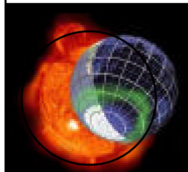
IPY, eGY, IHY: perspectives for solar-terrestrial physics?

Maurizio Candidi, IFSI-CNR/INAF Italy



International Geophysical Year 2007

Celebrating 50 years of global geospace studies

What is this all about?

Register: Click here to register your interest in IGY2007.
Interesting IGY2007 links:

- **National Academy's historical description**
- **Photos of IGY1957**
- **IGY memorabilia**
- **International Heliophysical Year 2007 (NASA/GSFC)**

The International Original IGY Logo

Following a suggestion by NAS member Lloyd Berkner, ICSU in 1952 proposed a comprehensive series of global geophysical activities to span the period July 1957-December 1958. The International Geophysical Year (IGY), as it was called, was modeled on the International Polar Years of 1882-1883 and 1932-1933 and was intended to ….
ICSU recommended that artificial satellites be launched for the occasion …..
International organization and funding of the IGY were overseen by the International Council of Scientific Unions (ICSU), an independent federation of international scientific unions. A Special Committee for the IGY (CSAGI, an acronym derived from the French) ..

American participation in the IGY was charged to a US National Committee (USNC) appointed in March 1953 by the NAS. Joseph Kaplan, Professor of Physics at UCLA, was appointed Chairman of the USNC. Physicist Alan H. Shapley of the National Bureau of Standards (NBS) was appointed Vice-Chairman, .. The thirteen Technical Panels … were formed to pursue work in the following areas: aurora and airglow, cosmic rays, geomagnetism, glaciology, gravity, ionospheric physics, longitude and latitude determination, meteorology, oceanography, rocketry, seismology, and solar activity. In addition, a technical panel was set up to attempt to launch an artificial satellite into orbit around the earth.

Sputnik and The Dawn of the Space Age

History changed on October 4, 1957, when the Soviet Union successfully launched Sputnik I. The world's first artificial satellite was about the size of a basketball, weighed only 183 pounds, and took about 98 minutes to orbit the Earth on its elliptical path …. While the Sputnik launch was a single event, it marked the start of the space age…

The story begins **in 1952**, when **the International Council of Scientific Unions decided to establish July 1, 1957, to December 31, 1958, as the International Geophysical Year (IGY)** because the scientists knew that the cycles of **solar activity would be at a high point then**. **In October 1954, the council adopted a resolution calling for artificial satellites to be launched during the IGY to map the Earth's surface.**

In July 1955, the White House announced plans to launch an Earth-orbiting satellite for the IGY … In September 1955, the Naval Research Laboratory's Vanguard proposal was chosen to represent the U.S. during the IGY.

The Sputnik launch changed everything …. Its size was more impressive than Vanguard's intended 3.5-pound payload….

Immediately after the Sputnik I launch in October, …. a simultaneous alternative to Vanguard , Wernher von Braun and his Army Redstone Arsenal team began work on the Explorer project.

On January 31, 1958 the United States successfully launched **Explorer I.** This satellite carried a small scientific payload that eventually discovered the magnetic radiation belts around the Earth, named after principal investigator James Van Allen .

http://www.hq.nasa.gov/office/pao/History/sputnik/

The International Geophysical Year , 1957-58

The International Geophysical Year, IGY (1957-1958) grew out of the highly successful sequence of International Polar Years – the first in 1882/83 and the second 50 years later in 1932/33. These first and second IPYs involved predominantly Arctic activities. The Third International Polar Year, planned for 1957/58, was expanded in scope and became the IGY.

The IGY greatly expanded our knowledge about global processes, heralded the exploration of geospace, and left a legacy of monumental achievements:

- a **huge increase in the number and spread of geophysical observing stations** around the globe, particularly in Antarctica (12 nations maintained 65 stations in Antarctica, 40 on the continent)
- the discovery of the Van Allen Radiation Belts
- investigation of large unexplored areas of Antarctica
- the first measurement of the thickness of the Antarctic ice sheet
- the first artificial satellite was launched – the Russian Sputnik-1, launched 4 October 1957)
- establishment of the World Data Centre system

It has been argued that the IGY led directly to the Antarctic Treaty, and the Global Atmospheric Research Programme (GARP - the predecessor to the present World Climate Research Program, WCRP) was a direct consequence of the success of the IGY. **The base level of geophysical observations and research opportunities was broadened in many countries.**

Status of H. Con. Res. 189: IGY 2007

Passed by the House of Representatives on 24 March 2004, currently in the Senate Commerce, Science and Transportation Committee.

CONCURRENT RESOLUTION: Celebrating the 50th anniversary of the International Geophysical Year (IGY) and supporting an International Geophysical Year-2 (IGY-2) in 2007-08.

