SWITNET
The Space Weather ITalian NETwork
and Its Role in the European Scenario

Mauro Messerotti

INAF- Trieste Astronomical Observatory
and
Department of Physics, University of Trieste
Outline of the Talk

• A Scheme for SpW Monitoring, Modelling and Forecasting

• SWITNET Space Weather ITalian NETwork

• The National, the European and the International Scenarios

• Conclusions
Space Weather Science & Service Scheme

**OBSERVATION**
- Sun
- IPM
- Earth

**MODELING**
- Solar Phenomena, Phenomena that affect IPM & Earth
- Phenomena that occur in IPM & on Earth

**SERVICES**
- Level 0: NOWCASTING
- Level 1: WARNINGS ALERTS
- Level 2: FORECASTING

**STATISTICAL ANALYSIS**
- CORRELATIONS
- PRECURSORS
SWITNET
The Space Weather Italian Network
What is SWITNET

SWITNET is not just a network of instruments that operate in coordinated mode, i.e., a service, but it is

• A network of instruments (SINERGIES)

AND

• A network of shared scientific expertise in S, S-T, T physics

AND (when completed)

• An advanced data handling system with processing and knowledge discovery capabilities (IVOSEC)
SWITNET Observing Resources
SINERGIES

- **INAF-OATo** - Solar & Heliospheric Space Observations
- **INAF-OATs** - Trieste Solar Radio System
- **INAF-OAA** - Next generation large aperture solar telescopes
- **UNI Fi** - Solar & Heliospheric Space Observations
- **INAF-OAR** - PSPT & CVS
- **UNI Roma 1** - MOF
- **UNI Roma 2** - Next generation large aperture solar telescopes
- **UNI Roma 3** - Mini-Network of Neutron Monitors (see IFSI)
- **INAF-IFSI** - Solar & Heliospheric Space Observations
  - Magnetospheric & Ionospheric Observations
  - Mini-Network of Neutron Monitors
  - Antarctica Monitors
- **INGV** - Geomagnetic & Ionospheric Observations
  - Antarctica Monitors
- **UNI AQ** - Magnetospheric Observations (SEGMA magnetometer array & Antarctic stations)
- **INAF-OAC** - MOF (VAMOS)
- **INAF-OACt** - MOF (VAMOS)
- **UNI AQ** - Magnetospheric Observations (SEGMA magnetometer array & Antarctic stations)
- **UNI Roma 3** - Mini-Network of Neutron Monitors
- **INAF-OACt** - WL & H-alpha solar observations

M. Messerotti
SWWT Meeting, 29 June 2006, Paris
SWITNET Modelling Resources

- All the previous institutes
- ICTP
  - Ionosphere Modelling
  - Astrobiology
- UNI Na
  - Flare physics
- UNI Cal
  - Turbulence
  - Flare precursors
- UNI Ct
  - AR formation
  - Flare precursors
  - Flare physics
- INAF-OAPa
  - Hydrodynamics
- UNI Pa
  - of flux tubes

Phenomenology

Solar Phenomena, Phenomena that affect IPM & Earth

Phenomena that occur in IPM & on Earth

STATISTICAL ANALYSIS

CORRELATIONS

PRECURSORS

MODELING
SWITNET Forecasting Resources

- Flares
  - INAF-OACt
- Radio Sun
  - INAF-OATs
- Ionosphere
  - ICTP
  - INGV
  - IFSI
- Geomagnetic Field
  - INGV
  - UNI AQ
  - IFSI

Level 0
NOWCASTING

Level 1
WARNINGS
ALERTS

Level 2
FORECASTING
SWITNET
Advanced Data Handling and Integration
IVOSEC

The Italian Virtual Observatory for Sun-Earth Connections
IVOSEC Expected Features

- Based on SOLARNET as core architecture
- Can include S, S-T, T data bases
- Can handle real-time data ingestion and retrieval
- Is operable via an advanced web GUI for complex queries in user-transparent mode
- Has capabilities for distributed processing for data visualization and analysis (V-Grid)
- Is compliant with VO standards
Welcome to the SOLARNET Portal for browsing and retrieving Italian Solar Archives data.

