



# UN Office for Outer Space Affairs:

## UN Basic Space Science Initiative

### **SPS5: Astronomy for the Developing World**

IAU XXVIth General Assembly

Prague, Czech Republic

*21-22 August 2006*

- A. United Nations*
- B. Information Dissemination*
- C. Regional Centres*
- D. Workshops*
- E. International Heliophysical Year*





## A. UN Office for Outer Space Affairs

- × **Mandated by the Fourth Committee of the UN General Assembly and the Committee on the Peaceful Uses of Outer Space (COPUOS) and its subsidiary bodies**
  - × Intergovernmental Process
  - × Programme on Space Applications
  - × Inter-Agency Meeting on Outer Space Activities
  - × Responsibilities of the Secretary-General under the UN Treaties and Principles on Outer Space



- × **Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)**
  - × **1999 UNISPACE III: The Space Millennium - Vienna Declaration on Space and Human Development**
    - × Action Teams established by COPUOS under voluntary leadership by Member States
  - × **2004 UNISPACE III+5 Plan of Action contained in the report of COPUOS to the UNGA on the review of the implementation of the recommendations of UNISPACE III and endorsed by the UNGA**



## B. UN Information Dissemination Network

- × **United Nations International Space Information System (UNISIS)**

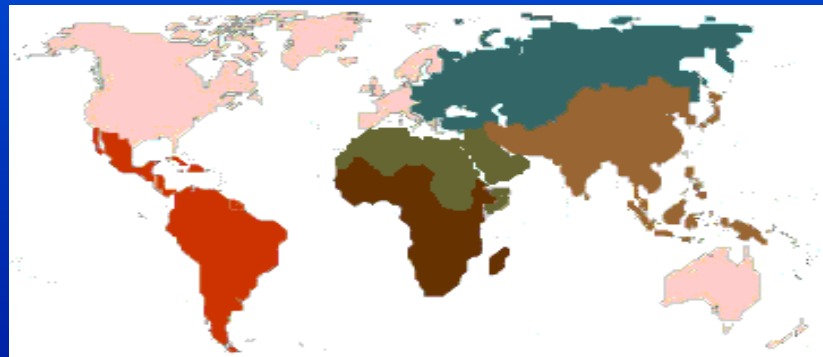
<http://www.unoosa.org/>

- × **United Nations Development Programme (UNDP) Offices**

- × **UNDP cooperates with governments and peoples, largely in developing countries**

- × 178 offices worldwide

- × Cc: 185 Permanent Missions of UN Member States



UNDP Regional groupings

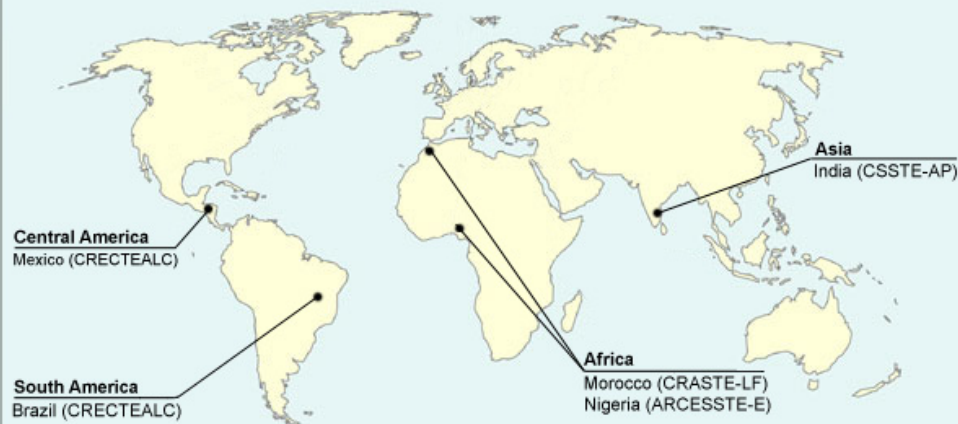
- × **United Nations Information Centres and Offices**

- × Located in over 60 nations in all regions.