- *Whereas the year 2007 is the 50th anniversary of the IGY of 1957-58; (several "Whereas" items omitted)*
- *Whereas the IGY, conceived in and promoted by the U.S., was the largest cooperati... scientific endeavor undertaken to that date, involving more than 60,0... ...ns;*
- *Whereas it is entirely fitting that Congress takes ... spirit, in promoting global cooperation through worldwide co... ...h activities reflecting the unity and diversity of life on Earth:*
- N... ...olved by the House of Representatives (the Senate concurring),* That it is the sense of t... ...gress that the President should–

Do we have similar initiatives by the european government(s)?

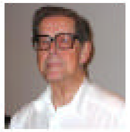
(1) endorse the concept of a worldwide IGY-2 for the 2007-2008 timeframe;

(2) direct the Director of the NSF, NASA, in association with the NAS and other relevant governmental and nongovernmental organizations, to initiate interagency and international inquiries and discussions that explore the opportunities for a worldwide IGY-2 in the 2007-2008 timeframe, emphasizing activities dedicated to global environmental research, education, and protection; and

(3) submit to Congress at the earliest practical date … a report detailing the steps taken in carrying out paragraphs (1) and (2), including descriptions of possible activities and organizational structures for an IGY-2 in 2007-2008.

IAGA News

No. 41 November 2004



http://www.iugg.org/IAGA/

*e*GY and IGY+50

In 2007, fifty years will have passed since the International Geophysical Year (IGY). IGY was the largest and most successful international collaborative research project ever in the geosciences and will be celebrated in several ways by ICSU and its member organisations. "International Years" for many different fields are being prepared to celebrate IGY: the **International Heliophysical Year (IHY), the International Polar Year (IPY), the International Year of Planet Earth (IYPE) and the electronic Geophysical Year (*e*GY)** are examples of the many programmes that are being planned. IAGA is a partner in the **SCOSTEP programme Climate and Weather of the Sun-Earth System (CAWSES)** that runs until 2008. The *e*GY is an initiative of the IUGG, driven by IAGA. It aims to exploit the power of modern communications and information management capabilities to accomplish in 21st century terms what the IGY achieved through the establishment of a worldwide network of geophysical observatories and World Data Centres – namely open access by the world community to vastly better and more comprehensive information about the Earth and geospace. Additionally, the establishment and coordination of a network of virtual observatories will be a central feature of the *e*GY.

IAGA News

No. 41 November 2004

TOULOUSE Meeting, July 22nd, 2005 **GAIV05 International Heliophysical Year: A program of global research**

In 1957 a program of international research was organized as the International Geophysical Year (IGY) to study global phenomena of the Earth and geospace. The IGY involved about 60,000 scientists from 66 nations, working at thousands of stations, from pole to pole to obtain simultaneous, global observations on Earth and in space. There had never been anything like it before. The fiftieth anniversary of the International Geophysical Year will occur in 2007. **We propose to organize an international program of scientific collaboration for this time period called the International Heliophysical Year (IHY).** Like its predecessors, the IHY will focus on fundamental global questions of Earth science via the following goals:

1) Obtain a coordinated set of observations to study at the largest scale the solar-generated events and their effect life and climate on Earth,

2) Document and report the observations and provide a forum for the development of new scientific results utilizing these observations,

3) Foster international cooperation in the study of Heliophysical phenomena now and in the future, and

4) Communicate the unique scientific results of the IHY to the interested scientific community and to all the peoples of Earth.

The objective of the IHY is to discover the physical mechanisms at work which couple the Earth to events from the Sun and heliosphere. The systematic global study of this connection is to be the central theme of the IHY. This special session will focus on research and campaign efforts which lay the groundwork for the IHY. This session will be used as a forum for discussion of the nature of the IHY, and to solicit suggestions and ideas from the community.

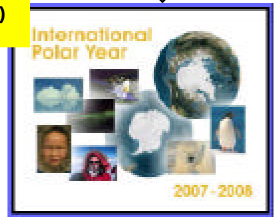
Convener: J. M. Davila, Code 682, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA; tel +1301 286-8366; fax +1 301 286-1617; e-mail: joseph.m.davila@nasa.gov

Co-conveners: R. A. Harrison, Rutherford Appleton Laboratory, UK; R. Jain, Physical Research Laboratory, Ahmedabad, India; I. S. Veselovsky, Institute of Nuclear Physics, Moscow State University, Russia.

