



NASA HDF and HDF-EOS Status Use in EOSDIS

HDF & HDF-EOS Workshop
September 23-25, 2003
Silver Spring, MD

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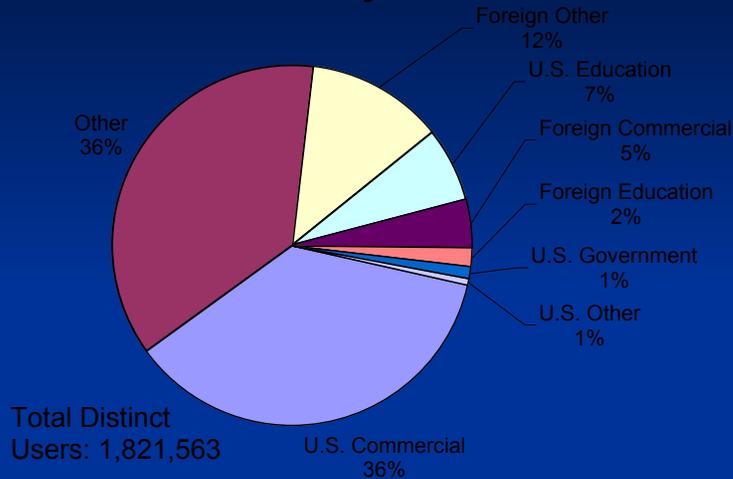
EOSDIS

- EOSDIS is a system to acquire, archive, manage and distribute NASA's Earth observation data.
- EOSDIS data sources:
 - "Standard products" from EOS satellite instruments.
 - Field Measurement programs
 - Legacy data sets
- EOSDIS consists of the geographically distributed EOSDIS Core System (ECS), a network of EOS production systems (called SIPS) as well as other production and archive systems.
- EOSDIS is managing and distributing data from:
 - EOS missions: 3050 Terabytes
 - Pre-EOS missions: UARS, SeaWiFS, TOMS-EP, TOPEX/Poseidon and TRMM, and ESE legacy data (284 Terabytes.)

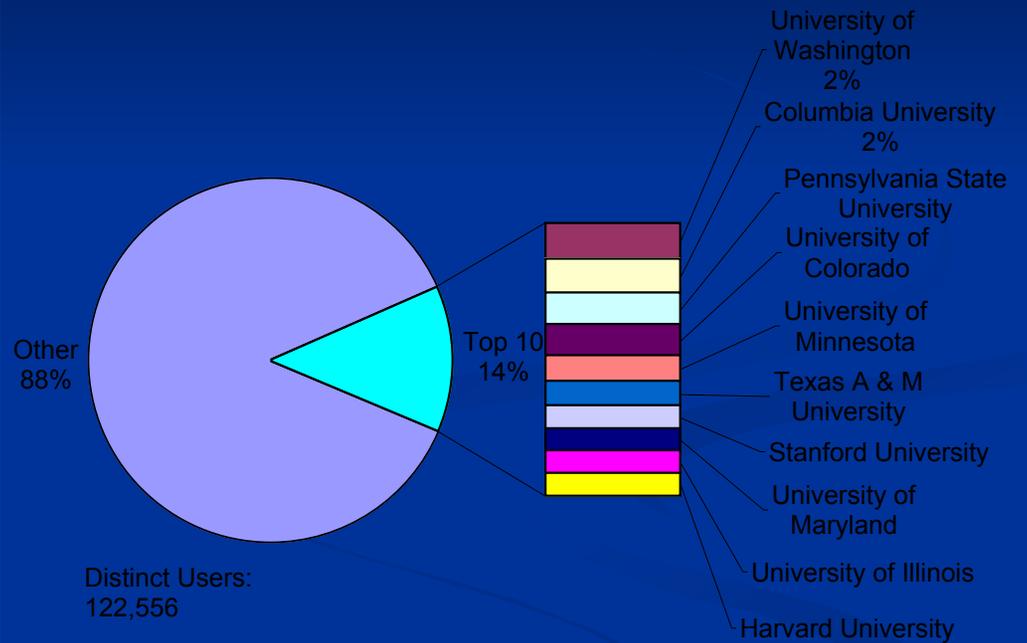
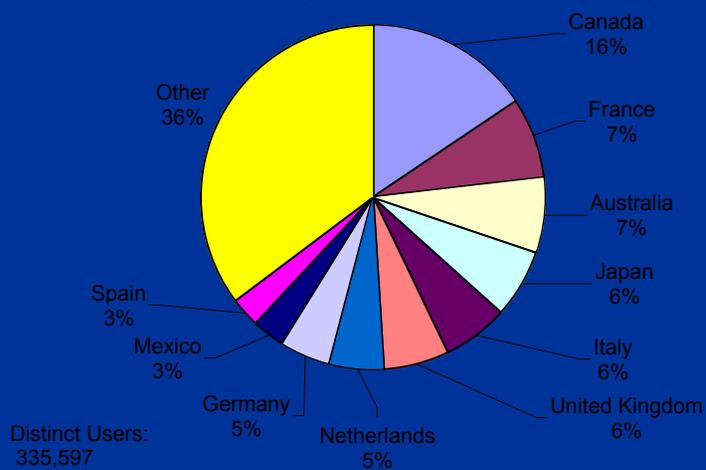