## C.1. UN affiliated Regional Centres for Space Science and Technology Education

### Regional Centres for Space Science and Technology Education (affiliated to the United Nations)



Map CENT-03-01 Rev.1  
June 2003

Office for Outer Space Affairs (UN-OOSA)  
United Nations



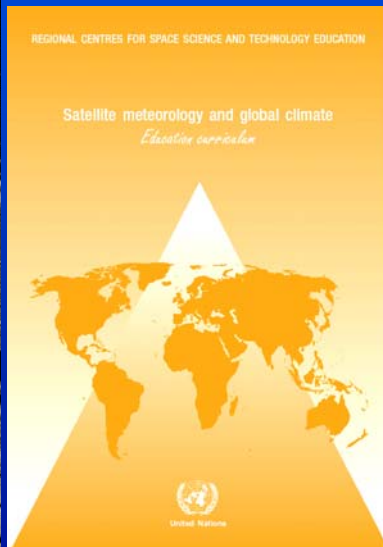
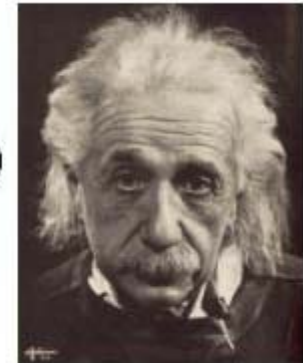
Education material



## C.2. UN affiliated Regional Centres: Education Curricula



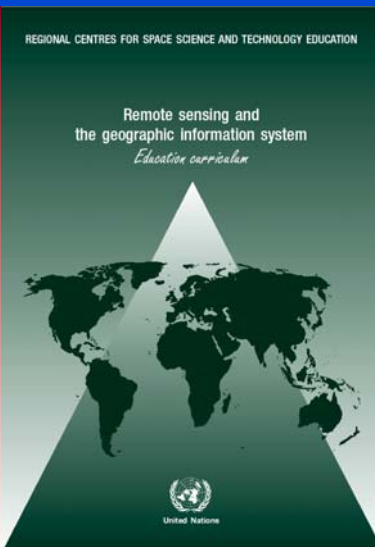
$$ds^2 = -\left(1 + \frac{2\Phi}{c^2}\right)(c dt)^2 + \left(1 - \frac{2\Phi}{c^2}\right)(dx^2 + dy^2 + dz^2)$$



