - Catalog) (Mandatory - Transfer)

Type: date
Form: YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the Gregorian calendar. Form follows "Calendar Date," Federal Information Processing Standard 4.
Example: "19871001"
Cross-references: Revision_date (NASA-DIF)
CREATE-DATE (USGS-DOCUMENT)
UPDATE-DATE (USGS-DOCUMENT)
250 - Edition Statement (USMARC)
ct_date (LCGISN)

Metadata Review Date -- the date of the latest review of the metadata entry for accuracy of scientific or technical content.

Type: date
Domain: Metadata Review Date later than Metadata Revision Date
Form: YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the Gregorian calendar. Form follows "Calendar Date," Federal Information Processing Standard 4.
Example: "19871001"
Cross-references: Science_review_date (NASA-DIF)
583 subfield c - Action Note, Time of Action (USMARC)

Metadata Future Review Date -- the date, suggested by the author, by which the metadata entry should be reviewed for technical content and currency.

Type: date
Domain: Metadata Future Review Date later than Metadata Revision Date
Form: YYYYMMDD where YYYY is the year, MM is the month (domain: 01-12), and DD is the day (domain: 01-31), as identified by the Gregorian calendar. Form follows "Calendar Date," Federal Information Processing Standard 4.
Example: "19871001"

Cross-references: Future_review_date (NASA-DIF)
583 subfield c - Action Note, Time of Action (USMARC)

Metadata Contact -- the identity of the individual responsible for the entry or update of the latest metadata summary for this data set. (Mandatory - Catalog) (Mandatory - Transfer)

Type: text
Form: name and userid
Example: "Jim Taylor, jtaylor@server1"
Cross-references: UPDATE-PERSON (USGS-DOCUMENT)
cataloger_person (LCGISN)

Alphabetical Index of Metadata Elements

Appendix B

Example Use of the Draft Standard

Below is an example of a metadata for a data set. This example illustrates the organization and content for metadata.