The national project SOLARNET (SOLar ARchive NETwork) aimed to federating all the Italian solar archives as a distributed database, is the first step toward an Italian Virtual Solar Observatory, which interconnected the distributed resources and available solar data in a unified database by a web user interfaces. Different user interfaces allow searches of all participating data services using different input parameters. Currently there are 5 data providers in SOLARNET: SOLAR, SOLRA, PSPT, DISCO/VAMOS and CATANIA archives, plus two services that the Italian solar community has developed for the EGSO project: SEC (Solar Events Catalog) and DSO (Database for Solar Observatory).
Introduction

EGSO, the “European Grid of Solar Observations”, is a Grid test-bed that will lay the foundations of a “Virtual Solar Observatory”.

EGSO addresses the problem of combining heterogeneous data from scattered archives of space and ground-based observations into a single “virtual” dataset. The project will also create catalogues of solar features and observation data to enable innovative searching, and provide visualisation tools for user-friendly data browsing. EGSO will be a unique resource for the solar physics community, while also serving as an interface to solar data for the Space Weather, Climate Physics and Astrophysics communities.

EGSO is funded under the Information Society Technologies (IST) thematic programme of the European Commission’s Fifth Framework Programme. The project is one of many partners from across Europe that cooperate through the EU GRIDSTART initiative. EGSO is also working closely with the Virtual Solar Observatory (VSO), Collaborative Sun-Earth Connector (CoSEC) and the Virtual Space Physics Observatory (VSPO) projects, all funded by NASA.
The Role of SWITNET in the National Scenario
Participation in ASI Programs

- SWITNET is an Enabling Science integrated resource by providing
  
  - Ground-based support to operating and planned space missions for the exploration of the S-T environment
  - Availability of expertise in Theoretical and Numerical Modelling of the relevant plasma processes
  - Availability of expertise in Data Analysis and Interpretation
  - Advanced Data Handling capabilities to be interfaced with the ASI Science Data Center
The Role of SWITNET in the European Scenario
Participation in ESA SWENET

- Upon completion, SWITNET will be flawlessly interfaced with SWENET, the Space Weather European Network promoted by ESA through a Pilot Project.

- To date, the previsional resources:
  - GIFINT (Geomagnetic Indices Forecasting and Ionospheric Nowcasting Tools) operated by INAF-IFSI, INGV and UNI Aq
  - TSRS (Trieste Solar Radio System Radio Indices) operated by INAF-OATs are already integrated in SWENET.
The Role of SWITNET in the International Scenario
Collaboration with Int’l Organizations

Active collaborations (both scientific and organizational) exist with the following international organizations/projects:

- **COST Action 724** (Developing the Scientific Basis for Monitoring, Modeling and Predicting Space Weather)
- **COST Action 296** (Mitigation of Ionospheric Effects on Radio Systems)
- **CAWSES** (Climate And Weather of the Sun-Earth System) by Scostep
- **ILWS** (International Living with a Star)
- **E-Star**
- **ICESTAR** by SCAR
Organization of Advanced Schools in 2006

- The Physics of the Sun: The Active Sun on Your Active Desktop (ISSS, L’Aquila, March 27-April 1, 2006)

- ICTP-COST-USNSWP-CAWSES-INAF-INFN International Advanced School on Space Weather (ICTP, Trieste, 2-19 May 2006)

Involvement in International Initiatives

- IHY  Int’l Heliophysical Year
- IGY  Int’l Geophysical Year
- IPY  Int’l Polar Year
- eGY  Electronic Geophysical Year
Conclusions

• SWITNET is a comprehensive geographic network of shared
  – ground-based instruments
  – modelling expertise
  – forecasting tools
for monitoring, modelling and forecasting SpW

• SWITNET data handling will be managed soon by IVOSEC, the Italian Virtual Observatory for Sun-Earth Connections
Conclusions

• **Relevant Issues**
  - Growing interest in Europe and in the world for SpW
  - **SWITNET**
    • Completeness
    • International relevance
    • Test-bed for state-of-the-art data handling
    • Ground-based support to space missions
    • Enabling science resource
    • Resource for Education and Public Outreach
    • Italian expertise has been acquired for decades
Solar and Geophysical Databases: The Tiles of a Planetary Meta-Archive