Meteorology



Communications



Remote Sensing

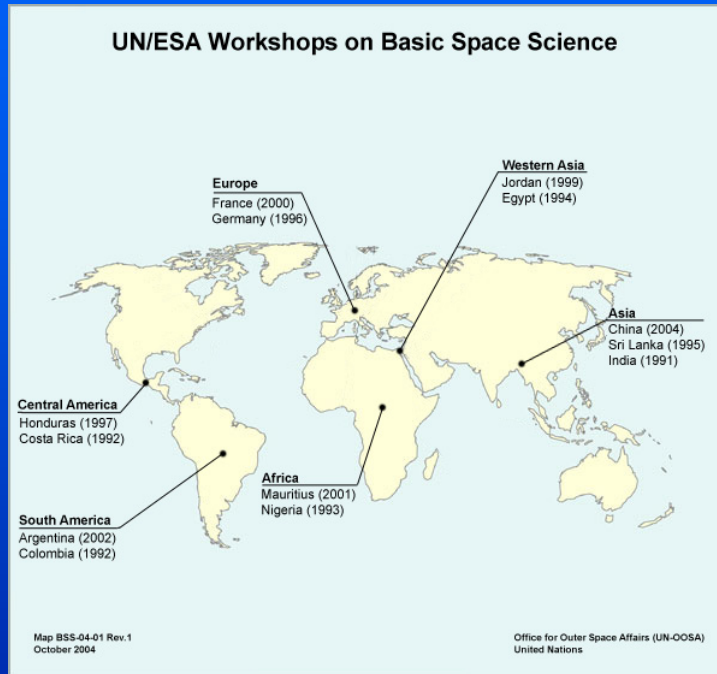


Space Science





## D.1. UN/ESA Workshops on Basic Space Science



### Regional:

India, Costa Rica, Colombia, Nigeria, Egypt

### Inauguration of Optical Telescopes:

Sri Lanka, Honduras, Jordan

### International:

Germany, France, Mauritius, Argentina

### Review of all Workshops:

P.R. China



Mauritius 2001



Argentina 2002





## D.2. UN General Assembly Documents

### × Reports on UN/ESA Workshops

× Document series: A/AC.105/\*\*\*

× Contains:

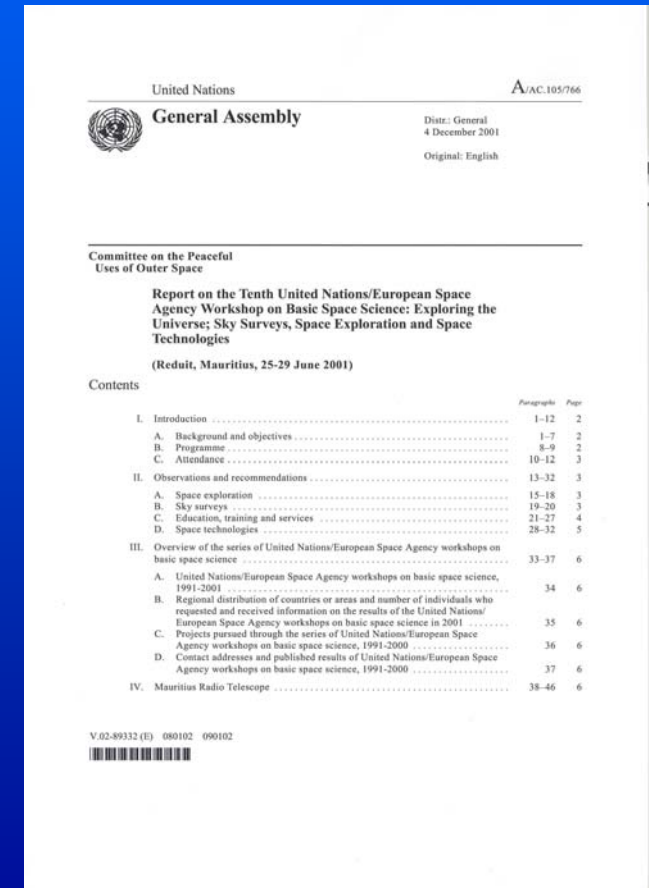
- × Background and objectives
- × Programme
- × Attendance
- × Summary of Presentations
- × Observations and recommendations
- × Review of status of follow-up projects

× Available in:

- × Arabic
- × Chinese
- × English
- × French
- × Russian
- × Spanish

× Reports to COPUOS/STSC

× Participants link with Governments





## D.3. TRIPOD: Telescope, Teaching, Observing

### × **Government of Japan:**

- × **Japanese Cultural Grant Aid**
  - × 45cm reflecting telescope
  - × CCD & computer equipment
  - × Building/ dome/ maintenance provided by local institution
  - × Sri Lanka 1996, Paraguay 2000, The Philippines 2001, Chile 2003, Nigeria 2004
  - × Bolivia, Pakistan, Ethiopia on-going



Sri Lanka 1996

### × **American Association of Variable Star Observers (AAVSO):**

- × **Hands-on Astrophysics**
- × **Setting Up a Variable Star Observing Programme**



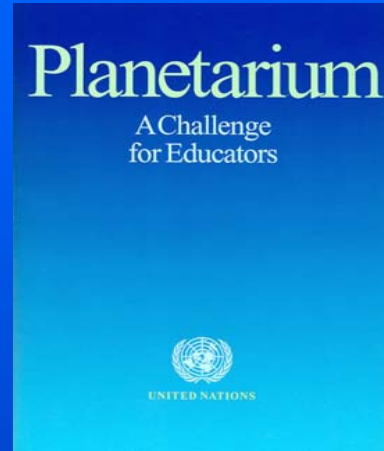
### × **Astrophysics for University Physics Courses**