The example is not intended as a standard for physical computer format or exchange. To implement the standard, the data should be labelled using standard identifiers, or tags. This approach would allow for support of multiple languages, access names, and a more compact storage. For prototyping and testing purposes the following example may be used to communicate content between those testing data cataloging and software.

```
Data_set_identity:  "Hydrologic Unit Map, Intermediate Scale"
Theme_keywords:  hydrolog* basin* huc "hydrologic unit" watershed
Representation_model:  Vector-topologic
Spatial_object_types:  Chain GT-polygon
Native_data_set_size:  40.0
Transfer_format:  "DLG-3 Optional"
Transfer_size:  40.0
Transfer_format:  "ARC/INFO Export 6.1"
Transfer_size:  41.2
Data_set_description:  "Hydrologic units as defined by the Federal
   government, collected and digitized at 1:250,000-scale with
   1:100,000-scale insets in several western states.  Hydrologic units
   have been appended into a single data set that comprises the
   conterminous 48 states, removing map edges in the process. Polygon and
   boundary attributes are present for site analysis and basin boundary
   symbolization."
Intended_use:  "Data set to be used for tagging of water sampling
   locations with the correct hydrologic unit code. Also for use in
   quality assurance of sampling locations that are already tagged with
   basin identity."
Data_set_extent:  21.4346,-126.0221 49.23,-67.000 NAS
Geographic_area:  "Conterminous United States"
Intended_scale(s)_of_use:  250000
Resolution_of_data:  "10 m"
Projection_name:  "Albers Equal Area"
Horizontal_datum_or_ellipsoid:  NAS
Vertical_datum:  NGVD
Projection_units:  meters
Standard_parallel:  29.5
Standard_parallel:  45.5
Longitude_of_central_meridian:  -96.0
Latitude_of_projection's_origin:  23.5
Coordinate_precision:  Single
Contact_type:  Author/Originator
Contact_organization:  "U.S. Geological Survey, Water Resources Division"
Contact_person_title:  "Doug Nebert, hydrologist"
Contact_mailing_address:  "445 National Center, Reston, VA 22092"
```

```
Contact_telephone:  "(703) 555-1212"
Contact_email:  ddnebert@qvarsa.er.usgs.gov
Contact_instructions:  "contact for technical information via e-mail or
   regular mail"
Contact_type:  Distributor
Contact_organization:  "U.S. Geological Survey, Water Resources Division"
Contact_person:  "Mark Negri, computer specialist"
Contact_mailing_address:  "445 National Center, Reston, VA 22092"
Contact_telephone:  "(703) 555-1212"
Contact_email:  mnegri@qvarsa.er.usgs.gov
Contact_instructions: "Data are available through WAIS software and
   anonymous ftp from Internet site 130.11.51.171.  Tape requests are
   filled at cost of duplication."
Transfer_mode:  Network
Transfer_instructions:  "Data are available through WAIS software and
   anonymous ftp from Internet site 130.11.51.171."
Transfer_mode:  Tape
Transfer_instruction:  "Tapes containing DLG-formatted data are available
   at 1600 or 6250 cpi in block sizes that are multiples of 80 bytes."
Degree_of_digital_completion:  Complete
Completion_status:  Completed
Completion_date:  19921001
Percentage_complete:  "100% through final review"
Degree_of_availability:  "Fully available"
Policy_status:  "Users may obtain these data at the cost of reproduction
   and redistribute them as desired."
Copyright_status:  "Public domain"
Custodial_liability:  "Custodian does not assume liability"
Table_identity:  huc250.pat
Table_definition:  "Polygon attribute table for hydrologic units"
Table_definition_source:  author
Table_identity:  huc250.aat
Table_definition:  "Attribute table for chain (arc) features"
Table_source:  author
Attribute_identity:  area
Attribute_definition:  "area measured in equal area meters"
Attribute_definition_source:  software-defined
Attribute_table_identity:  huc250.pat
Attribute_domain_value:  "positive real numbers"
Attribute_domain_value_definition:  none
Attribute_format:  real
Attribute_format_length:  12
Attribute_units_of_measure:  "square meters"
Attribute_identity:  huc
Attribute_definition:  "Hydrologic Unit - Cataloging Unit Identity"
Attribute_definition_source:  "Catalog of Information on Water Data (1972)"
Attribute_table_identity:  huc250.pat
Attribute_authority:  "U.S. Geological Survey, Water Resources Division"
Attribute_domain_value:  "Concatenation of valid Region, Subregion,
   Accounting, and Cataloging Units as two-digit pairs in a hierarchy:
   RRSSAACC"
Attribute_domain_value_definition:  none
```

```
Attribute_format:  integer
Attribute_format_length:  8
Attribute_units_of_measure:  meters
Attribute_identity:  source
Attribute_definition:  "The source from which the current boundary feature
   was generated"
Attribute_definition_source:  "generated from source material"
Attribute_table_identity:  huc250.aat
Attribute_domain_value:  1 2 3
Attribute_domain_value_definition:  none
Attribute_format:  integer
Attribute_format_length:  1
Source_name:  "Land Use and Land Cover Digital Data from 1:250,0000- and
   1:100,0000-Scale Maps -- GIRAS Series Data from USGS National Mapping
   Division"
Bibliographic_reference:  "U.S. Geological Survey, 1990, Land use and land
   cover digital data from 1:250,000- and 1:100,000-scale maps, Data users
   guide 4."
Bibliographic_reference:  "U.S. Geological Survey, 1982, Codes for the
   identification of hydrologic units in the United States and the
   Caribbean outlying areas:  U.S. Geological Survey Circular 878-A"
Source_scale:  100000
Source_scale:  250000
Source_medium:  "Digital data files in GIRAS format"
Creator_of_source:  "U.S. Geological Survey, National Mapping Division"
Date(s)_of_source_materials:  "1976-1987"
Source_projection:  "Universal Transverse Mercator (UTM)"
Procedure:  "1. Performed an affine transformation between the internal
   map coordinates (to nearest ten meters) and true UTM coordinates for
   each quadrangle.  2. Eliminated bounding neatline from each quadrangle
   and replaced with geometrically-correct neatline.  Extended undershoots
   to intersect new neatline using 500 meter maximum extension.  Clipped
   overshoots to neatline.  3. Re-establish topology of polygon and line
   features using 2 meter feature-feature tolerance, clip all overshoot
   features.  4. Joined all quadrangle data sets together preserving line
   and polygon features and attribution.  5. Removed map edge lines where
   hydrologic unit identities (HUC) were the same on either side of a
   line."
Procedure_tolerances:  "see procedure"
Procedure_date:  199209
Procedure_contact:  "Pete Steeves, U.S. Geological Survey, 28 Lord Road,
   Marlborough, MA  01752, telephone (508) 485-6360"
Procedure:  "Seattle and Bakersfield 1:250,000-scale quadrangles were
   damaged and data were inserted using above procedure from different
   copies of the digital files."
Procedure_tolerances:  "see procedure"
Procedure_date:  199210
Procedure_contact:  "Doug Nebert, U.S. Geological Survey, 445 National
   Center, Reston, VA 22092, telephone: (703) 648-5691"
Positional_accuracy:  "+/- 250 meters"
Positional_accuracy_method:  "Deductive estimate"
```

Positional_accuracy_explanation: "Map data at 1:250,000-scale do not comply with National Map Accuracy Standards."
Attribute_accuracy: 90
Attribute_accuracy_method: "comparison with 1:2M scale source values"
Data_model_integrity: "Data set is topologically-structured polygon and line data with nodes at all intersections"
Completeness: "All hydrologic units identified by U.S. Geological Survey are included in this digital map product. Several hydrologic units may be composed of multiple, non-contiguous polygons."
Metadata_revision_date: 199210
Metadata_contact: "Doug Nebert, ddnebert@qvarsa.er.usgs.gov"