M. Messerotti

Trieste Astronomical Observatory
### Data Organization

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matter of Fact</td>
<td>Huge amount of space and g-b data</td>
</tr>
<tr>
<td>Data Organization</td>
<td>Databases, Archives, Meta-Archives</td>
</tr>
<tr>
<td>Data Indexing</td>
<td>Tables, Catalogs managed by RDBMS</td>
</tr>
<tr>
<td>Data Access</td>
<td>FTP, TELNET, WWW via GUI</td>
</tr>
<tr>
<td>Data Search</td>
<td>Local, Distributed over the net</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>Local</td>
</tr>
</tbody>
</table>
Scientific Requirements

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| Physical modelling            | MULTI WAVELENGTH DATA SEARCH  
                             | MULTI WAVELENGTH DATA DISPLAY  
                             | MULTI WAVELENGTH DATA ANALYSIS via a common unified, user-friendly interface |
| Space Weather                 | SOLAR, SPACE, EARTH DATASETS  
                             | MULTI-EVENT MODELLING  
                             | LARGEST COVERAGE POSSIBLE |
| Event Prediction              | CROSS-SEARCH OVER ARCHIVES  
                             | STATISTICAL ANALYSES  
                             | REAL-TIME DATA AVAILABILITY |
Scientific Motivations

• Some major Solar-Terrestrial Data Portals exist

• Mainly Resource Indexing is available

• Few resources partially allow complex, distributed data searching over limited subsets of databases

• Very few resources partially allow data analysis on inhomogeneous datasets

A PLANETARY META-ARCHIVE IS NEEDED TO EXPLOIT THE FULL SCIENTIFIC POTENTIALITIES OF MULTIWAVELENGTH MODELING IN SOLAR-TERRESTRIAL PHYSICS
Solar-Terrestrial Physics Portals

CDS AstroWeb
http://cdsweb.u-strasbg.fr/astroweb.html

NASA Space Physics Data System (SPDS)
http://spds.nasa.gov/

NASA Space Physics Data Facility (SPDF)
http://nssdc.gsfc.nasa.gov/spdf/
Magnetospheric Yellow Pages

NASA National Space Science Data Center (NSSDC)
http://nssdc.gsfc.nasa.gov/

Canadian Astronomy Data Center
http://cadcwww.dao.nrc.ca/
# CDS AstroWeb - Astronomy on the Internet

http://cdsweb.u-strasbg.fr/astroweb/solar.html

<table>
<thead>
<tr>
<th>ARTHEMIS</th>
<th>Hiraiso Solar Terrestrial Research Center/CRL</th>
<th>SEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAsé Solaire Sol 2000 (BASS2000)</td>
<td>IPS Radio &amp; Space Services</td>
<td>SEC</td>
</tr>
<tr>
<td>Big Bear Solar Observatory (BBSO)</td>
<td>Imager for Magnetopause-to-Aurora Global Exploration</td>
<td>ESE</td>
</tr>
<tr>
<td>Birmingham Solar Oscillations Network (BiSON)</td>
<td>Institut d'Astrophysique Spatiale (IAS)</td>
<td>SPI</td>
</tr>
<tr>
<td>Catania Astrophysical Observatory (OAC)</td>
<td>International Solar-Terrestrial Physics (ISTP)</td>
<td>STN</td>
</tr>
<tr>
<td>Centre de Prevision de l'activite solaire et geomagnetique</td>
<td>Joint Organization for Solar Observations (JOSO)</td>
<td>ISO</td>
</tr>
<tr>
<td>Cluster II, ESA's spacefleet to the magnetosphere</td>
<td>Kharkov multi-wave station of solar monitoring (KHASSM)</td>
<td>SRO</td>
</tr>
<tr>
<td>Cracow - Solar radio emission in dm wavelength</td>
<td>Kiepenheuer-Institut für Sonnenphysik (KIS)</td>
<td>SRI</td>
</tr>
<tr>
<td>Departement d'Astronomie Solaire (DASOP, Observatoire de Paris)</td>
<td>Laboratory for Atmospheric and Space Physics (LASP)</td>
<td>SRI</td>
</tr>
<tr>
<td>ETH Institute of Astronomy (ETH Zurich)</td>
<td>LASCO/SOHO</td>
<td>SSE</td>
</tr>
<tr>
<td>Estación de Observación Solar / Solar Observational Station (EOS)</td>
<td>MEDOC (Multi-Experiment Data Operations Center for SOHO)</td>
<td>SDC</td>
</tr>
<tr>
<td>European Incoherent SCATtter</td>
<td>MSU Solar Physics Group (Montana)</td>
<td>SRI</td>
</tr>
<tr>
<td>GALLEX</td>
<td>Mees Solar Observatory (MSO, Hawaii)</td>
<td>SOO</td>
</tr>
<tr>
<td>Global Oscillation Network Group (GONG)</td>
<td>Metsahovi Radio Research Station</td>
<td>SRO</td>
</tr>
<tr>
<td>Haleakala Observatories (Hawaii)</td>
<td>Mount Wilson Observatory</td>
<td>SOO</td>
</tr>
<tr>
<td>High Altitude Observatory (HAO)</td>
<td>NRL Solar Physics Branch</td>
<td>SRI</td>
</tr>
</tbody>
</table>