Telescope ⇒ Observing ⇒ Teaching ⇒ Data Analysis ⇒ Data Transfer ⇒ Telescope Networking





## D.4. International Space Year (ISY) 1992



Myanmar 1986



Peru 2003



Viet Nam 1998

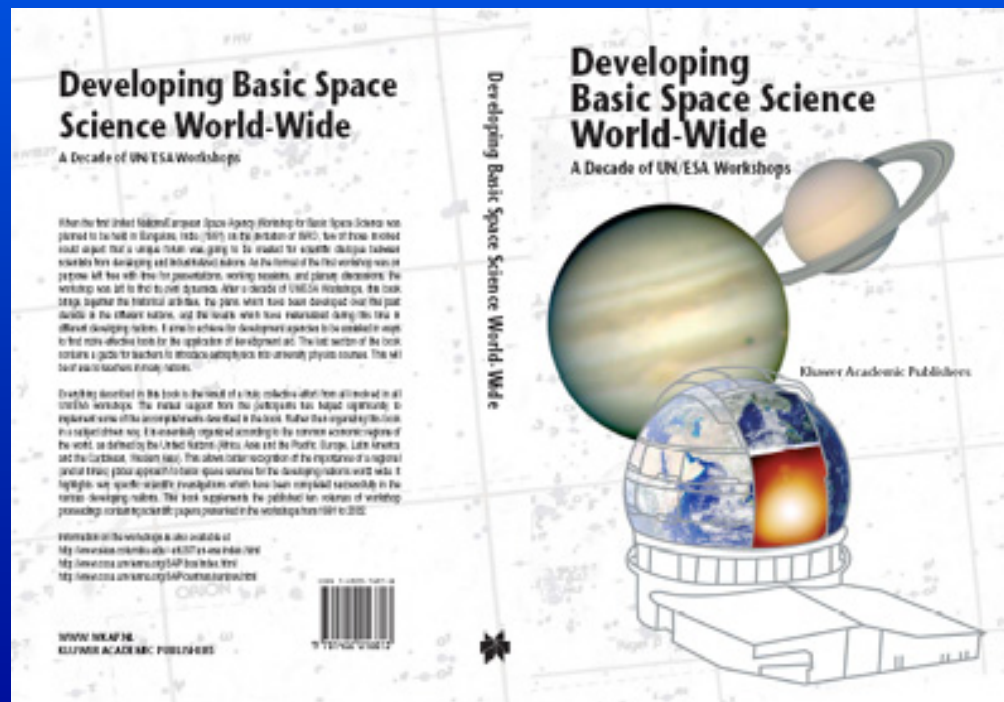
**Japan donated to: Jordan, Malaysia, The Philippines, India, Argentina, Uruguay, Vietnam, Thailand, Sri Lanka, Uzbekistan, Paraguay, Ecuador, Costa Rica, Peru**





