Putting the "I" in I*Y 2007

Overview

This presentation addresses our planned coordination with several international programs. By working with (and through) these programs, we believe we can achieve a truly international scientific impact.

1) This is our best chance of establishing an IHY network of global instrumentation,

2) Best chance of really "internationalizing" the IHY program

3) Clear and strong roles for people outside the "usual" scientific community

Elements

1) How are these activities coordinated?
   - International Scientific Organizations: IAGA, IUGG, IAU, ICSU, COSPAR, etc.
   - UN Basic Space Science Initiative
   - ISSI
   - The "GLOBE" Program
   - igy2007.org
   - Geo-Hitchhiker Program
2) Where does the money/support come from?
   - Various sources - we need clear examples of potential programs so we begin stimulating support for these activities.
3) What do we need from this workshop?
   - 10 potential international instrumentation/research projects which hinge on the coordination with developing nations.

The IHY/IGY Developing Nations "Internationalization" Initiative

We first need to identify scientific objectives which can be advanced by an organized global campaign of scientifically useful measurements.

We then identify PI's who will develop the instrumentation plans.

Through UNBSSI, GLOBE and supporting agencies, we will obtain funding for researchers in BSSI Member States to develop the instrumentation and participate in the campaigns.

PI's and global measurement ideas are needed!!

U.N./ESA "Basic Space Science" Initiative

- Established in 1990 - first workshop in Bangalore, India in 1991
- Basis is a series of workshops held at different global locations
- The focus is on the development and enabling of astronomical and space physics research, particularly in developing countries
- Frequently done in collaboration with IAU/COSPAR workshops (both IHY endorsers)
- 12th United Nations/European Space Agency Workshop on Basic Space Science: *Beijing, P.R. China, 24-28 May 2004*

Each of the UN/ESA workshops has resulted in a set of unique observations and recommendations identifying the regional needs, strengths and possible outlook for future progress.

In the context of the needs for the developing countries, basic space science was defined to cover:

1) Fundamental Physics, 2) Astronomy and Astrophysics, 3) Solar-terrestrial interaction and its influence on terrestrial climate,4) Planetary and atmospheric studies, and 5) the Origin of life and exo-biology.

Applicable techniques identified as potential tools for the pursuance of basic space science research:

* Ground-based optical, and radio observations,
* Radio and optical telescopes with associated equipment,
* Remote sensing, both from the ground and from space,
* AII measurements from ground-inaccessible windows which can only be made through the use of instruments and telescopes in Earth orbit,
* In-situ measurements from rocket, balloon and satellite platforms

The UN/BSS developed a 3-stage or "Tripod" concept, in conjunction with the "World Space Observatory" program, to assure in the developing countries:

1. The availability of research tools of a level where meaningful science can be made, but at a level where the national socio-economical infrastructure can maintain functionality in the university/research laboratory environment, e.g.. a small telescope facility.

2. Teaching materials allowing basic space science to be introduced at the teaching level of fundamental mathematics, physics and chemistry courses in middle and higher education.

3. Application materials for original research in basic space science such as e.g. observing programmes for variable stars.

Using this approach, small astronomical telescope facilities in Colombia, Egypt, Honduras, Jordan, Morocco, Paraguay, Peru, the Philippines, Sri Lanka, and Uruguay have been established and continue to be in operation.

United Nations Basic Space Science Initiative (UNBSSI) Plan to Support IGY/IHY

UNBSSI, through the Programme on Space Applications of the Office for Outer Space Affairs, started in 1991 with annual regional/international ***workshops*** on basic space science being organized for the benefit of developing nations and nations with economies in transition in the economic regions of Africa, Asia and the Pacific, Latin America and the Caribbean, Western Asia, and (eastern) Europe. On a continuing basis ***follow-up projects*** that emanated from the workshops were implemented in developing nations with in-kind and in-cash support from industrialized nations. International organizations, for example the International Astronomical Union (IAU) and the Committee on Space Research (COSPAR), followed up these workshops with similar activities at a more specialized level. UNBSSI has established over the period of time of the initiative a ***world wide electronic network*** reaching all ***191 Member States*** of the United Nations (***scientists and engineers from 127 United Nations Member States participated at and/or contributed to the initiative***).