29 September 2000

SOLSPA 2000, Tenerife, Spain
### CDS AstroWeb - Astronomy on the Internet

**http://cdsweb.u-strasbg.fr/astroweb/solar.html**

<table>
<thead>
<tr>
<th>National Solar Observatory (NSO)</th>
<th>SOO</th>
<th>Space Environment Center</th>
<th>SEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSO Sacramento Peak, Sunspot, NM (NSO/SP)</td>
<td>SOO</td>
<td>Stanford SOLAR Center</td>
<td>SEC</td>
</tr>
<tr>
<td>Naval Research Laboratory Space Science Division (NRL SSD)</td>
<td>SPI</td>
<td>Sternberg Astronomical Institute (Heliophys. and Seismology)</td>
<td>SRI</td>
</tr>
<tr>
<td>Observatoire Midi-Pyrenees (OMP)</td>
<td>SOO</td>
<td>THEMIS</td>
<td>SOI</td>
</tr>
<tr>
<td>Service d'Aeronomie</td>
<td>EDC</td>
<td>The INTER-SOL Sun Observation Programme (ISP)</td>
<td>GSN</td>
</tr>
<tr>
<td>Soft X-Ray Telescope onboard Yohkoh Satellite, ISAS, Japan</td>
<td>SSE</td>
<td>Transition Region And Coronal Explorer (TRACE)</td>
<td>SSE</td>
</tr>
<tr>
<td>Solar Data Analysis Center (SDAC)</td>
<td>SEC</td>
<td>Universitat de les Illes Balears - Solar Phys. at Dept. of Phys.</td>
<td>SRI</td>
</tr>
<tr>
<td>Solar Extreme-ultraviolet Rocket Telescope and Spectrograph</td>
<td>SSE</td>
<td>Wilcox Solar Observatory (WSO)</td>
<td>SOO</td>
</tr>
<tr>
<td>Solar Flare Theory (NASA/Goddard Space Flight Center)</td>
<td>SRI</td>
<td>Yohkoh Public Outreach Project (YPOP)</td>
<td>SSE</td>
</tr>
<tr>
<td>Solar Group of RATAN-600</td>
<td>SRO</td>
<td>Zurich Solar Radio Spectrometer</td>
<td>SRO</td>
</tr>
<tr>
<td>Solar Physics Division - American Astronomical Society</td>
<td>NSO</td>
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<tr>
<td>Solar Physics at Stanford University</td>
<td>SRI</td>
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<tr>
<td>Solar Terrestrial Activity Report</td>
<td>SEC</td>
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<tr>
<td>Solar Terrestrial Dispatch (STD)</td>
<td>SEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar UV Atlas from HRTS (HRTS data)</td>
<td>SDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar and Heliospheric Observatory (SOHO)</td>
<td>SSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar, Auroral, Ionospheric, ... Information (Lethbridge, Canada)</td>
<td>SEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar-Terrestrial Physics Home Page (STP)</td>
<td>SEC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**64 Entries**