EOSDIS User Base

Distinct ECS and Non-ECS Users Accessing DAACs By Domain



Distinct Foreign ECS and Non-ECS Users Accessing DAACs by Country

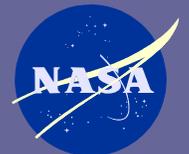


Based on Email Addresses of Users
October 1, 2002 - August 31, 2003



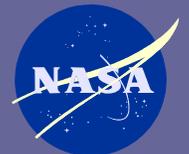
Standard Data Format Goals

- Support Core System Development
 - Provide interface standard for passing of data
 - Allow Dataset-Independent Development and Services
- Provide Instrument-Independent Services
 - Geolocation Services: row/column to/from latitude/longitude
 - Subsetting and subsampling by parameter, row/col, lat/long



Standard Data Format Goals

- Facilitate scientific data storage, exchange, access, analysis and discovery.
- Make Data Easily Accessible
 - Make data self describing
 - Provide instrument-independent data structures
 - Use widely available standards and software
 - Metadata, Geolocation, Annotations, Organization



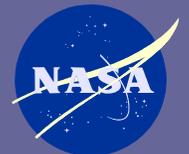
HDF

- Format and software for scientific data
- Stores images, arrays, tables, etc.
- Emphasis on storage and I/O efficiency
- Free and commercial software support
- Emphasis on standards
- Users from many engineering & scientific fields



HDF-EOS

- A “profile” of HDF
 - Profiles are sets of standard conventions for application to a particular community of users
 - HDF-EOS conventions
 - Consistent metadata location and format
 - Consistent application of geolocation information
 - Point, Swath, Grid objects
 - HE5 additional objects: atmospheric profile, zonal
- The EOS profile of HDF is supported by a library that calls the underlying HDF library
 - Similar API philosophy
 - HDF-EOS files are readable by standard HDF libraries but without EOS specific services.
- Can facilitate standard services on data
 - Example subsetting



HDF-EOS History

- September 1993, HDF adopted as baseline standard for EOSDIS Core System standard data product generation, archival, ingest, and distribution capabilities
- December 1994, Began definition of HDF profile for EOS (HDF-EOS)
- June 1996, HDF-EOS v1.0 using HDF-4 (HE-4)
- November 2000, HD-EOS v5.0 using HDF-5 (HE-5)
 - Upgrades to both HE-4 and HE-5 occur as needed - about every 6 months



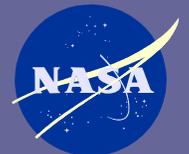
HDF-EOS Present

- ESDIS development of HDF-EOS is complete. Remaining work is primarily corrective and adaptive maintenance.
 - Current version HE-4 is 2.9 on HDF 4.1r5
 - Current version HE-5 is 5.1.5 on HDF 5-1.4.4
 - Nearly all ECS holdings are in HE-4
 - Instrument science teams are encouraged to consider migration to HE-5 to avoid future obsolescence but there is no stated requirement for this migration.
- Many tools for use with EOS data rely on HDF-EOS.
 - Many developed and maintained by instrument science teams and DAACs.
 - See <http://hdfeos.gsfc.nasa.gov/>
 - See also DAAC websites
 - Some commercial tools include HDF-EOS read capability
 - MatLab, IDL, ENVI, PCI Geomatics (Landsat), others



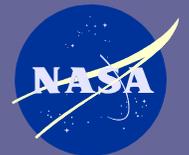
EOS Profile Experience

- HDF was new to most in the EOS program when the format was chosen for EOSDIS standard products.
- Initial reluctance by EOS product developers yielded to appreciation for self-description and data organization flexibility.
- Flexibility of HDF allows tailoring to custom needs and desires of producers.
- Still learning impact of HDF on end users
 - Anecdotal evidence is that many users do not use data in HDF-EOS, but instead “unpack” the data for use in their own application.



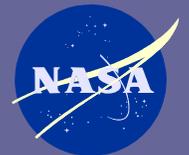
EOS Profile Experience

- “Weak” profile is a hindrance to general data interoperability
 - Increases difficulty for development of general services for data.
 - Discourages adoption of standard by general tool vendors.
 - Discourages reuse of format by external product developers.
 - Hinders end-user ability to easily use data.



New directions for Data Standards at NASA Earth Science Enterprise

- NASA has directed the formation of a standards working group for recommending adoption of ESE wide standards for data and data systems interfaces.
- Standards adoption will stress implementation and operational experience.
- Standards will be “community based” and will likely differ for different kinds of measurements or applications.



Workshop

- The HDF and HDF-EOS workshop is the annual meeting of the HDF community. Goals:
 - Educate participants in the use of HDF and HDF-EOS
 - Share progress
 - Help prioritize future development of the standard
- Logistics
 - Tutorials (yesterday)
 - Consulting (please talk with NCSA or L3 staff about private consultation)
 - “Plenary” - this morning will be in “lecture” format
 - Presentations - presentations will be in combined oral abstract with poster sessions.
 - Discussion - discussion topics are meant to be free-form and open and are intended to develop understanding of the community’s needs with respect to HDF and HDF-EOS.

