CDDIS 1999 GLOBAL DATA CENTER REPORT

Carey E. Noll

NASA Goddard Space Flight Center
Code 922, Greenbelt, MD 20771, USA
noll@cddis.gsfc.nasa.gov

1 Introduction

The Crustal Dynamics Data Information System (CDDIS) has supported the archive and distribution of laser ranging data (both lunar and satellite) since its inception in 1982. This report summarizes the current and future plans of the CDDIS with respect to the International Laser Ranging Service (ILRS). Included here is background information about the CDDIS, its computer architecture, staffing, and archive contents, as well as future plans for the system within the ILRS.

2 Background

The CDDIS has been operational since September 1982, serving the international space geodesy and geodynamics community. This data archive was initially conceived to support NASA's Crustal Dynamics Project; since the end of this successful program in 1991, the CDDIS has continued to support the science community through NASA's Space Geodesy Program (SGP) and the Solid Earth and Natural Hazards (SENH) activity. The main objectives of the CDDIS are to store all geodetic data products acquired by NASA programs in a central data bank, to maintain information about the archival of these data, and to disseminate these data and information in a timely manner to authorized investigators and cooperating institutions. Furthermore, science support groups analyzing these data submit their resulting data sets to the CDDIS on a regular basis. Thus, the CDDIS is a central facility providing users access to raw and analyzed data to facilitate scientific investigation. A large portion of the CDDIS holdings of GPS, GLONASS, laser ranging, VLBI, and DORIS data are stored on-line for remote access. Information about the system is available via the WWW at the URL *http://cddisa.gsfc.nasa.gov/cddis_welcome.html*.

The CDDIS successfully responded to the 1998 Call for Participation in the International Laser Ranging Service (ILRS). This response stated that the CDDIS would support data center activities by providing access to an archive of laser ranging data, both to orbiting satellites (SLR) and to the moon (LLR). This archive consists of data (SLR on-site normal points, SLR full-rate, and LLR normal points), information about these data, and products derived from these data.

3 System Description

The CDDIS archive of laser ranging data and products are accessible to the public via anonymous ftp and the WWW at address *ftp://cddisa.gsfc.nasa.gov/pub/slr* and *ftp://cddisa.gsfc.nasa.gov/pub /reports*.

3.1 Computer Architecture

The CDDIS is operational on a dedicated Compaq/Digital Equipment Corporation (DEC) AlphaServer 4000 running the UNIX operating system. This facility currently has over 300 Gbytes of on-line magnetic disk storage; approximately twenty Gbytes will be devoted to laser ranging activities. The CDDIS is located at NASA's Goddard Space Flight Center (GSFC) in Greenbelt Maryland and is accessible to users 24 hours per day, seven days per week.

3.2 Staffing

Currently, a staff consisting of one NASA civil service employee and three contractor employees with Raytheon Information Technology and Scientific Services (RITSS) supports all CDDIS activities:

Ms. Carey Noll, CDDIS Manager
Dr. Maurice Dube, Head, CDDIS contractor staff and senior programmer
Ms. Ruth Kennard, request coordinator
Ms. Laurie Batchelor, data technician

4 Archive Content

4.1 SLR Data

The CDDIS receives on-site normal point data on a daily basis from two sources: the NASA operations center managed by AlliedSignal Technical Services Corporation (ATSC) and the EUROLAS data center (EDC) at the Deutsches Geodätisches ForschungsInstitut (DGFI) in Munich, Germany. Both sources deposit their data files to their individual user accounts on the CDDIS computer. EDC deposits a single file containing all data from all satellites tracked by over twenty stations in EUROLAS and the WPLTN and transmitted to their data center in the last 24-hour period. ATSC receives data from the seven NASA and NASA-partnership stations as well as seven other global stations each day. ATSC also retrieves the single file deposited by EDC at the CDDIS. The data from these two sources are then merged and compiled into several daily files, one containing data received at ATSC in the last 24 hours, one containing these data as well as data sent by EDC, and individual files by satellite, each also containing all data received in the last 24 hours. These three types of files containing normal point data are then transmitted to the CDDIS and are available to the user community. The data are in the ILRS normal point format and stored in uncompressed ASCII files.

The CDDIS staff has created automated routines that peruse the accounts of the two sources of laser data and copy new files to the public disk areas. The content and structure of the ILRS

global data center at the CDDIS is shown in Table 1 below. Data are archived in daily files where each file contains all data received at the operations and other global data centers within the last 24 hour period. Thus, a daily file could contain data recorded any time 24 hours prior to the date. Typically, the file contains data from the previous one to two days. However, at times laser stations transmit data several days or weeks old that have been corrected or recently checked for quality. Since the date in the file name does not reflect the date of the data itself, the CDDIS staff create merged, time-sorted files containing a month of data. These files are stored in the satellite-specific subdirectories by year and are created about thirty days after the end of the month. This delay ensures that a majority of the month's data is captured.