29 September 2000

SOLSPA 2000, Tenerife, Spain
Goals

- Index observational resources in ST Physics
- Index theoretical resources in ST Physics
- Allow
  - User-transparent data access to distributed datasets all over the world
  - Complex data searching, retrieval and analysis via a simplified common GUI

Present data archiving technologies allow the achievement of such goals provided that a global coordination and collaboration is established as well as the allocation of proper financial resources by the participating organizations.
Advances in Solar and Solar-Terrestrial Data Archiving and Retrieval Techniques

M. Messerotti

INAF-Trieste Astronomical Observatory

and

Physics Department, Trieste University
Simplified Architecture of an SQL-Based RDBMS

Table A

Table B

Table C

CATALOG

Table A

Table B

Table C

SQL

View

WWW

GUI

FIELD

RECORD

TABLE
DATA GRID Architecture

SOLAR

ARTHEMIS

SOLARNET

SOLRA

SOLARNET is a Data GRID which links multiple data collections by managing data entities across distributed repositories
A consistent modelling requires a multi-instrument multi-wavelength approach.

**DATA ANALYSIS** must be provided in addition to **SEARCH** and **RETRIEVAL**.

**EGSO** European Grid of Solar Observations
INTELLIGENT VIRTUAL DATA GRID Architecture

KNOWLEDGE DISCOVERY IN DATABASES (KDD)

DATA ASSOCIATION AND GUIDED PROCEDURES are EMBEDDED

Data Collection → Intelligent Virtual Data GRID → Derived Data Products

- Data Collection management
- GRID protocols to process data
- EMBEDDED KNOWLEDGE
ADVANCED GOAL

- Pointing out the **physical associations** in multi-wavelength datasets is the **basis of interpretative scientific research**

- **Concept association** is the **kernel of knowledge**

- **Automated storage and search of knowledge in databases is possible** through advanced techniques and is called **Knowledge Discovery in Databases (KDD)**

- **Advanced techniques are based on Artificial Intelligence (AI) and Expert Systems (ES) embedding**

THE **EMBEDDING OF AI-ES TECHNIQUES IN THE GRID ARCHITECTURE** REPRESENTS THE NEXT GENERATION IN DATA SEARCH, RETRIEVAL, PROCESSING AND ANALYZING
CONCLUSIONS

• S-T space and ground-based observatories operate
  – set of instruments which operate at different wavelengths and produce inhomogeneous 1-, 2-, 3-, 4-D datasets

• Many S-T archives exist all over the world

• Modern archiving techniques allow
  – efficient data search and retrieval through
  – a Relational Data Base Management
  – onsite or in a distributed environment (GRID)

• Next generation archiving techniques will fully exploit the data information via KDD
<table>
<thead>
<tr>
<th><strong>Title of contribution</strong></th>
<th>STEVM (Solar-Terrestrial Environment Virtual Monitor)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proposer</strong></td>
<td>M. Messerotti (&amp; al.)</td>
</tr>
<tr>
<td><strong>Relevant MoU objectives</strong></td>
<td>Data standardization and accessibility</td>
</tr>
<tr>
<td><strong>Relevant parts of MoU sci. programme</strong></td>
<td>Aims of WG4</td>
</tr>
<tr>
<td><strong>Deliverables</strong></td>
<td>Resources survey &amp; architecture (&amp; ?)</td>
</tr>
<tr>
<td><strong>Timetable</strong></td>
<td>3-5 years according to final goals</td>
</tr>
<tr>
<td><strong>Required Manpower</strong></td>
<td>To be defined according to final goals</td>
</tr>
<tr>
<td><strong>Resources availability</strong></td>
<td>Existing Data Archives community</td>
</tr>
<tr>
<td><strong>Expected collaborations</strong></td>
<td>With main VO projects (e.g. EGSO)</td>
</tr>
<tr>
<td><strong>Previous experience in the field</strong></td>
<td>SOLAR, SOLRA, SOLARNET, EGSO</td>
</tr>
</tbody>
</table>
Space Weather as Driver of Data Homogeneization

- Inhomogeneous and fragmented character of available observations

**CAUSES**

Difficulties in carrying out a posteriori modelling of complex phenomena

- These limitations are intrinsic to data acquisition mode

**HENCE**

Even advanced data search by Grid architectures cannot overcome
DRAWBACKS OF DATA INADEQUACY

