



Office for Outer Space Affairs
United Nations Office at Vienna



UN Office for Outer Space Affairs

The United Nations and GNSS: Global in Space and Time

XXIII International FIG Congress INTERGEO

8-13 October 2006
Munich, Germany





Outline of the Presentation

- x **UNCOPUOS, UNOOSA, UNISPACE III**
- x **International Coordination of GNSS Activities**
- x **UNISPACE III: Action Team on GNSS**
- x **International Committee on GNSS**
- x **Education and Training**
- x **International Heliophysical Year 2007**





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**



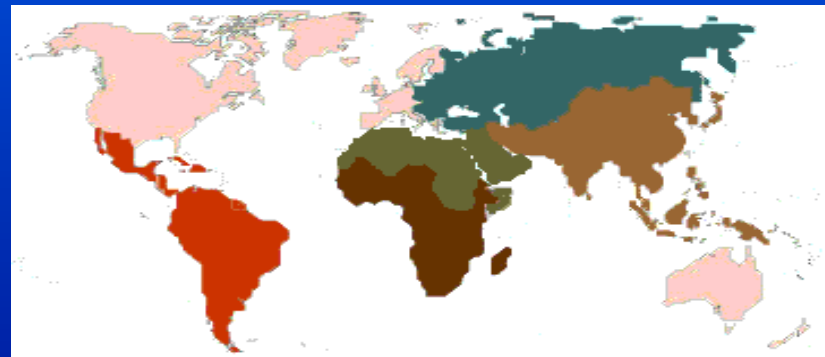
UN Information Dissemination Network

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

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

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

- × **UNDP cooperates with governments and institutions, largely in developing countries**
 - × 178 offices worldwide
 - × 185 Permanent Missions of UN Member States



UNDP Regional groupings

- × **United Nations Information Centres and Offices**
 - × Located in over 60 nations in all regions.

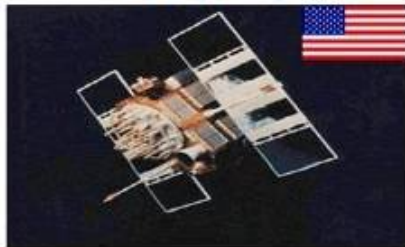




Global Navigation Satellite Systems and Augmentation Systems

Operating Global Navigation Satellite Systems (GNSS)

GPS (1973)



x USA's GPS Modernisation and ultimately GPS-III (+ WAAS)

x Russia's GLONASS Re-vitalisation

GLONASS (1976)



x EU's Galileo (+ EGNOS)

x Japan's QZSS/MSAS

GALILEO (1999)



x India's GAGAN

x China's Beidou



UNISPACE III: 1999, UNOV, Vienna, Austria

- × **“The Space Millennium: Vienna Declaration on Space and Human Development” (Vienna Declaration)**

- × **GNSS related recommendation:**

“To improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems”





Action Team GNSS: Establishment in 2001

- × **12 Action Teams were established by UN Committee on the Peaceful Uses of Outer Space (COPUOS)**

Action Team Nr. 1 (Environmental Monitoring Strategy);
Action Team Nr. 2 (Management of Natural Resources)
Action Team Nr. 4 (Weather and climate monitoring)
Action Team Nr. 6 (Public health)
Action Team Nr. 7 (Disaster management)

Action Team Nr. 9 (Knowledge-sharing)
Action Team Nr. 10 (GNSS)
Action Team Nr. 11 (Sustainable Development)
Action Team Nr. 14 (Near-Earth objects)
Action Team Nr. 17 (Capacity building)
Action Team Nr. 18 (Awareness increase)
Action Team Nr. 32 (Innovative funding sources)

- × **Recommendations that have been assigned highest priority by Member States of the United Nations**
- × **GNSS Action Team co-chaired by the United States and Italy**
- × **GNSS applications/coordination: Regionally ?, Internationally ?**





Action Team GNSS: Membership

× **38 nations**

Australia	Colombia	Iraq	Nigeria	Russian Federation
Austria	Czech rep.	Italy	Pakistan	Saudi Arabia
Belarus	Egypt	Japan	Philippines	Syria
Brazil	France	Lebanon	Poland	Turkey
Bulgaria	Germany	Malaysia	Portugal	Ukraine
Canada	Hungary	Mexico	Rep. of Korea	United States of America
Chile	India	Mongolia	Romania	Zambia
China	Iran	Morocco		