Abstract deadline March 28th, 2005

SCIENTIFIC PROGRAMS FOR 2007-2009

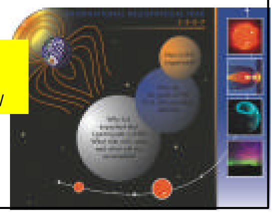
The International Polar Year (IPY4)
www.ipy.org



The International Year of the Planet Earth
http://www.esfs.org/

planetearth

The International Heliophysical Year
http://ihy.gsfc.nasa.gov/



The electronic Geophysical Year
www.egy.org

What is IPY

The Polar Regions are remote areas of the Earth that have profound significance for the Earth's climate and ultimately environments, ecosystems and human society. However we still remain remarkably ignorant of many aspects of how polar climate operates and its interaction with polar environments, ecosystems and societies. To understand the current global climate and what might happen in future the science community needs a better picture of conditions at the poles and how they interact with and influence the oceans, atmosphere and land masses. Existing climate models do not work well in the polar regions and have for example failed to predict the dramatic break-up of Antarctic ice shelves observed in recent years. The three fastest warming regions on the planet in the last two decades have been Alaska, Siberia and parts of the Antarctic Peninsula.

……….

The IGY produced unprecedented exploration and discoveries in many fields of research and fundamentally changed how science was conducted in the polar regions. Fifty years on, technological developments such as earth observation satellites, autonomous vehicles and molecular biology techniques offer enormous opportunities for a further quantum step upwards in our understanding of polar systems. An IPY in 2007-2008 also affords an opportunity to engage the upcoming generation of young Earth System scientists and to get the public to realize just how much the cold ends of the sphere we all live on really do influence us.

Solar - Terrestrial Physics is not main objective!

But…. **ChrisRapley-Chair ICSU Planning Group**

IPY Concept

An international programme of coordinated, interdisciplinary, scientific research and observations in the Earth's Polar regions: to explore new scientific frontiers, to deepen our understanding of polar processes and their global linkages, to attract and develop the next generation of polar scientists, engineers and logistics experts, to capture the interest of the public and decision-makers

Timeframe 1st March, 2007 to 1st March 2009

Geographic Focus 60° t 90° N and S

Content 5 major themes comprising a manageable number of Core Activities plus associated activities

Involvement : Scientists from 25 countries, 25 ICSU and non ICSU bodies, 7 national points of contact / National Committees under formation, more than 340 "ideas"

And…… **IPY Themes**

1. To determine the present environmental status of the polar regions by quantifying their spatial and temporal variability
2. To quantify and understand past and present environmental and human change in the polar regions in order to improve predictions
3. To advance our understanding of polar global teleconnections on all scales, and of the processes controlling these interactions
4. To investigate the unknowns at the frontiers of science in the polar regions
5. To use the unique vantage point of the polar regions to develop and enhance observatories studying the Earth's inner core, the Earth's magnetic field, geospace, the Sun and beyond

The 5th theme includes solar-terrestrial physics!

ICESTAR: is one of five major programs for SCAR, may be Core Program for IPY

How to fit the pieces together

Project Steering Committees

Task

Develop science and implementation plans

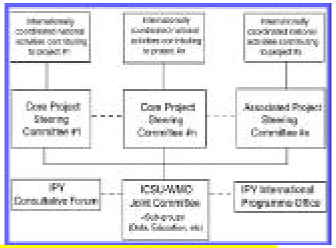
Lead and manage project

Membership

National PI's

Representatives from bodies key to success

Self-funding



What Exactly by Whom?

Projects carried out by researchers and support staff from:

National university research groups

National research institutes and operational bodies

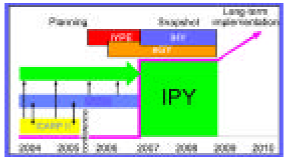
International bodies

Funded by national mechanisms (plus some international)

Coordinated by : National Committees within nations

<u>IPY organisational structure internationally</u>

The International Polar Year (IPY4)
www.ipy.org



Latest News

- **The ICSU/WMO IPY EXPRESSION OF INTENT ON-LINE SUBMISSION AVAILABLE**
- 09 Nov2004
- **01-11-04 - Pre-Publication Copy of the Planning Group Report now available online.**
- 01 Nov2004

Latest News

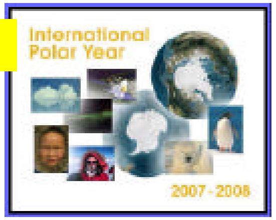
Published: 09 Nov 2004

The ICSU/WMO IPY EXPRESSION OF INTENT ON-LINE SUBMISSION AVAILABLE

The IPY Programme Office has now established an online submission form for Expressions of Intent which participants are encouraged to use, rather than the Word document version which is for those without reliable Web access. The forms are designed to ensure a standardised response by participants in addressing the IPY project criteria. The deadline for submission will be January 14th, 2005. All submissions will be examined by the IPY Joint Committee and comments on the match to IPY criteria provided to each Expression by February/March 2005.