• The outcomes are:
  – Inadequate modelling
  – Limited to a subset of phenomenological and physical aspects
  – Often neglects the complex interplays among different processes
Scheme of SpW Data Requirements

- **SPACE WEATHER**
  - Drivers
  - Precursors
  - Effects

- **SpW Data Requirements**
  - Completeness
    - Time
    - Space
    - Wavelength
  - Standardization
    - Homogeneity
    - NRT Availability

- **NRT OBSERVATION**
- **NRT PUBLICATION**
- **NRT INGESTION**
- **NRT Modelling**
  - Prediction
- **Post-Event Modelling Interpretation**

- **Improved Interpretation**
- **Improved Modelling**
- **Improved Prediction**

COST Action 724
Athens, 29-30 January 2004
M. Messerotti, INAF-OATs & UNI-TS
The Role of Observing Requirements for SpW

Observing requirements for SpW and SpW drivers observation in monitoring and nowcasting can play a primary role in providing:

1. homogeneization in observations
2. near real-time data ingestion in archives
3. unified data access via web through a user friendly GUI capable to facilitate:

1. data availability in near real-time
2. full exploitation of the data information content by pointing out interrelationships in different datasets
3. self-consistent modelling
Introduction to the Electronic Geophysical Year, 2007-2008 (eGY)

www.egy.org

messerotti@oats.inaf.it
IGY+50

Four International Year (I*Y) programs are linked to the 50-year anniversary of IGY

International Polar Year

International Heliophysical Year

Electronic Geophysical Year, 2007-2008
eGY is an initiative of the International Union of Geodesy and Geophysics

led by the International Association of Geomagnetism and Aeronomy

sponsored by: LASP, NASA, IUGG, IAGA
The information era - interoperability

Modern information and communications technologies have creating an “interoperable” information era in which ready access to data and information can be truly universal. Open access to data and services enables us to meet the new challenges of understand the Earth and its space environment as a complex system:

- managing and accessing large data sets
- higher space/time resolution capabilities
- rapid response requirements
- data assimilation into models
- crossing disciplinary boundaries.
Vision

eGY will lead to a major step forward in geoscience capability, knowledge, and usage throughout the world by accelerating the adoption of modern and visionary practices for managing and sharing data and information.
eGY embraces and extends IGY principles...

International cooperation and data sharing
Universal access to data and information
Timely and convenient access to data
Global, cross-disciplinary scope
Data preservation
Capacity building, especially in developing countries
Education, public outreach, information for decision making
What is eGY?

eGY is a cooperative international effort to address the challenges of modern data stewardship, interoperability (e-Science), and integrative science:

- Ready and open access to distributed data, information and services
- Access to large, complex, and cross-disciplinary data sets
- Real-time access and assimilation of data into models
- Data integration and knowledge discovery
- Data discovery (who holds what, where, how? Metadata issues)
- Data release (secure access permission)
- Data preservation (preserve existing and future data)
- Data rescue (identify and rescue critical data sets at risk)
- Education and public outreach; informing decision makers
- Advancement of science in developing countries (reducing the digital divide)
Facilitate, inform, stimulate, encourage, and promote:

- Modern data access and services ("e-Science for Geoscience")
- Responsible data stewardship
- Cooperation among bodies/initiatives to reduce duplication and proliferation of standards, and share expertise
- Establishment of **virtual observatories** throughout the geosciences
- Establishment of criteria to determine optimal and minimum funding for data activities supporting research

*eGY* also serves to provide a link between programs with related data and information requirements - IPY, IHY, Planet Earth, and initiatives such as GEOSS.
What value can eGY add?

Q. There’s nothing original in the principles and objectives behind eGY, and lots of informatics (e-Science) initiatives are already taking place, so why bother with eGY?