At the 2004 session of the Scientific and Technical Subcommitte of UNCOPUOS, the United States proposed for consideration a one-year agenda item for the purpose of exchanging information on scientific research and programme plans in the area of ***solar-terrestrial physics***. Elements of this proposed agenda item were part of all workshop programmes in the UNBSSI to stimulate, strengthen, and coordinate space research in developing nations to understand physical processes that govern solar-terrestrial interaction. Emphasis was placed on solar phenomena that affect the ***environment of Earth*** and their ***consequences for life and society*** in the short and long term.

United Nations Basic Space Science Initiative (UNBSSI) to Plan to Support IGY/IHY

Such elements covered:

- Access to data bases of observational data on heliospheric events and their effect on life and climate of Earth.
- Utilization of observational data, both from ground-based and space-borne facilities, to undertake scientific research projects.
- Foster regional and international cooperation in the study of heliophysical phenomena.
- Communicate scientific results from solar-terrestrial research to the scientific community and the public at large through proceedings, reports containing collections of project proposals, and the world-wide-web.
- Focus on space satellite missions, some of them contained in the attached table (missions undertaken by space related entities in developing nations, such as ISRO, CNSA, CONAE, INPE, etc. will be added to this table).
- Explore and demonstrate clear roadmaps along which significant progress can be accomplished for national basic space science efforts in developing nations.
- Enhance the understanding of solar phenomena through the application of detailed knowledge on the heliosphere to general stellar evolution effects.

United Nations Basic Space Science Initiative (UNBSSI) to Plan to Support IGY/IHY

It is recommended that the UNBSSI proceeds with its successful series of workshops and follow-up project implementations and re-orients its focus towards the understanding of the heliosphere and its direct and indirect influence on planet Earth and its inhabitants. This can generate an effective preparation of IHY 2007 with the creation of a global awareness programme for the benefit of an enhanced and accelerated capacity building regionally and internationally, particularly in the developing nations. Such efforts shall be planned and coordinated in the spirit of the deliberations of UNCOPUOS and concerned member States.

Papers on specific projects that were dealt with in UNBSSI can be made available as the need arises.

U. N. Agenda Item: International Geophysical Year 2007

In 1957 a program of international research, inspired by the International Polar Years of 1882-83 and 1932-33, 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. IGY 2007-2008 will be both an affair of scientific collaboration as well as a commemoration of IGY 1957. Several planning efforts in support of IGY are underway. These efforts focus on stimulating activities and campaigns to broaden the scientic potential of IGY, establishing an organizational structure for the historical and commemorative efforts for IGY 1957, assisting groups and organizations in identifying resources and support for IGY activities, and spreading awareness and stimulating interest in IGY participation.

The International Union of Geophysics and Geodesy (IUGG) has established an IGY 2007 planning committee, while efforts such as the International Heliophysical Year and Electronic Geophysical Year (eGY) are attracting worldwide attention and focus. Through collaboration with the United Nations Basic Space Science Program, IGY will continue to gain momentum on an international scale.

The primary activities within our planning effort are as follows:

- Support individual science planning efforts such as IHY and eGY through a series of workshops and activities in 2004-2005, preparation and integration exercises in 2006, and support campaigns and analysis efforts and activities in 2007-2008
- Provide a framework through which individual science planning efforts can be integrated by 2006
- National Activities, Resolutions and Endorsements: Getting IGY "recognized" or "adopted" around the world, nation by nation, region by region
- Coordinate activities with other I*Y's, such as International Polar Year (IPY) and International Year of Planet Earth (IYPE)
- Establish and support an extensive historical effort, to reflect back on the advances and achievements of IGY 1957, to capture the "living memory" of IGY 1957, and to create an extensive record of IGY 1957 and its successes for historical preservation.
- Stimulating public interest and supporting planning activities to demonstrate the beauty and importance of geophysics.