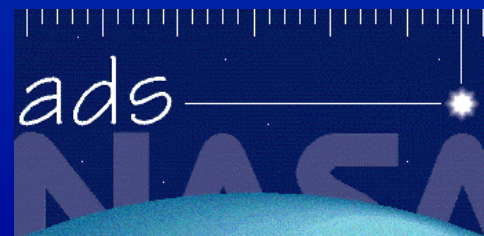
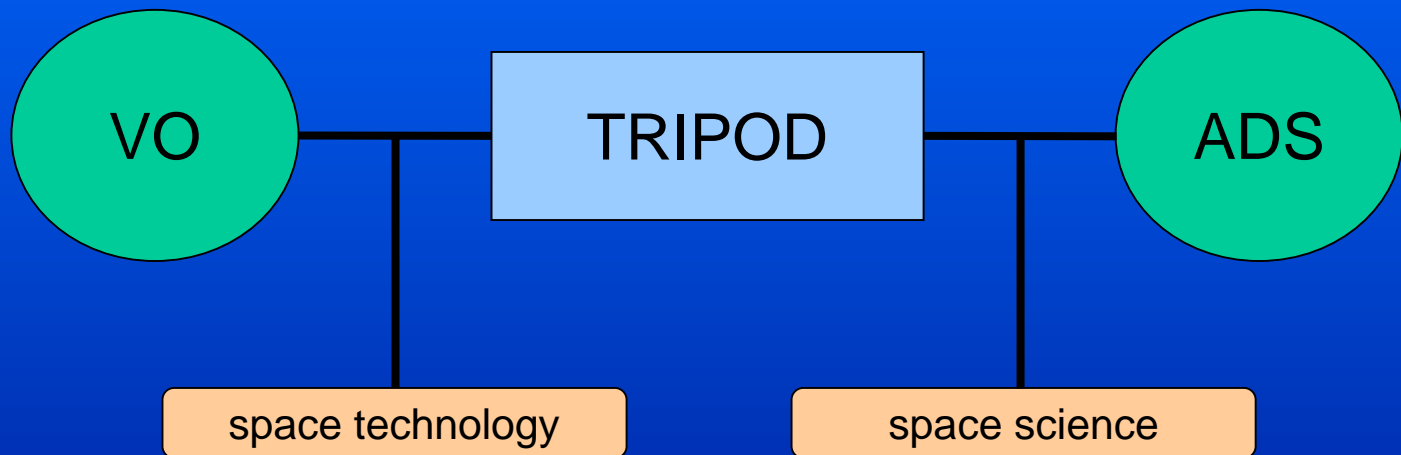
## D.5. Proceedings and Decadal Report for Workshops

- × **Developing Basic Space Science World-Wide: A Decade of UN/ESA Workshops**
  - × 40 workshop follow-up projects
  - × 70 scientists and engineers
  - × Regionally and internationally





## D.6. TRIPOD+Virtual Observatory+Astrophysical Data



Astrophysical Data System



## D.7. Concurrent Design Capability for the Development of International Space Missions

- × NASA/JPL
- × ESA/VILSPA
  
- × France 2000
- × Argentina 2002
- × China 2004





## D.8. Theoretical Astrophysics

### × Non-extensive Statistical Mechanics



### B.G. Statistics - A reminder.

- **Entropy:**  $S = -k \sum_i \rho_i \ln \rho_i$
- **Constraints:**  $\begin{cases} 1 = \sum_i \rho_i \\ U = \sum_i \rho_i \epsilon_i \end{cases}$
- **Maximize the objective:**  $J = -k \sum_i \rho_i \ln \rho_i + \sum_i \rho_i + \beta \sum_i \rho_i \epsilon_i$   $\frac{\partial J}{\partial \rho_i} = 0$
- **Yields distribution:**  $\rho_i = \frac{e^{-\beta \epsilon_i}}{Z}$  where  $Z = \sum_i e^{-\beta \epsilon_i}$



### Postulate: [C. Tsallis J. Stat. Phys. 52 p479 (1988)]

Generalized entropy:

$$S_q = k \frac{1 - \sum_i \rho_i^q}{q-1} \quad q \in \mathfrak{R}$$

where q characterizes the extensivity of the statistics.