SCIENTIFIC PROGRAMS FOR 2007

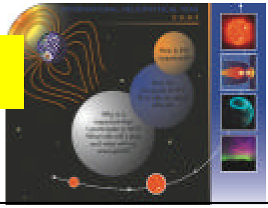
The International Polar Year (IPY4)
www.ipy.org



The International Year of the Planet Earth
http://www.esfs.org/

planetearth
2006 – 2007

The International Heliophysical Year
http://ihy.gsfc.nasa.gov/



The electronic Geophysical Year
www.egy.org

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http://www.egy.org/ *e* is in lower case italics)

Welcome

eGY News No. 2 November 2004

to: papita@umich.edu.

Vladimir (Volodya) Papitashvili, Editor

The electronic Geophysical Year

The eGY website currently contains descriptions of eGY – objectives, themes, operational models, activities, attractions, news articles, and downloadable copies of presentation material. The site will be developed as a portal for use by eGY participants. Please send content suitable for the website to: marissa.rusinek@lasp.colorado.edu

eGY website www.egy.org

eGY News No. 1 **October 2004**

… and Newsletter

The electronic Geophysical Year

Background

A key achievement of the 1957-1958 International Geophysical Year (IGY) was the establishment of a world-wide system of physical observatories and data centres. The access to data that this observational data framework provided triggered a leap forward in our understanding of the Earth and its space environment.

Two developments have brought us to the threshold of another revolution in the advancing of our understanding of the Earth and geospace. First, our ability to collect data has increased dramatically, with pervasive networks of observational stations on the ground, in the oceans, in the atmosphere, and in space. Second, modern digital communications and methodologies for information management (largely internet-based) provide us with an unprecedented ability to access and share information.

These developments coincide with a heightened awareness by governments of the need for sustainable management of the finite natural resources of our planet, the importance of understanding the Earth as a complex system, and the central role that ready access to comprehensive information plays. This translates into a growing readiness to support so-called *e*-Science and grid infrastructures of computing resources.

An international resolve and coordinated effort by all nations spanning all geoscience disciplines will help us maximise the value to society of these developments and to share the benefits equally between all nations.

SCIENTIFIC PROGRAMS FOR 2007

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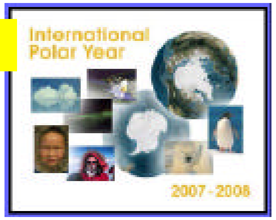
www.ipy.org



The International Year of the Planet Earth
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planetearth
2006 - 2007

The International Heliophysical Year
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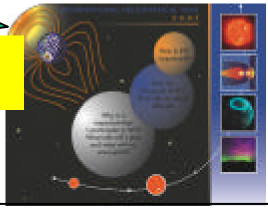


The electronic Geophysical Year
www.egy.org

How IHY is Organized

The IHY organization is developed in response to the goals and objectives of IHY. An *International Steering Committee* coordinates all of the IHY activities, through its Science Working Groups.

Science Working Groups coordinate analysis and modeling efforts, and are responsible for planning IHY meetings, symposia and workshops through the three major thrusts:

1. ***Scientific Campaigns***: the IHY oversees coordinated observing campaigns. The team reviews proposals for IHY campaigns, coordinates the input from the observatory representatives, and maintains the IHY observing and campaign schedule.
2. ***Scientific Meetings and Publications***: arranges for communication of scientific results to broader science community
3. ***Public Outreach***: responsible for increasing public awareness of IHY activities. This committee produces newsletters, maintains the website(s), writes articles, coordinates media affairs, and develops outreach products

These IHY activities link directly to the success of IHY and require a long-term commitment for the planning and execution phases. We're seeking the participation of both individuals and organizations in these efforts.

Science Working Groups

Atmosphere-Climate Working Group
Solar Drivers Working Group
Heliosphere & Solar Wind Working Group
Magnetospheres & Ionospheres Working Group

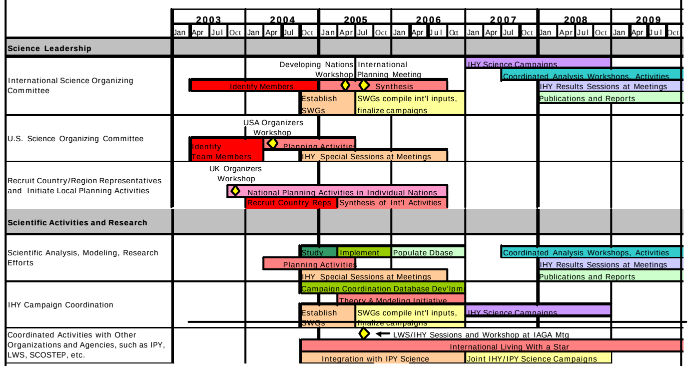
The oversight of the Scientific Campaigns is coordinated through the Scientific Working Groups.