Support would (ideally) involve

1) The U.N. adopting a resolution (similar to the house resolution attached) recognizing 2007-2008 as International Geophysical Year, and encouraging member nations to do the same.

2) Agree to support collaboration between the U.N. Basic Space Science initiative and IGY, so that the IGY program can be fully integrated with the developing nations programs, and so that the Basic Space Science initiative may play a key role a global campaign of scientific research.

3) Resources to facilitate international activities, and assistance in identifying support for national activities and collaboration within individual nations.

4) Continued effort within the Scientific and Technical Subcommittee UNCOPUOS to evaluate the progress of IGY activities worldwide and to identify needs and issues for the assurance of the success of IGY

The "GLOBE" Program

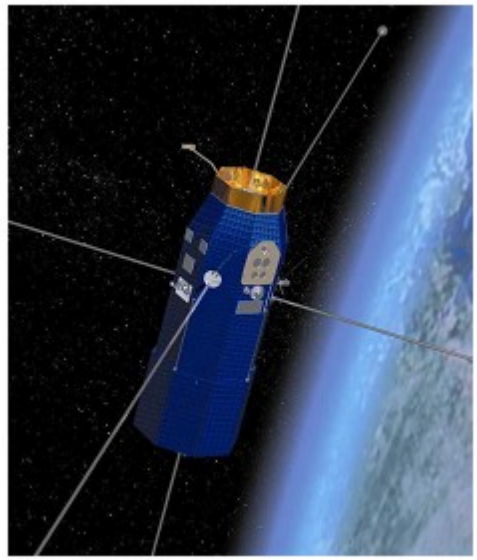
The model for our collaboration with the United Nations Basic Space Science Initiative is the tremendously successful GLOBE Program.

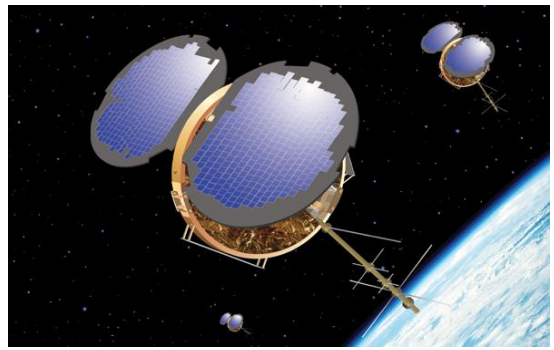
Principal Investigators of GLOBE projects develop campaigns which rely on wide global participation. Measurements and relatively simple instrumentation are defined by the PI teams. Partipants purchase or develop the instruments according to the PI's plans, and perform the following roles:

- Taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land cover/phenology - depending upon their local curricula
- Reporting their data through the Internet
- Creating maps and graphs on the free interactive Web site to analyze data sets
- Collaborating with scientists and other GLOBE students around the world

Geospace & IHY

- 2007 is not an optimal time for Geospace science since the current plan is to ramp down operating missions leaving quite a gap prior to the LWS/Geospace launches.
- C/NOFS will launch on Dec 2, 2004, and with life expectancy of 4 to 5 years.
- The COSMIC constellation is currently planned to be launched in the spring of 2005, and is expected to last for five years
- THEMIS constellation will launch fall 2006
- DMSP, GOES and POES will still be operational at this time





Instrumentation to support C/NOFS, THEMIS & COSMIC

- Cheap magnetometers around the equator. It is particularly important to have 2 on the same geomagnetic meridian, one at the equator, and one above or below (about 10 degrees or so of separation).
  - Estimate the electrojet strength by subtracting the 2 H components. This allows an estimate of eastward electric field during the day. Scintillation-causing instabilities are thought to be a function of this E field.
- Beacon receivers
  - for transit satellites; will provide scintillation parameters
  - for the C/NOFS satellite (the same as above, except that they accept one more frequency); will provide scintillation parameters
  - for the UHF/VHF communication satellites at geosynchronous orbit; will provide scintillation parameters
- GPS receivers, will provide TEC and, if the receiver is complex enough, scintillation at L-band
- All sky camera: can contribute to measure of ambient ionosphere, and detection of equatorial bubbles