Table 1. CDDIS Directory Structure for ILRS Data and Information

Directory	File Name	Description
Data Directories		
slr/slrql/allsat/*yyyy*	all_ql*yymmdd*.all	SLR on-site normal point data files for all satellites and stations, year *yyyy* or *yy*, month *mm*, and day *dd*
	nasa_ql*yymmdd*.dat	SLR on-site normal point data files for all satellites and NASA stations only, year *yyyy* or *yy*, month *mm*, and day *dd*
	ql_allsat_*yymmdd*	SLR on-site normal point data files for all satellites and EDC stations only, year *yyyy* or *yy*, month *mm*, and day *dd*
slr/slrql/*satname*/*yyyy*	new_ql*yymmdd.sat*	SLR on-site normal point data files for satellite *satname* or *sat*, year *yyyy* or *yy*, month *mm*, and day *dd*
slr/slrfr/*satname*/*yyyy*	*satname_ver.yymm*.Z	Monthly SLR full-rate data files for satellite *satname* and year *yyyy* or *yy*, month *mm*, and version *ver*
slr/slrfr/*satname*/*yyyy*/daily/*ssss*	*ssss_yymmdd_ver.satname*.Z	Daily SLR full-rate data files for satellite *satname*, year *yyyy* and station *ssss* or *yy*, month *mm*, day *dd*,, and version *ver*
slr/slrnpt/*satname*/*yyyy*	*satname_ver.yymm*.Z	Monthly SLR normal point data files derived from full-rate data for satellite *satname* and year *yyyy* or *yy*, month *mm*, and version *ver*
slr/llrnpt/*yyyy*	llr_npt.*yymm*.Z	Monthly LLR normal point data files for year *yyyy* or *yy*, and month *mm*
Other Directories		
pub/reports/slrweek/*yyyy*	slrql_week.*sdate_edate* slrql_week.*yymm*	Weekly SLR data reports for year *yyyy* or *yy* and start date *sdate* and end date *edate* or month *mm*
pub/predicts/*satname*	*satname*_ephemeris*no*_ *yymmdd.source*	Daily SLR satellite prediction files for the current year for satellite *satname* and source *source*
pub/predicts/*yyyy*	*satname*_ephemeris_*yyyy*. *source*	Yearly SLR satellite prediction files for year *yyyy* and source *source*
pub/reports/slrmail	slrmail.####	SLRMail archive, message number ####

During 1999, all LLR stations began transmitting lunar laser data in the ILRS normal point format for inclusion in the data stream already established for SLR data. Therefore, lunar and satellite laser ranging data are available in the daily files discussed above.

In addition to normal point data, the CDDIS receives full-rate data from a subset of the global tracking network. Since full-rate data is a minimally supported product within the ILRS, many stations do not transmit these data. The NASA operations center transmits full-rate data from several stations to the CDDIS on a daily basis; these data are archived by satellite and station. If available, the CDDIS retrieves any full-rate data archived at EDC and creates merged files on a monthly basis for each satellite. At this time, the individual daily satellite files of full-rate data are removed from the public archive.

4.2 SLR Products

During 1999, the CDDIS archived SLR product files for an ILRS Analysis Working Group pilot project to compare individual analysis center solutions of station positions and Earth orientation parameters. These solutions were deposited to the CDDIS by the ACs and copied to public disk areas within the SLR data directories. This procedure will serve as a test for future routine submission of laser data solutions.

4.3 Supporting Information

The CDDIS anonymous ftp archive and web site provides access to many types of ancillary data used with laser ranging data. This information includes site occupation histories, coordinates, and eccentricities, SLR satellite prediction and time bias files, format documents, SLR data reports (quantity and quality), and historic SLRMail messages. These files are updated as new information is received via email, ftp, etc. from the global SLR community.

5 ILRS Web Site

Since the ILRS Central Bureau and the CDDIS are both located within the Laboratory for Terrestrial Physics at NASA GSFC, the CDDIS computer facility hosts the ILRS web site. An alias for host *cddisa.gsfc.nasa.gov*, *ilrs.gsfc.nasa.gov*, was established for the ILRS web site. Thus, users can enter the URL *http://ilrs.gsfc.nasa.gov* from the web browser to view the central ILRS web site. More details on the web site can be found in the Central Bureau section of this annual report.

6 Future Plans

The ILRS is looking to standardize the data products available through the global data centers. Therefore, the CDDIS, in conjunction with the EDC, will study ways to archive data in a common directory structure and file naming convention. This commonality will ensure a way for users to retrieve data from either data center with a minimal amount of change to existing data download scripts. In addition, some SLR missions will require a more frequent distribution of data since a daily update of the satellite orbit may not be sufficient. The CDDIS and EDC staff will study the impact of this requirement on the ILRS data flow and develop plans for handling these data, reducing the latency and increasing the frequency of data availability at their respective archives.

Various SLR missions now require satellite prediction information more often than the standard weekly product. Therefore, operations centers supporting the ILRS are planning to issue SLR satellite prediction files on a daily basis. The ILRS global data centers will make these files available and retain them for approximately one month. The daily files will then be merged into monthly prediction files and eventually yearly prediction files to reduce the number of individual files archived.

7 Contact Information

To obtain more information about the CDDIS archive of ILRS data and products, contact:

Ms. Carey E. Noll	Phone:	(301) 614-6542
Manager, CDDIS	Fax:	(301) 614-5970
Code 920.1	E-mail:	*noll@cddis.gsfc.nasa.gov*
NASA GSFC	WWW:	*http://cddisa.gsfc.nasa.gov/cddis_welcome.html*
Greenbelt, MD 20771		
USA		