Public Outreach

The Public Outreach initiative communicates the goals and activities of IHY by coordinating affairs with the media and making a variety of materials available, such as newsletters, websites, newspaper articles and other outr each products.

Of course, IHY benefits from everyone's participation in the public outreach program.

Schedule of Activities



IHY International Steering Committee

-Help to stimulate, find support for, and coordinate with National IHY Initiatives in other countries
- Help to plan international workshops and meetings
- Work on "integration and synthesizing" in 2005-2006

Joe Davila, NatGopalswamy, Dick Fisher, J.-L. Bougeret, Richard Harrison, Madhavan Nair, Barbara Thompson, Takeo Kosugi, Vladimir Obridko, Archana Bhattacharya, Marcos Machado, Don Melrose, Oddbjorn Engvold, Hermann Opgenoorth, Jingxiu Wang, Roger Bonnet, Richard Marsden, Harm Moraal, Shahinaz Yousef, Chris Rapley, Charlie Barton, Hans Haubold, Greg Ginet, Rainer Schwenn, Wing Ip, Eric Priest, Roger Smith, George Siscoe, Iver Cairns, Pierre Rochus, Mike Mendillo, Tim Killeen, Paulett Liewer, Dave McComas, Neil Murphy, Joann Joselyn, R. Srinivasan, Jack Gosling

IHY has Six International Regions: *Latin America, Asia/Pacific, FSU, Europe, Africa, US/Canada*. Leadership teams have been or are being established for each region.

Note: All members are not confirmed

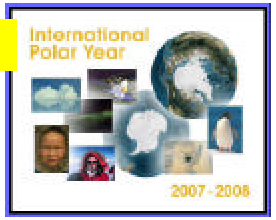
IHY International Planning Coordinators

- Heinzl : Czech Republic
- Michalek : Poland
- Arnold Benz: Switzerland
- Rob Wimmer-Schweinbruger: Germany
- Dalmiro Maia: Portugal
- Javier Rodriguez-Pacheko : Spain
- Ester Antonucci : Italy
- Brigitte Schmeider: France
- Andy Breen: UK
- Peter Gallagher: Ireland
- Pierre Kauffman: Brazil
- Bill Liu: Canada
- Guangli Huang: China
- Rajmal Jain, Narain Rao : India
- Lu Lee: Taiwan
- Kojima, Kamide, Fuji, Terasawa: Japan
- Stefan Poedts: Belgium
- Ismail Sabbah : Kuwait
- Bo Andersen: Norway

- Cristina Mandrini, Marta Rovira: Argentina
- Xochitl Blanco -Cano (Mexico)
- E Turunen, Usoskin, Pulkinnen : Finland
- Rajmal Jain: India
- Karel Kudela: Slovakia
- Bindschadler: Antarctica
- Obridko, Veselovsky : Russia
- Harm Moraal : South Africa
- Hady : Egypt
- Babatunde Rabiu : Nigeria
- Dong-Hun Lee, S.Y. Yun : S. Korea
- Chilingairayan : Azerbaijan
- Axel Brandenburg, Eigil Friis-Christensen: Denmark
- Sixto Gonzalez: Puerto Rico
- Rusdijak : Croatia
- Walter Gonzalez: Brazil
- Xenophon Moussas : Greece
- Gedalin: Israel

SCIENTIFIC PROGRAMS FOR 2007

The International Polar Year (IPY4)
www.ipy.org



The International Year of the Planet Earth
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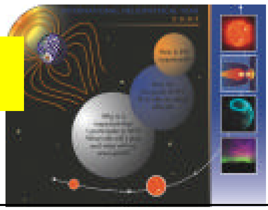


The electronic Geophysical Year
www.egy.org

The International Year of the Planet Earth
http://www.esfs.org/

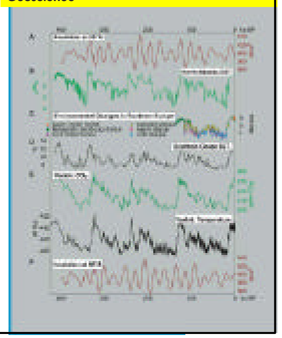
What has been the variability in climate over the last 1000 years?