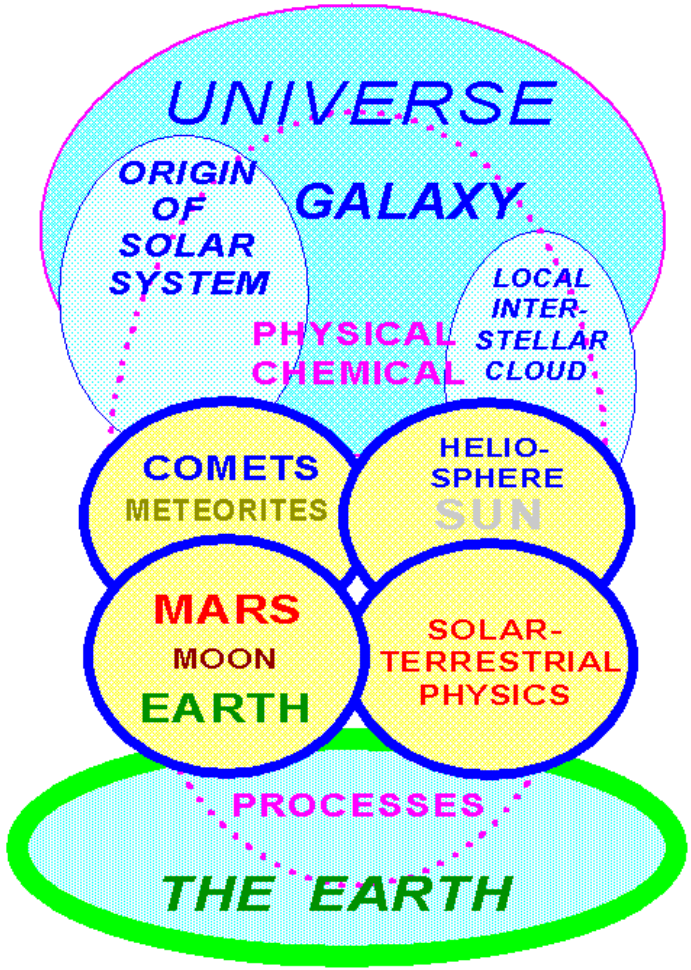
ISSI Workshops and Programs

The International Space Science Institute (ISSI) in Bern has been established to further interdisciplinary studies and interpretation of the very complex experimental data which originate from multiexperiment satellites, already launched or due to be launched over the next several years by different space agencies.

Space scientists are encouraged to pool their data and results and to work closely with theorists and modelers. Scientists working in related fields and with ground-based observations and the results of laboratory investigations are also invited to participate. The result of these activities are expected to help identifying the scientific requirements of future space science projects.

ISSI organizes study projects, focussing on workshops, on specific scientific themes selected in consultation with the Science Committee members and other advisers from the relevant segment of the scientific community.

ISSI Workshops and Programs



ISSI's Interdisciplinary Approach

Description of Geo-Hitchhiker Concept

- Fly science instruments and technology demos on the excess capacity of geostationary comm. satellites
- Saturation in the transponder market, satellite owners search for new revenue streams, and the excess capacity on all communication satellites are creating new opportunities for NASA and other organizations
- Develop a GEO Instrument Carrier (GIC) platform that can be configured to meet multiple satellites, instruments, and tech demos while providing a frame-work for avionics innovation and technology infusion
- Technical and organizational issues exist, but can be resolved by working with all parties to a mutual benefit - win win proposition!