A. We need awareness-raising and international cooperation to reduce duplication, reinvention, and proliferation of standards. IGY+50, together with the advent of GEOSS, provides a timely opportunity to help accomplish this. IGY+50 is also an opportunity to expand participation by geoscientists in informatics developments. eGY provides an international framework to help accomplish these goals.
Deliverables

• Networking, links to experts and peers
• Coordination for the I*Y and other programs
• A mandate via the eGY Declaration for a Geoscience Information Commons
• Codes of best practice
• Meetings, workshops, and symposia at conferences
• Presentations, articles, brochure, press releases
• Website: www.egy.org and eGY News
• Education and public outreach program
• Capacity building activities in developing countries (not yet implemented)
Declaration for a Geoscience Information Commons

“Knowledge is the common wealth of humanity”

Adama Samassekou, Convener of the UN World Summit on the Information Society

The underlying principles on which eGY is based have been articulated by ICSU, the World Summit on the Information Society, CODATA, and other bodies. The principles are encapsulated in the eGY Declaration for a Geoscience Information Commons - a statement of aspirations and principles of data stewardship.
Shifting the burden from the user to the provider

Balancing resources for developing Online access

- Increasing level of resources and skills to create
- Dynamic pages on-the-fly from databases
- Static HTML pages
- Web Services

Increasing complexity of data structures

Increasing level of resources required to maintain
Challenging the “heroic” science funding paradigm

eGY draws attention to the need to reassessment our reward systems to recognise that the burden of making data and information easily accessible is shifting from the user to the provider.
Structure

**Secretariat** (at LASP, Univ. Colorado)
- Executive Director: Dan Baker, LASP
- Secretary: Bill Peterson
- Communications: Marissa Rusinek
- Public Relations and E/PO: Emily CoBabe-Ammann

**International Committee**
- Chair: Charlie Barton
- Representatives from key participants and countries

**Thematic Working Groups**
- Virtual Observatories: Peter Fox
- Data Integration & Knowledge Discovery: Paul Berkman
- Best Practice (joint with CODATA): Herb Kroehl, Jean Bonnin
- Data Rescue and Preservation: Jeff Love
- Education and Public Outreach: Emily CoBabe-Ammann
Virtual observatories complement in cyberspace the role of physical observatories by providing ready access to data from distributed sources. They also provide processing, analysis, visualisation, and simulation capabilities.

Promoting the development of Virtual Observatories in the Earth and space sciences is a central objective of eGY.
Working Group on Best Practice
Information ingredients – content, context structure.

The ability to utilize automatically the inherent structure of information marks the threshold in information management from hardcopy to digital media.
WG: Education and Public Outreach

**eGY Education: Connecting Teachers to Science**

**The eGY Portal: Bringing Data into the Classroom in a Contextual Way**

- Data-Rich Activities
- Inquiry-Based Lessons
- Online Interactives, Images and Animations
- Web Resources
- Tutorials, Primers and other Teacher Support

**Virtual Observatories**

- Climate Change
  - Earth Observing System Data & Information System (EOSDIS), NASA Earth Observatory
- Our Oceans & Environment
  - IOS eMinerals
- Global Seismology
  - Incorporated Research Institutions for Seismology (IRIS)
- The Sun-Earth Connection
  - Virtual Solar Observatory (VSO), Space Physics Interactice Data Resources (SPI/DR)

**Goal:** To Develop a Non-Specialist 'Use Case' for Virtual Observatories and Other Online Data Systems

**Virtual Communities**

- Virtual Teacher Workshops
  - 50 pairs of Master Teachers
  - 135 Workshops in 2007
  - 3000 Teachers Worldwide
  - TERC
- Virtual Educational Community
  - Synchronous & Asynchronous Tools
  - The Sakai Project
- Web-Streamed Science and Education Seminars
- Sustainable Architecture for the Future
  - DLESE

**Goal:** To Forward the Models on Virtual Education, Pushing the Boundaries in the Developing World
Discussions are underway with GEO to explore how to use eGY in the development of GEOSS.
Interested in getting involved?

www.egy.org

eGY News

Email lists

Sign the “Declaration for a Geoscience Information Commons”

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CODATA 2006

Scientific Data and Knowledge within the Information Society

22-25 October 2006, Beijing

CALL FOR PAPERS http://www.codataweb.org/06conf/call.html

DEADLINE FOR PAPER SUBMISSION: 30 June 2006
Virtual Observatories in the Geosciences

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