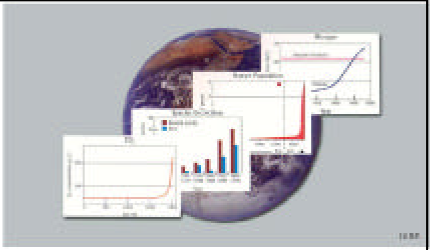
Climate varies in temperature, precipitation and the frequency of extremes such as drought, storms and floods...The emerging view from the long-term climate record is important to modern societies because it provides a basis for understanding recent trends and their causes…. By about 5-6000 years ago agricultural systems were widespread ... By 3000 years ago extensive areas were under cultivation ... The geological record tells us that all these changes were accompanied by forest clearing, increased burning patterns, and increased erosion rates ... This graph shows records of climate changes from the last four glacial cycles. High resolution records of the recent past can be obtained from growth rings of long-lived trees, ice cores and laminated lake sediments. All are sensitive at annual scale to reconstruct climate changes. The datasets are few, the best being reconstructions of mean temperature for the last 1000 years for the mid to high latitudes of the Northern Hemisphere..

The International Union of Geological Sciences (IUGS) initiated the International Year of Planet Earth; it was endorsed by UNESCO's Earth Science Division, and by the UNESCO-IUGS International Geoscience Programme (IGCP). The main aim of the IYPE is to demonstrate the great potential of Earth sciences to lay the foundations of a safer, healthier and wealthier society. The IUGS-UNESCO team aims to have the IYPE proclaimed through the UN system, targeting 2006 as the Year itself. However, we expect the Year's activities to begin in 2005 and culminate in 2007.

Full Partners

Geological Society of London, International Geographical Union, International Lithosphere Programme, International Union of Geodesy and Geophysics, International Union of Soil Sciences, Netherlands Institute of Applied Geoscience



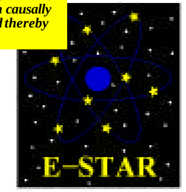


What is the role of human activities in climate forcing?

We know that human activity has resulted in changes to atmospheric chemistry and land cover, and caused serious decline in biodiversity. In addition thousands of new synthetic chemical substances have been produced whose role in the biosphere is not fully understood. Many lake systems, for example, have become acid as a direct consequence of industrial gas emissions over the past 150 years. Modifying biogeochemical cycles leads to complex feedbacks into key elements of climate systems and hence into economic activity and water and food security. One of the ways we can monitor climate modulation by humans is to estimate the greenhouse gas emissions resulting from human activities. We can estimate the amounts but we cannot identify where they all end up. Are they trapped in the soil, incorporated into forest cover? Has the ocean absorbed much of them, or are all these - and maybe more – factors involved? Figure 7 attempts to separate human and natural factors in driving recently observed climate change. The relative climatic contributions of land-cover change and changes to the chemistry of the atmosphere still remain to be worked out. **Research priorities in this area require process studies in biology, soil science (pedology) and oceanography, involving automatic monitoring, remote sensing and "ground-truthing"** – in other words, the necessary reality check of actual field studies. In addition, studies of sediment chemistry in high deposition rate settings will also add detail.

EUROCORES Programme
European Solar Terrestrial and Atmospheric Research (E-STAR)
The quantification of physical coupling processes which causally link interplanetary space to the Earth's atmosphere and thereby influence the global climate system.

COST 724
a European Space Weather Network



CAWSES
Climate and Weather of the Sun-Earth System
A new SCOSTEP Program for 2004-2008

The International Living With a Star program http://ilws.gsfc.nasa.gov/

SCOSTEP

SCOSTEP Bureau

- President: M. A. Geller
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- T. Tsuda (IAMAS)
- M. Candidi (SCAR)

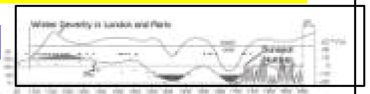
SCOSTEP's mission: to implement research programs in solar-terrestrial physics that benefit from international participation and that involve at least two ICSU bodies.

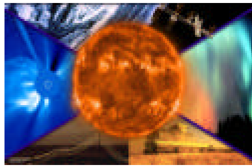
CAWSES Scientific Steering Group

- Chair: Sunanda Basu, BU, USA
- Jean-Louis Bougeret, CNRS, France
- Joanna Haigh, Imperial College, UK
- Yohsuke Kamide, STEL, Japan
- Arthur Richmond, NCAR, USA
- C.-H. Liu, NCU, Taiwan
- Lev Zelenyi, IKI, Russia
- P. Duggirala, Scientific Coordinator
- L. Vercauteren, Program Admin.