Geo-Hitchhiker: Description of Opportunity

- **Spacecraft & Launch Opportunities**
  - Average excess capacity - mass: 89kg, power: 460W, & volume.
  - Commercial: Loral (28+); Boeing (5+), Lockheed Martin, and others
  - Government: GOES & TDRSS have mass, power, & volume
- **Rough Costs Estimates:**
  - Platform Development Cost (w/o GOES or SDO/GPM): ~$12M
  - First S/C Integration: $10-15M, X-Ponder: $1.5M/y (& dropping)
- **Mission Life:**
  - Communication satellites have a mission life of 15 years
  - The Geo-Hitchhiker Platform uses Beginning of Lifeexcess capacity
- **Pathfinder:**
  - The Geo-Hitchhiker platform will be the future Hitchhiker program
- **Technology Infusion Path:**
  - Technology could be infused on the carrier or tested on platfrom

108th CONGRESS
1st Session

H. CON. RES. 189

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

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

IN THE HOUSE OF REPRESENTATIVES

May 21, 2003

Mr. UDALL of Colorado (for himself and Mr. EHLERS) submitted the following concurrent resolution; which was referred to the Committee on Science

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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;

Whereas the IGY, conceived in and promoted by the United States, was the largest cooperative international scientific endeavor undertaken to that date, involving more than 60,000 scientists from 66 nations;

Whereas the IGY legacy includes the dedication of an entire continent to cooperative scientific study through the Antarctica Treaty and the inauguration of the global space age through the launching of Sputnik and Vanguard;

Whereas IGY cooperation continues as the model and inspiration for contemporary world science and also, in this strife-torn era, for the human species as a whole;

Whereas the IGY was conceived as a follow-on to the International Polar Year of 1932 that would reflect new and more globally comprehensive research and measurement techniques in geophysics; and whereas in like-minded spirit it would be appropriate for an IGY-2 to reflect global developments in biology, genetics, the neurosciences, and other areas of scientific research;

Whereas it also would be appropriate for an IGY-2 to recognize interdisciplinary research that incorporates the physical and social sciences and the humanities in enriching understanding of diverse life on Earth;

Whereas the 35th anniversary of the IGY was commemorated by the International Space Year, a globally implemented congressional initiative conceived by the late Senator Spark Matsunaga of Hawaii, that was highlighted by globally coordinated environmental monitoring and research whose ongoing legacy continues to benefit humanity; and

Whereas it is entirely fitting that Congress takes the lead again, in the same spirit, in promoting global cooperation through worldwide commemoration of the IGY with activities reflecting the unity and diversity of life on Earth: Now, therefore, be it

Resolved by the House of Representatives (the Senate concurring), That it is the sense of the Congress that the President should--

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

(2) direct the Director of the National Science Foundation and the Administrator of the National Aeronautics and Space Administration, in association with the National Academy of Sciences 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, but no later than March 15, 2004, 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.

The Power of eGY

Electronic Geophysical Year (eGY): the establishment of a global virtual network of observations and activities in 2007-2008

Through eGY, campaign planning and data access becomes more universible and accessible.

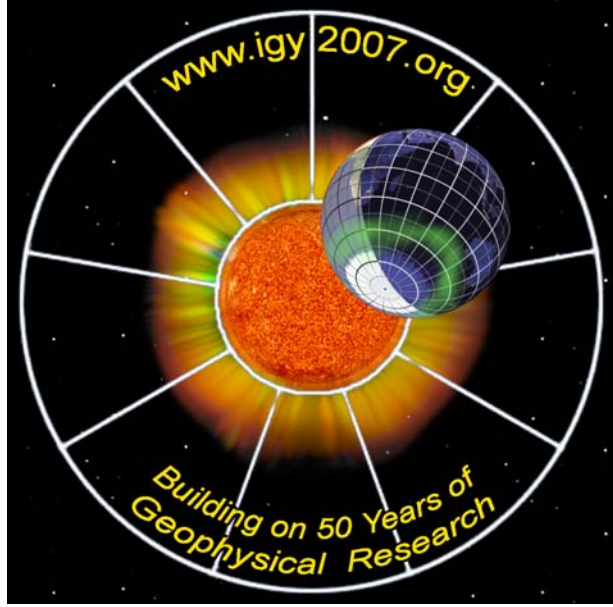
An international network of virtual observatories is already being established by a number of organizations and initiatives. This allows for greater ease in facilitation and communication, and (perhaps more importantly), broader accessibility.