× **15 organizations**

- × **3 UN system entities:** ESCAP, ICAO, ITU
- × **4 IGOs:** ESA, European Commission, Eurocontrol, BIPM
- × **8 NGOs:** CGSIC, EURISY, AIAA, IAG, IAIN, ICA, FIG, IGS





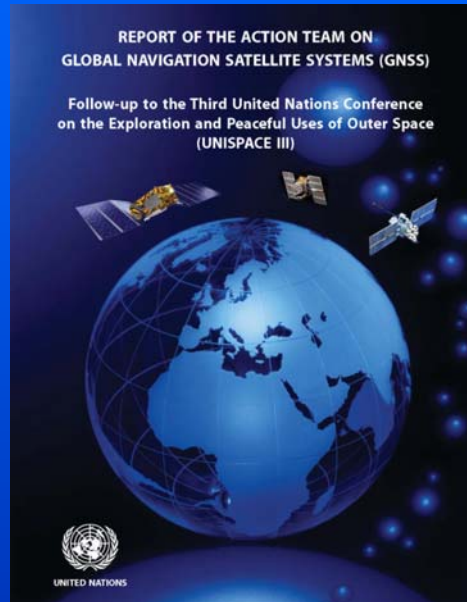
Action Team GNSS: Working Groups

- × **Five Thematic Areas:**
 - × **Surveying, mapping, and Earth sciences**
 - × **Agriculture and management of natural resources**
 - × **Environmental monitoring and management**
 - × **Transportation**
 - × **Education and training, awareness increase**





Action Team GNSS: 2001-2004



- × **Use of GNSS for applications as disaster warning and emergency response, aviation, maritime and land transportation, mapping and surveying, agriculture, power and telecommunication networks, and geographic information systems**

- × **Regional workshops and international meetings with**
- × **system providers,**
- × **augmentation system providers, and users**

2001: Malaysia (ESCAP) and Austria (ECE)

2002: Chile (ECLAC) and Zambia (ECA)



Action Team GNSS: Main Findings (1)

- × “GNSS and their augmentations are generally recognized as being useful for a wide range of societal, civil and commercial applications. System providers are working to increase awareness among policy makers of the benefits of this technology, but the task is **beyond the resources of any individual operator**. A coordination mechanism involving operators of GNSS and their augmentations, as well as appropriate international organizations, could easily be established for this purpose.”
- × “While current and future GNSS operators are in a competitive mode, it is fully expected that collaboration will increase in order to serve the user community better. Outreach efforts must move beyond simple awareness among the general public and experts to provide assistance in the **integration of GNSS into the basic infrastructure** (government, commercial and scientific) of countries, particularly in the developing world.”





Action Team GNSS: Main Findings (2)

- × “GNSS signal security and integrity are one of the top priorities for the global user community, regardless of application. There is an urgent need for assistance to national and regional authorities, in particular in developing countries, to establish mechanisms for **identifying and eliminating sources of interference** that could degrade signals from GNSS and their augmentations.”





**Moving from a
short-term
“Action Team”
to a
Long-term
“International Committee on GNSS”
(ICG)**





- × **Meetings of the Action Team (2001-2004) and Establishment of the International Committee on GNSS (2005) have been facilitated by the UN Office for Outer Space Affairs**



UN/USA International Meetings on the Use and Applications of GNSS

- × **2002**
- × **2003**
- × **2004**
 - × **Action Team concluded (Report)**
 - × **ICG Terms of Reference (Draft)**
 - × **ICG Work Plan (Draft)**
 - × **GNSS/ICG Web Information Portal (Draft)**
 - × **Follow-up projects/initiatives on GNSS applications (21)**
 - × **UN/Italy Long-term fellowship programme GNSS**
 - × **AFREF, SIRGAS, EUPOS, ...**
- × **UNISPACE III + 5 : Review of the implementation of the recommendations of UNISPACE III (UN GA Res. 59/2, para 11)**



United Nations International Meeting for the Establishment of the ICG: 2005

ICG ToR: Objectives (1)