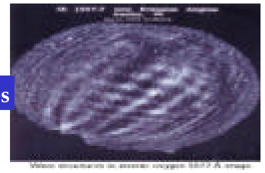
Four Themes under CAWSES

Solar Influence on Climate

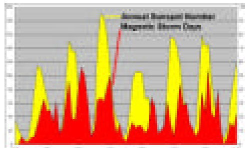




Space Weather: Science and Applications



Atmospheric Coupling Processes



Climatology of the Sun-Earth System

Theme 1: Solar Influence on Climate

Co-Chairs: Michael Lockwood (UK) and Lesley Gray (UK)

WG 1.1: Assessment of Evidence for Solar Influence on Climate, *Juerg Beer (Switzerland), William Russow (USA), Ilya Usoskin (Russia), Judith Lean (USA), Gerard Thuillier (France), Gerry North (USA), Peter Stott (UK), Warren White (USA), Lon Hood (USA), Karin Labitzke (Germany), Augusto Mangini (Germany)*

WG 1.2: Investigation of Mechanisms for Solar Influence on Climate, *Ulrich Cubasch (Germany), Gerry Meehl (USA), Kuni Kodera (Japan), R. Garcia (USA), David Rind (USA), Mark Baldwin (USA), Charles Jackman (USA), Jon Kristjansson (Norway) and Giles Harrison (UK)*

Theme 2: Space Weather Science & Applications

Co-Chairs: Janet Kozyra (USA) and Kazunari Shibata (Japan)

Santimay Basu (USA), Walter Gonzalez (Brazil), Nat Gopalswamy (USA), A. T. Kobea (Ivory Coast), Anatoly Petrukovich (Russia), Rainer Schwenn (Germany), Wei Feng Si (China) and R. Sridharan (India)

Theme 3: Atmospheric Coupling Processes

Co-Chairs: Franz-Josef Luebken (Germany) and Joan Alexander (USA)

WG 3.1: Dynamical Coupling and its Role in the Energy and Momentum Budget of the Middle Atmosphere, *Martin Mlynczak (USA), William Ward (Canada), David Fritts (USA), Nikolai Gavrilov (Russia), S. Gurubaran (India), Maura Hagan (USA), J. Y. Liu (Taiwan), Alan Manson (Canada), Dora Pancheva (UK), Kauro Sato (Japan), Kazuo Shiokawa (Japan), Hisao Takahashi (Brazil), Robert Vincent (Australia) and Yi Fan (China)*

WG 3.2: Coupling via Photochemical Effects on Particles and Minor Constituents in the Upper Atmosphere, *Charles Jackman (USA), Ulf Hoppe (Norway), Manuel Lopez-Puertas (Spain), Daniel Marsh (USA), James Russell (USA), David Siskind (USA)*

WG 3.3: Coupling by Electrodynamics including Ionospheric Magnetospheric Processes, *Steve Cummer (USA), Peter L. Dyson (Australia), Inez S. Batista (Brazil), Archana Bhattacharya (India), Jorge Chau (Peru), Martin Fullekrug (Germany), Gang Lu (USA), Roland Tsunoda (USA), and M. Yamamoto (Japan)*

WG 3.4: Long-Term Trends in Coupling Processes *(inter-connected with 4.4)*

Theme 4: Space Climatology

Co-Chairs: Claus Froehlich (Switzerland) and Jan Sojka (USA)

WG 4.1: Solar Irradiance Variability, *Judit Pap (USA) and Gerard Thuillier (France)*

WG 4.2: Heliosphere Near Earth, *Leif Svalgaard (USA)*

WG 4.3: Radiation Belt Climatology, *Takahiro Obara (Japan)*

WG 4.4: Long-Term trends in Ionospheric and Upper-Atmospheric Variability *(inter-connected with 3.4), M. Jarvis (UK) and John Emmert (USA)*

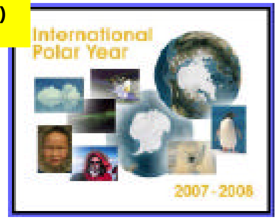
Capacity Building & Education

Co-Chairs: Marv Geller, S. T. Wu and Joe Allen

- CAWSES will hold meetings and provide specialized training courses for scientists from developing nations and help with computational and data resources
- Establish partnerships between developing & industrialized nations
- CAWSES – AOPR Center will facilitate such activities

SCIENTIFIC PROGRAMS FOR 2007-2009

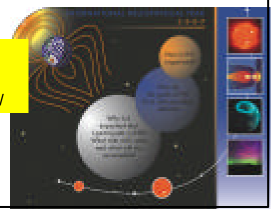
The International Polar Year (IPY4)
www.ipy.org



The International Year of the Planet Earth
http://www.esfs.org/

planetearth

The International Heliophysical Year
http://ihy.gsfc.nasa.gov/

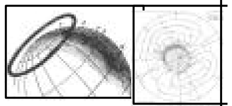


The electronic Geophysical Year
www.egy.org

Advances During Previous International Years

Lapland, 1882

- **IPY 1**
  - ***Auroral oval structure and dynamics***
  - ***Currents in the upper atmosphere produce magnetic perturbations on the ground***
  - ***Currents flow between upper atmosphere and space***