Note: For q=1 regular B.G. Statistics is recovered:

$$S_{q \rightarrow 1} \rightarrow -k \sum_i \rho_i \ln \rho_i$$



## D.9. World Space Observatory/UV

**World Space Observatory Implementation Committee  
(WIC): Russia**





## E.1. International Heliophysical Year (IHY) 2007



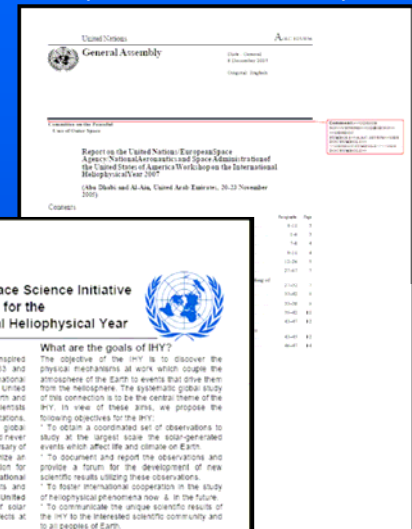
- × 50<sup>th</sup> anniversary of IGY 1957
- × 50<sup>th</sup> session of UNCOPUOS
- × 40<sup>th</sup> anniversary of Outer Space Treaty
- × 50<sup>th</sup> anniversary of Sputnik 1
  
- × Putting the 'I' in IHY by coordinating with institutions in all 192 UN Member States
  
- × Regional and international workshops on solar-terrestrial interaction jointly organized by UNBSSI and IHY Secretariat
  
- × Studying global phenomena on the largest possible scale with simultaneous observations from low-cost ground-based world-wide arrays of instruments and space-borne data
  
- × IHY Secretariat hosted by the American Geophysical Union (AGU)
  
- × International IHY website at [www.ihy2007.org](http://www.ihy2007.org)



## E.2. IHY/UNBSSI Activities

- × Flyer
- × Poster
- × Brochure
- × 50-page booklet
- × Workshops 2005-2009
- × International/Regional/National websites
- × UNCOPUOS Work Plan
- × UN GA Resolution

### Report on BSS Workshop



UNBSSI Flyer



UNBSSI Brochure (6 languages)

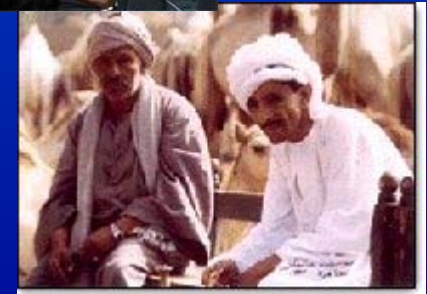
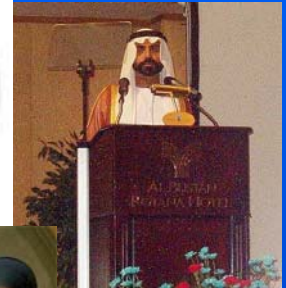






## E.3. First UN/NASA Workshop *succeeded "...beyond expectations!"*

- × **UN, ESA, NASA, UAE Government sponsored**, attendance by His Highness Sheikh Al-Nahayan Minister of Education and the Chancellor of the UAE University
- × **Instrument Donors Attending:**  
USA, Canada, UK, Switzerland, Japan, Brazil, Armenia
- × **Potential Hosts Attending:**  
Georgia, India, Pakistan, Indonesia, Malaysia, Iraq, Iran, Sudan, Saudi Arabia, Algeria, Egypt, Libya, Cape Verde, Jordan, Ivory Coast, Cameroon, Nigeria, Eritrea, South Africa, ...
- × **Second UN/NASA Workshop, IIA, 27 November-1 December 2006, Bangalore, India.**





## **E.4. IHY/UNBSSI Distributed Instrument Programme**

- 1. Atmospheric Weather Educational System for Observation and Modeling of Effects (USA)**
- 2. International Heliophysical Year magnetometer observatories (Canada)**
- 3. Magnetic Data Acquisition System project (Japan)**
- 4. Compound Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory (Switzerland)**
- 5. Low-frequency radio antenna arrays (USA)**
- 6. Global Positioning System in Africa (France)**
- 7. Remote Equatorial Nighttime Observatory for Ionospheric Regions (USA)**
- 8. South Atlantic Magnetic Anomaly very low frequency array (Brazil)**
- 9. Scintillation Network Decision Aid (USA)**
- 10. New type of particle detectors for space weather forecasting network (Armenia)**
- 11. Muon network (Japan)**