NGDC's Mission is to provide long-term scientific data stewardship for the Nation's geophysical data, ensuring quality, integrity, and accessibility.

NGDC's Vision is to be the world's leading provider of geophysical and environmental data, information, and products.
Scientific Data Stewardship Challenges

- **Managing the Nation’s operational SWx datasets**
  - NOAA’s satellite space environmental data & models
  - DoD’s space weather data – ground & space
  - Other duties, as assigned – World Data Center

- **Safeguarding historical datasets**
  - Geomagnetic / solar indices & records
  - Solar synoptic drawings and photographs
  - NOAA Climate Data Modernization Program

- **Documenting relevant datasets – metadata**
  - Global Change Master Directory – ISO 19115
  - Space Physics Archive Search and Extract (SPASE)

- **Archiving data for long-term preservation**
  - Comprehensive Large Array-data Stewardship System (CLASS)
  - Open Archival Information System (OAIS)

- **Developing data discovery / access tools**
  - Space Physics Interactive Data Resource
  - New STP website available for comment

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1. Not to be discussed

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Dr. Rob Redmon – circa 2040
GOES Space Environment Monitor
• Geosynchronous Orbit, since 1974
• Elements: In Situ Magnetic Fields
  Whole Sun X-ray Flux
  Energetic Particles
• All Data are Online

GOES Solar X-ray Imager – GOES 12-15
• Geosynchronous Orbit, since 2003
• X-ray Images taken every minute
• All Data Are Online (once operational)

POES/MetOp Energetic Particle Detector
• Polar Low Earth Orbit
• Energetic Particles Archived Since 1979
• All Data Are Online
Operational SWx Datasets
USAF SWx Datasets – Satellite & Ground

Solar Electro-Optical Network (SEON)
- Solar Optical Observing Network (SOON) – daily sunspot drawings from 4+ SEON sites
- Radio Solar Telescope Network (RSTN) – Solar radio noise backgrounds at selected frequencies (245 MHz – 15.4 GHz)

MIRRION Ionosonde Data System
- Digital Ionospheric Sounding System (DISS)
- Vertical Incidence Pulsed Ionospheric Radar (VIPER)
- International ionosonde datasets

Defense Meteorological Satellite Program (DMSP)
- Operational Linescan System auroral imagery
- Space Weather Sensors – SSJ / SSIES / SSM
- SSUSI / SSULI tbd
NGDC serves as both a National Data Center and a World Data Center\(^1\)

**Government data centers are repositories for the nation’s environmental data.** Methods of data archiving and stewardship are complemented by strategies for ingesting large volumes of raw data. In addition, data centers perform a valuable service to the scientific community through data quality control, integration, and value-added activities, such as processing data and developing tools for data analysis and presentation. In many cases, they have been successful in developing a laudable level of customer service and satisfaction.

NRC, 2003

There is a need for global federations of professional state of the art data management institutions, working together and exchanging practices. Such federations can provide quality assurance and promote data publishing, providing the backbone for the development of a global virtual library for scientific data. They can also complement and assist the multitude of very worthy voluntary initiatives that flourish alongside them by helping to develop and disseminate good practices and standards.

ICSU, 2007

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\(^1\)The World Data Center (WDC) structure was officially disbanded in 2008. WDCs will be incorporated into the new World Data System.
NGDC acquires and archives a variety of solar and geomagnetic indices which are made available in tabular format or as time-series data. Archived indices include:

- Daily/monthly/yearly sunspot numbers
- Solar radio flux, $F_{10.7}$, USAF data
- Geomagnetic $K_p$, $A_p$, $Dst$, $AA$, $AA^*$
- AMIE derived indices (SWx Climatology)
- Cosmic ray datasets
Archives include a variety of solar synoptic drawings, sunspot images and photographs derived from mostly ground observatories. Digitization done through the Climate Database Modernization Program.