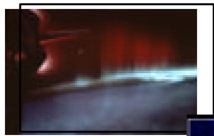


- **IPY 2**
  - ***International polar observing network***
  - ***New instrumentation (radiosondes and ionosondes)***
  - ***Rapid run magnetometers***
  - ***Simultaneous measurements at multiple stations***
  - ***Global current pattern for specific magnetic disturbance (magnetic bays)***
- **IGY**
  - ***Interhemispheric network of polar stations***
  - ***New instrumentation (all-sky cameras, satellites)***
  - ***Major discovery (radiation belts)***
  - ***New concepts (the magnetosphere, substorms)***
  - ***Exploration of space***
  - ***Global 3D synoptic data***
  - ***Evidence of time-dependent global dynamics***

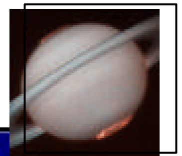
The logical next step is to extend global studies into the Heliosphere to incorporate the drivers of Geophysical change into the global system- The IHY.

What is the Opportunity?

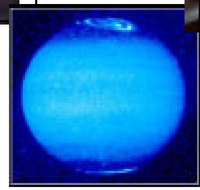
Cross-cutting solar system science



True-color image of Earth's aurora taken from Space Shuttle



Aurora at Saturn's poles



Jupiter's aurora imaged with HST

- **Similar physical processes are evident in vastly different environments**

IPY, eGY, IHY: perspectives for solar-terrestrial physics?

Maurizio Candidi

IFSI-CNR/INAF Italy

In 2007 to 2009 the 50th anniversary of the IGY will be celebrated, and many research intiatives by ICSU and its disciplinary bodies are underway; solar terrestrial physics is present in the draft plans and will certainly have a large role, as a core discipline in this framework Several scientific programs in STP are being implemented by SCAR, IAGA, SCOSTEP, and other unions.

SCAR has recently approvedthe Interhemispheric Conjugacy Effects in Solar Terrestrial Physics (ICESTAR) program, for bipolar reserach; SCOSTEP is conducting its CAWSES program; COST724 is active in Europe ; these programs present ample space for coordination and synergy in international research.

Context

Existing polar science co -ordination bodies:
Scientific Committee on Antarctic Research (SCAR)
International Arctic Science Committee (IASC)
Committee of Managers of National Antarctic Programmes (COMNAP)
Forum of Arctic Research Operators (FARO)
National and International Space Agencies (e.g. NASA, ESA, CSA, JAXA)
Arctic Ocean Sciences Board (AOSB)
Climate and Cryosphere Programme (CliC)
International Arctic Social Sciences Association (IASSA)
International Oceanographic Commission (IOC)
International Permafrost Association (IPA)
Arctic Council / Antarctic Treaty Parties

More Context

Other coordination bodies with an interest:
International Union of Geodesy and Geophysics (IUGG)
International Union of Geological Sciences (IUGS)
Scientific Committee on Ocean Research (SCOR)
World Climate Research Programme (WCRP)
International Geosphere-Biosphere Programme (IGBP)
International Human Dimensions Programme (IHDP)
DIVERSITAS
Global X Observing System (GXOS)
European Polar Board (EPB)
International Union of Radio Science (URSI)
International Society of Photogrammetry and Remote Sensing (ISPRS)
Census of Marine Life (CoML)

Additional "Stakeholders":

National Funding Agencies and Polar Logistics operators
Other national bodies (Academy committees, interdepartmental / interagency coordinating bodies, etc.)
The various meteorological and ocean operational agencies (NOAA, EUMETSAT, etc.)

Specific Issues (1)

What is status of the high latitude ocean circulation and composition?
How do polar ecosystem structure and function ……….
How are climate, environment, and ecosystems in the polar regions changing?
How has polar diversity responded to long-term changes in climate?

What are the inter-hemispheric connections in these changes? (Including magnetic conjugacy of geospace phenomena, for SCAR; see ICESTAR program)

How has the planet responded to multiple glacial cycles?

Specific Issues (2)

…………………

Specific Issues (3)

What is the pattern and structure of polar marine and terrestrial biodiversity, ….
What effect does the solid earth have on ice sheet dynamics?
What are the nature, composition and morphology of the sea floor and earths crust …..
How does phylogenetic and functional diversity ………

How does the neutral atmosphere interact with geospace at the polar regions and what are the consequences?

What is the influence of solar processes at the polar regions on earth's climate?

What is the state of the Earth's magnetic dipole?
Is the inner core rotating differentially?