

Geophysical Data Management System

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ABSTRACT

The geoscience community relies heavily on the use of a variety of data sets in its research efforts. Data sets range from remotely sensed satellite imagery covering large geographical areas to locally sampled data of regional interest. Researchers acquire much of this data in varying quantities ranging from tens to tens of thousands of data sets. Smaller collections of data sets can usually be handled manually and are rarely shared amongst research groups. Larger collections of data sets are usually handled by large scale database systems such as the EOS Data and Information System under development by NASA [1]. However, this still leaves a large number of researchers with data set collections somewhere between these two extremes. Often times, researchers pursuing the same ultimate objective or working in collaboration with colleagues will share data sets on a limited basis. In order to archive these "medium sized" data set collections in an organized and easily accessible manner and to facilitate distribution of data sets on a limited basis, we have developed a system to provide researchers with a simple to use archive and browse system.

SYSTEM DESCRIPTION

The GDMS system consists of four basic components: load utilities, archive, browse functions and the GUI (Fig. 1). These utilities are extendible to additional remote nodes which may be accessed via WWW (World Wide Web) based hyperlinks (Fig. 2).

The current, beta version of GDMS is implemented in PERL (Practical Extraction & Report Language), CGI (Common Gateway Interface) and HTML (Hypertext Markup Language). A useful feature of the local GDMS system at BPRC is the ability to automatically ingest ERS-1 and JERS-1 SAR data sets directly from the distribution media. A browse image is also produced by the ingest procedure (50-100 Kbytes). The loader functions are implemented in C and can be controlled from the GDMS WWW interface. Access to these functions and the ability to modify a local data archive is restricted to authorized local individuals.

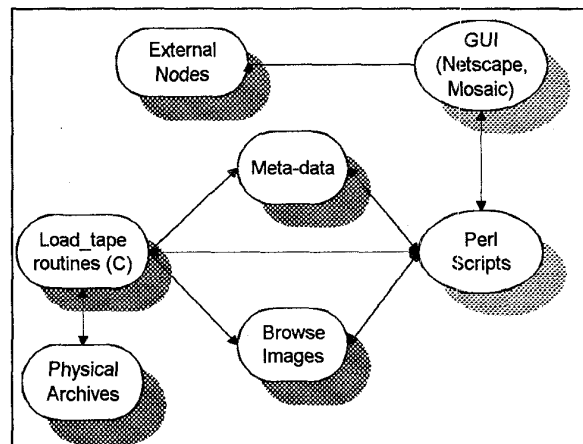


Figure 1. Level 1 system diagram for GDMS.

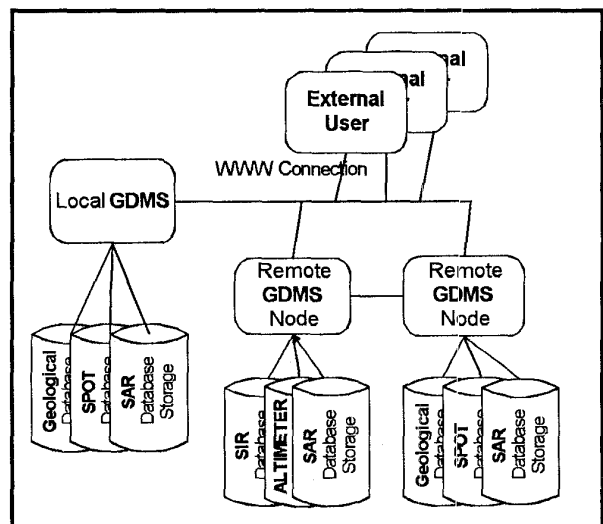


Figure 2. Level 0 System diagram

USER INTERFACE

GDMS provides the user with a GUI based interface (Fig. 3) for searching and viewing data sets, in both remote and local archives. The system is WWW based. This makes the system accessible from most of the widely varying computer platforms used by scientists and researchers.

A user may conduct searches on data archives by specifying search parameters or by using an interactive coverage map. Hyperlinks to data set images and coverage maps (Fig. 4) showing geographical locations of data sets make GDMS a powerful search and browse tool. The browse images (Fig. 5) are reduced considerably in resolution to facilitate rapid downloading and viewing over the internet.

BPRC-RSL SAR Archive Page

Note:
The SAR images provided in these archives are Copyright of ESA. They are intended to be used as browse images only. The resolution has been degraded considerably from the original image data.

Sort... ^archive vorbit vframe vdate varea vplatform

Search Options

Orbit: 000140 014396 Frame: 00001 05715
Date: 19910729 19940517 Tape-ID: C-0001 E-0213
within: 40000 km.
Geographical area: ALL AREAS

Search... Reset

Click here to open a Map Page.