- × Benefit users of GNSS services through **consultations** among participants of the Committee;
- × Encourage coordination among providers of GNSS core systems and augmentations in order to ensure greater **compatibility and interoperability**;
- × Encourage and promote the introduction and utilization of satellite positioning, navigation, and timing services, particularly in the **developing countries**, through assistance with the integration of GNSS services into their infrastructures;



ICG ToR: Objectives (2)

- × Assist both the members of the Committee and the international user community by, inter alia, serving as the **focal point for international information exchange** related to GNSS activities, respecting the roles and functions of GNSS service providers and intergovernmental bodies such as ITU, ICAO, and IMO;
- × Better address future **user needs** in the GNSS development plans and applications; and
- × Report periodically on its activities to **UNCOPUOS**.





ICG ToR: Participants (3)

- × **Potential participants in the ICG are Member States of the UN, international organizations or international entities that are responsible for GNSS and their augmentations operating under governmental authority or involved in implementing or promoting GNSS services and applications:**
 - × **(a) Members:**
 - × **Current and future core system providers including, European Community (Galileo), Russian Federation (Glonass), and United States (GPS);**
 - × **Member States of the UN with an active programme in implementing or promoting a wide range of GNSS services and applications;**
 - × **Current and future regional or augmentation system providers including, China (Beidou), ESA (EGNOS), India (GAGAN), Japan (MSAS/QZSS), Nigeria (NigComsat-1 SBAS), US (WAAS), and other compatible ground-based systems;**





ICG ToR: Participants (4)

- × **(b) Associate Members:**
 - × International and regional organizations and associations dealing with GNSS services and applications including, UNOOSA, CGSIC, IAG, ICA, IGS, ISPRS, IERS, FIG, EUPOS, ICSU;

- × **(c) Observers:**
 - × COSPAR, BIPM, IAIN, URSI, ITU.

- × **Objectives will be accomplished by indicative ICG Work Plan**





ICG: Draft Work Plan (1)

- × Identify and encourage use of existing guidelines and standards to enhance **compatibility and interoperability**: common guidelines;
- × Consider the establishment of **user information centres** by GNSS providers: maintenance of globally focused web portal;
- × Organize and sponsor **regional workshops** and other types of activity: implementation of objectives;





ICG: Draft Work Plan (2)

- × Establish links with national and regional authorities, particularly in **developing nations**: identification of regulatory mechanisms to detect and mitigate sources of electromagnetic interference;
- × Consider, make recommendations, and agree on actions to promote appropriate **coordination across GNSS programmes**: maintain communication with other groups and organizations involved in GNSS activities and applications;
- × Support the establishment of national and/or regional planning groups for GNSS that would address **regulations** associated with the use of GNSS services: organizational models to use at the national level for coordinating and governing GNSS use.



ICG: Conclusion

- × **The ICG was officially established in 2005**
- × **Further development of the Work Plan**
- × **Further development of the Terms of Reference**
- × **Involvement of and interaction with providers and users**





UNGA and GNSS/ICG

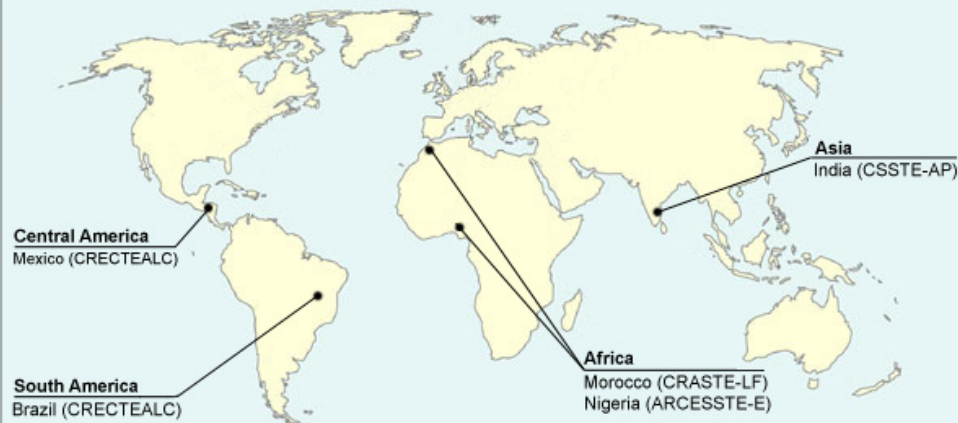
The United Nations General Assembly,
in its resolution 60/99 of 2005,

