



**UNITED NATIONS**  
**Office for Outer Space Affairs**



# **SPACE AND CLIMATE CHANGE**

## **IN THE UNITED NATIONS**

**Mazlan Othman**  
Director, UNOOSA

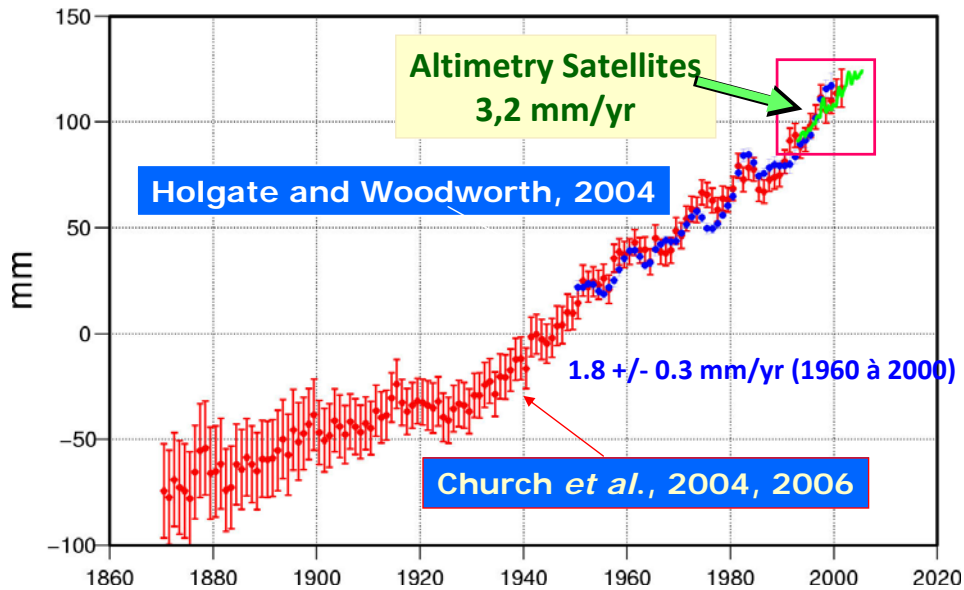


## Outline

- **Space and Climate Change**
- **Efforts Conducted by United Nations Organizations**
- **UNOOSA Efforts**
  - **The Way Forward**



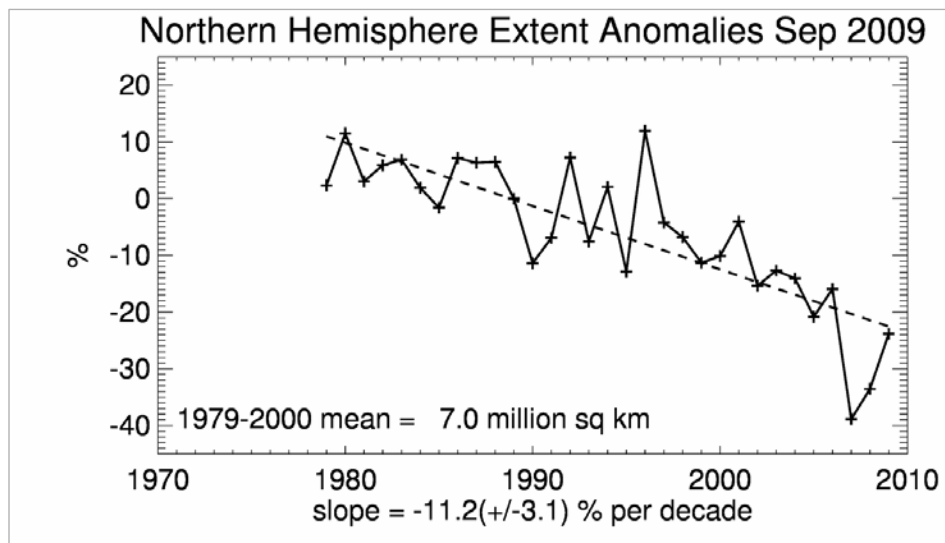
### Global Average Sea Level Rise: 1.3 mm/yr from 1960 to 2000



Reported by Dr. Jean-Louis Fellous, COSPAR in the 19th UN-IAF Workshop – Daejeon, Korea, 9-11 October 2009