Without the virtual component of IGY 2007 and the eGY, the IGY developing nations program would have great difficulty achieving full scientific success.

EOS Transactions article in 16 March 2004 issue!

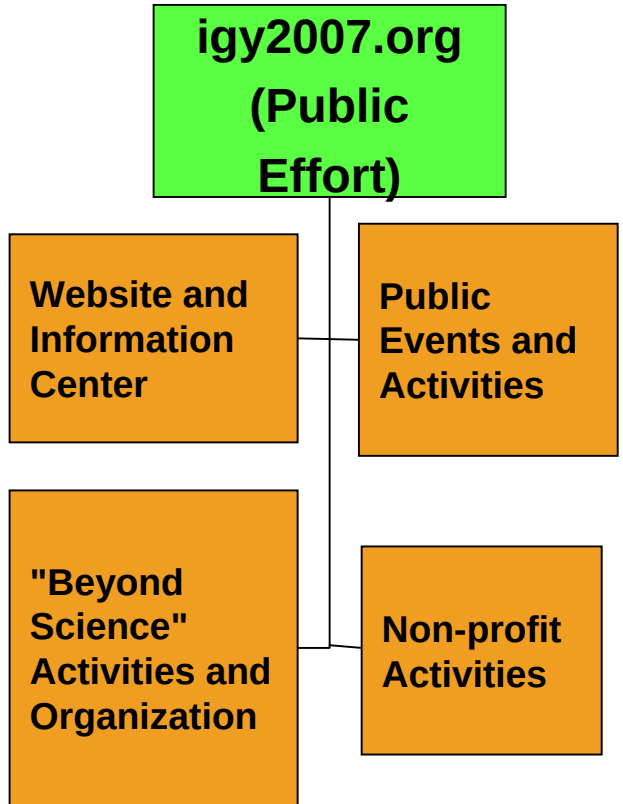
- Backup slides

igy2007.org



igy2007.org was formed because a non-affiliated, "public" organization can play a vital role in the public and international planning efforts. Anyone can join igy2007.org!

- *Website and Information Center:* a central resource for all people interested in IGY
- *Public Events and Activities:* members of igy2007.org will be very active in stimulating public interest in IGY
- *"Beyond Science" Activities and Organization:* IGY isn't merely a scientific event!
- *Non-profit activities:* activities outside the realm of government support of science organizations



igy2007.org will soon have a membership page - feel free to join!

Launching a Global Effort

IGY's goals will be achieved by dividing the effort into individual tasks and coordination activities.

1. igy2007.org: A public non-profit effort to stimulate interest and activities worldwide.

2. International and Regional Planning: Coordination across nations and organizations worldwide.

3. Integrated Planning Efforts: subtopics, scientific or otherwise, requiring detailed coordination. Integration across topics will take place in 2005-2006.

This "divide and conquer" strategy ensures that an appropriate amount of effort is spent on all aspects of IGY 2007, and that all potential participants are included and can play roles.

IYPE 2007 (International Year of Planet Earth)

IGY 2007

IPY 2007 (International Polar Year)

igy2007.org (Public Effort)

International and Regional Planning Efforts

Integrated Planning Efforts

Website and Information Center

Public Events and Activities

"Beyond Science" Activities and Organization

Non-profit Activities

National and Regional Scientific Unions

International Scientific Unions

United Nations Coordination

National Activities, Resolutions, Endorsements

IHY (International Heliophysical Year)

SEG (Society of Exploration Geophysicists)

eGY (Electronic Geophysical Year)

Atmospheric Sciences

IUPHS (International Union of Philosophers and Historians of Science)