“Notes with satisfaction the progress made,
in accordance with
General Assembly resolution 59/2,
by Global Navigation Satellite Systems (GNSS)
and augmentation system providers
to establish an international committee on GNSS.... ”



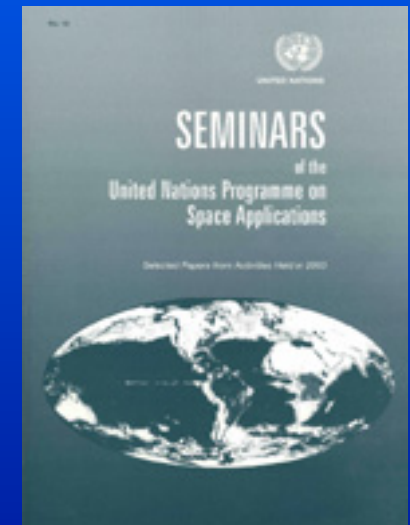
GNSS: UN-affiliated Regional Centres for Space Science and Technology Education

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



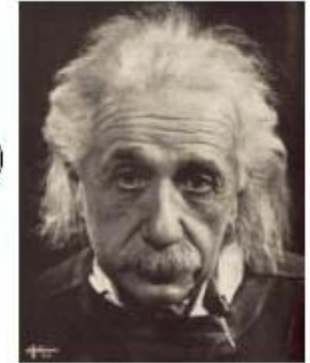
Education material



GNSS: Education Curricula



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



REGIONAL CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Satellite meteorology and global climate
Education curriculum

Meteorology

REGIONAL CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Satellite communications
Education curriculum

Communications

REGIONAL CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Remote sensing and the geographic information system
Education curriculum

Remote Sensing

REGIONAL CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Space and atmospheric science
Education curriculum

Space Science





GNSS: International Heliophysical Year 2007



- × 50th anniversary of IGY 1957
- × 50th session of UNCOPUOS
- × 40th anniversary of Outer Space Treaty
- × 50th 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

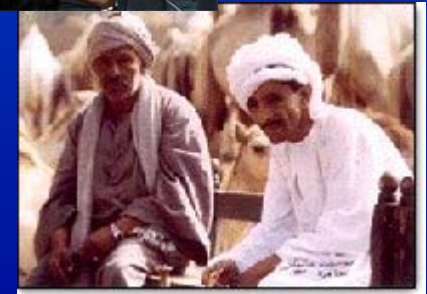
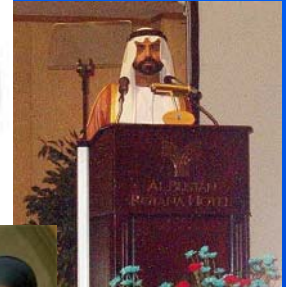
- × International IHY website at www.ihy2007.org



IHY + BSS: 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
Indian Institute of Astrophysics
27 November-1 December 2006
Bangalore, India





IHY + BSS: GPS Applications in Low-cost, Ground-based, World-wide Instrument Arrays

- 1. Global Positioning System in Africa (France)**
Increase number of real-time dual-frequency GPS stations for ionospheric studies
- 2. RENOIR: Remote Equatorial Nighttime Observatory for Ionospheric Regions (U Illinois, USA)**
Study equatorial/low-latitude ionosphere/thermosphere system
- 3. SCINDA: Scintillation Network Decision Aid (Hanscom AFRL, USA)**
Prediction of communications degradation due to ionospheric scintillation
- 4. SEVAN: Space Environment Viewing and Analysis Network (Alikhanian PI, Armenia)**
Neutron-muon detecting system for cosmicray secondary fluxes
- 5. CIDR: Coherent Ionospheric Doppler Radar (U Texas, USA)**
Measure line-of-sight relative electron content using radio beacons
- 6. Rutherford Appleton Laboratory Low-Cost Ionosonde (RAL, UK)**



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THANK YOU

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