## Arctic Sea Ice Extent Decline from Microwave Imagery – 1979-2009

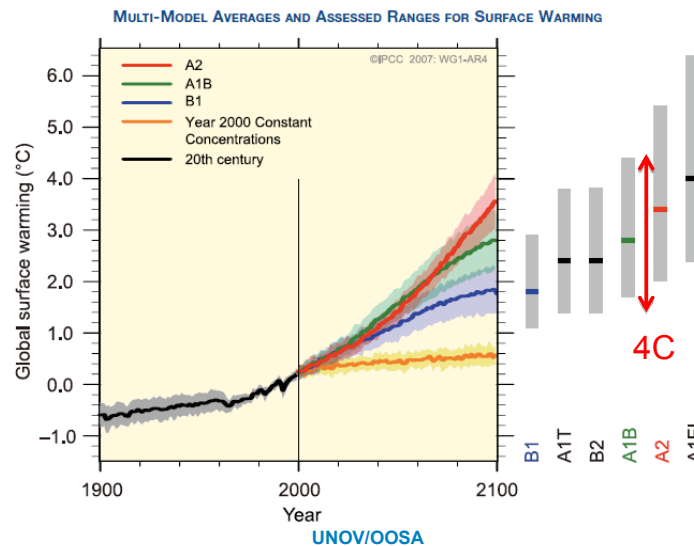


Reported by Dr. Jean-Louis Fellous, COSPAR in the 19th UN-IAF Workshop – Daejeon, Korea, 9-11 October 2009



## Uncertainty in the Climate Projection

- Large uncertainty of surface air temperature rise projection:  $4C \pm 2C$  (IPCC-AR4)
  - Emission scenario and natural climate modeling:  $\sim 1: 1$
  - Large model difference in climate sensitivity: Cloud modeling



Reported by Prof.  
Teruyuki Nakajima,  
University of Tokyo,  
Japan in the 19th UN-IAF  
Workshop – Daejeon,  
Korea, 9-11 October 2009

IPCC-AR4 (2007) <sup>5</sup>



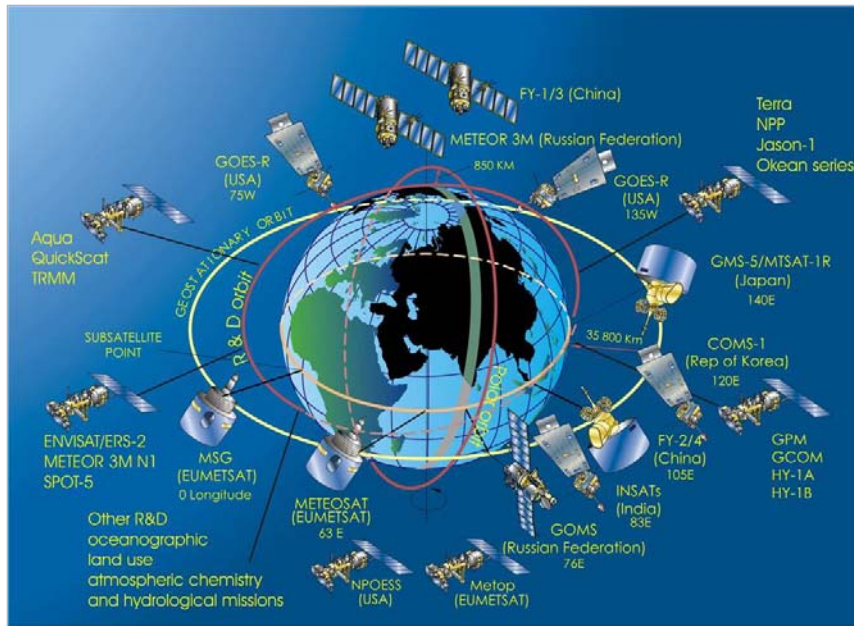
## **How Space Science and Technology Contribute to the Understanding of Climate Change...**

- Monitoring and forecasting global sea level rise due to:
  - Additional heat (global warming)
  - Additional freshwater (ice melting)
- Tracking changes in mean sea level and resulting changes in the frequency of flooding events.
- Monitoring Essential Climate Variables (ECV)
  - E.g. atmospheric, terrestrial and maritime variations in surface temperature, radiation budget, aerosol observation etc.
  - Applications in Sea-shipping industry and fishing industry; efficiency gains and monitoring illegal fishing
- Monitoring land use and urbanization:
  - Land subsidence due to groundwater withdrawals
- Monitoring cloud coverage.
- Monitoring glacier retreat and reduction in size of polar caps.