Orbit	Frame	Date	Cov. Area	Platform	Archive	Lat.
1.	003068-05697	19920216	SOUTH	ERS1-PR1	C-0001-01	-71.415
2.	001125-02295	19911003	GREENLAND	ERS1-PR1	C-0002-01	64.678
3.	000466-02197	19910818	CRAWFORD	ERS1-PR1	C-0003-01	69.897
4.	001154-02187	19911005	CRAWFORD	ERS1-PR1	C-0004-01	69.896
5.	001240-02187	19911011	CRAWFORD	ERS1-PR1	C-0005-01	69.897
6.	002014-02197	19911204	CRAWFORD	ERS1-PR1	C-0006-01	69.896
7.	002917-02205	19920205	JACOBHAVN	ERS1-PR1	C-0007-01	69.034
8.	003504-01935	19920303	GREENLAND	ERS1-PR1	C-0008-01	81.013
9.	003304-01935	19920303	GREENLAND	ERS1-PR1	C-0009-01	80.319
10.	003304-02187	19920303	GREENLAND	ERS1-PR1	C-0010-01	69.837
11.	003505-01935	19920317	GREENLAND	ERS1-PR1	C-0011-01	81.010
12.	003505-01935	19920317	GREENLAND	ERS1-PR1	C-0012-01	80.316
13.	003562-02205	19920321	JACOBHAVN	ERS1-PR1	C-0013-01	69.034
14.	004893-02187	19920608	CRAWFORD	ERS1-PR1	C-0014-01	69.681
15.	004836-02259	19920618	DYE-2	ERS1-PR1	C-0015-01	66.453
16.	005738-02205	19920820	JACOBHAVN	ERS1-PR1	C-0016-01	69.036

Figure 3. GDMS client search interface accessed using Netscape WWW browser. BPRC local SAR image archive.

Users may access the system as clients simply by using a WWW browser such as Netscape or NCSA Mosaic. A user may also maintain a GDMS server to archive local data sets on-line and make selected data sets available on-line to client users. Hyperlinks to published archive locations provided from the GDMS homepage.

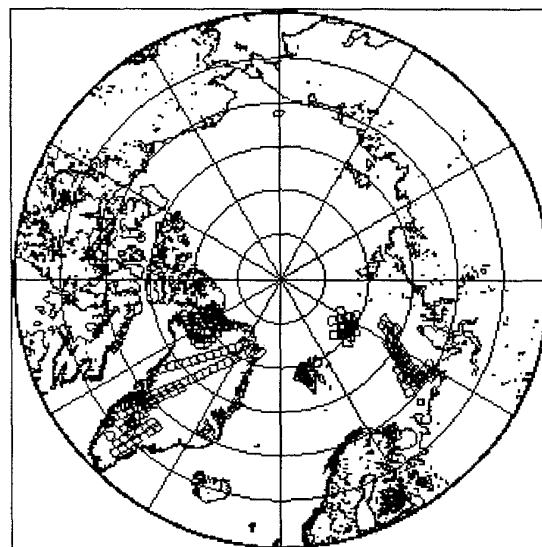


Figure 4. GDMS coverage map showing locations of SAR images. Map is a clickable image map. North polar projection.

APPLICATIONS

GDMS is implemented as a beta version at the Byrd Polar Research Center. The archive contains almost 500 synthetic aperture images primarily of polar regions. The archive has proven to be a valuable tool for assisting researchers at BPRC in identifying and locating data relevant to their particular research project. Some examples of how GDMS has been used are listed below.

- Selection of SAR imagery over the Antarctic Peninsula for use in studies to determine the feasibility of use of SAR in regional geomorphology.
- GDMS has been used to visually inspect SAR images of Antarctica in for selection of tie points to be used for terrain correction of the SAR mosaic to be produced by the Radarsat Antarctic Mapping Project. GDMS will also be used to monitor the progress of data acquisition during the 18 day Antarctic mapping mission. Access to the local archive has been provided to co-investigators as necessary.
- The Byrd Center's GDMS archive can be accessed at <http://polestar.mps.ohio-state.edu/gdms/GDMS.html>

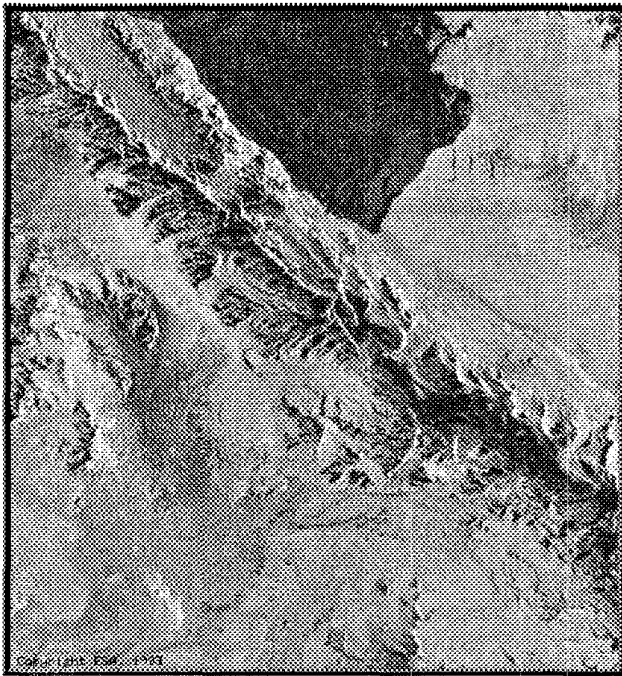


Figure 5. Synthetic aperture radar image of Alexander Island and George VI Sound in Antarctica. The image is used in an attempt to identify structural features of the glacier and underlying surface features.

FUTURE DEVELOPMENT

The Geophysical Data Management System will continue to be developed as a research tool for PI's and individual researchers. Some features to be added to the system for subsequent versions are listed below.

- Ability to conduct cross archive searches, thus allowing a researcher to search several archives for the desired data sets.
- Ability to ingest and archive a wide variety of data types not limited to SAR.
- Allow local archives to be easily configurable by users to accommodate the needs of a particular archive.

REFERENCES

- [1] EOS Data and Information System (EOSDIS), 1995
MTPE / EOS Reference Handbook.