Wendelstein Observatory*  
(1947-1987)

Boulder Composite Drawings*  
(1972-present)

Fraunhofer Institute  
(1956 - 1973)

Northwestern Observatory*  
(1958 -1970)

Drawings from the IGY  
(1957 - 1958)

*Recently added to the archives (2009-2010)
The NOAA CDMP program provides the resources to “rescue” historical datasets by conversion to digital form. NGDC has extensively used this program to facilitate public access to these data, including solar images and composite drawings (previous slide), film ionograms, and geomagnetic data. Continuing programs include digitizing the original records of Scott Forbush (1936 – 1960).
• CLASS is NOAA’s enterprise level data archive and distribution system for NOAA’s environmental datasets.

• CLASS is sized to accommodate data from new environmental satellite systems such as GOES-R and NPOESS (now JPSS) plus model datasets and other data sources.

• NOAA’s data centers retain responsibility for scientific data stewardship of CLASS datasets.

NEAAT is an Application Programming Interface (API) that facilitates user access to distributed NOAA environmental datasets including those available in CLASS. NEAAT provides a capability to integrate diverse data systems via a standards-based interface having well defined protocols.
STP & CLASS are implementing the OAIS structure for stewarding SWx environmental databases. Changes to the end-to-end management of data include a more rigorous adherence to standards including policies for accepting new datasets, preparing submission agreements, and maintaining proper metadata (see also NAO 212-15).
**Data Discovery & Access Tools**

**Space Physics Interactive Data Resource**

**Abstract**

The Solar Terrestrial Physics division of the NOAA National Geophysical Data Center (NGDC) is dedicated to the dissemination of high-quality space and space weather data sets and services. The Space Physics Interactive Data Resource (SPIR) system is the primary web-based distribution method for NGDC's S/P data and metadata holdings. This includes key NOAA space data sets such as GOES, POES, DMSP, and Scintillas, as well as many others currently under development. SPIR also provides a comprehensive resource on the development of data visualization tools for the space physics community. It has been recognized as the SPIR web-based application of data visualization does not mean that a community's needs or preferences for data access, or even those who want to develop applications which access the data directly, or those who prefer to integrate data through their own systems. 

**Data Discovery & Access Tools**

- **GOES/POES – visible/ultraviolet imagery**
- **DMSP – precipitating particles**
- **DMSP – GOES – ions drift**
- **AME – auroral specification**

**Data Assets and Services**

- **Service Providers**
  - DMSP/OLS – visible/ultraviolet imagery
  - DMSP GOES – precipitating particles
  - DMSP – GOES – ions drift
  - AMEs – auroral specification

**Poster presented at the SWW, 2010**

**Clients and Applications**

- **GOES/POES – visible/ultraviolet imagery**
- **DMSP – precipitating particles**
- **AME – auroral specification**

This represents a number of XML, structure containing both data and metadata. This simple client example is available at http://spidr.ngdc.noaa.gov. This example can be shown in a web browser with www.champl.com on-line page. The SPIDR Rest services are available at: http://spidr.ngdc.noaa.gov/spidr/REST/SDS/good_example.jsp.

**Metadata Services**

- **GOES/POES – visible/ultraviolet imagery**
- **DMSP – precipitating particles**
- **AME – auroral specification**

This represents a number of XML, structure containing both data and metadata. This simple client example is available at http://spidr.ngdc.noaa.gov. This example can be shown in a web browser with www.champl.com on-line page. The SPIDR Rest services are available at: http://spidr.ngdc.noaa.gov/spidr/REST/SDS/good_example.jsp.
On April 26th STP released a new website to review holdings and download datafiles. Data are available through the NGDC homepage or directly from:

http://www.ngdc.noaa.gov/stp/stp.html
Scientific Data Stewardship
Concluding Remarks

- NGDC/STP is responsible for the historical preservation of NOAA’s and DoD’s operational SWx data plus other mission related datasets
- STP datasets include a variety of current and historical SWx datasets dating from the 1957 International Geophysical Year (IGY) and earlier
- SWx datasets must have associated content and format descriptions to ensure future utility of the data (metadata – not discussed herein)
- NOAA capabilities and policies are used for the long-term historical preservation of environmental datasets (see NAO 212-15)
- Data access tools facilitate user search and discovery of SWx datasets within and available through STP

NAO 212-15 – Management of Environmental and Geospatial Data and Information (12/2/2008)