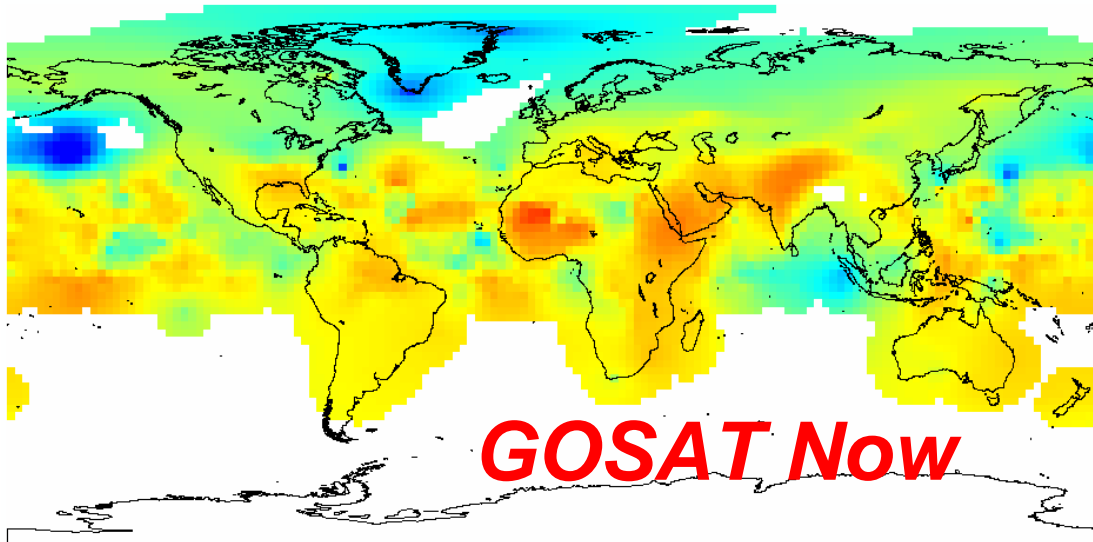
## Constellation of Earth Observation Satellites

The space component of the World Weather Watch in 2006

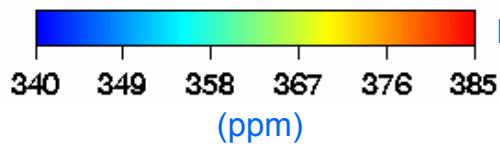




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# GOSAT Now



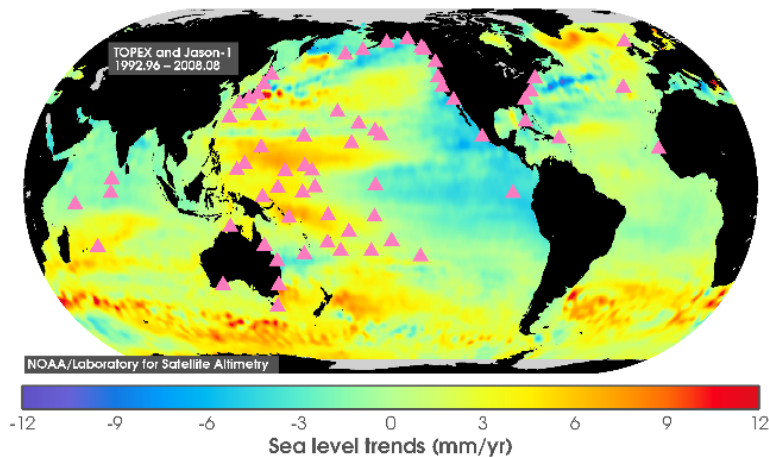
Estimated Carbon Dioxide Concentration Distribution  
(from Column-Averaged Dry-Air Mole Fraction)

Reported by Dr. Takashi Moriyama, JAXA in the 19th UN-IAF Workshop – Daejeon, Korea, 9-11 October 2009





## Sea-Level Rise is not Uniform



*From NASA/CNES TOPEX/Poseidon & Jason missions from 1993 to 2008*

*Jason-class satellite altimetry is required to resolve the spatial variability of sea level rise in determining accurate global means.*

*While tide gauges [ ] are poorly distributed, they are critical for calibration.*

Dr Stan Wilson, Senior Scientist, NOAA Satellite & Information Service, IAF Symposium on Earth Observation Satellites and Climate Change, S&T - COPUOS, Vienna, 9 Feb. 2009.



# SEAL THE DEAL!

During the 13th session of the Conference of Parties to the UNFCCC in Bali, Indonesia, the Secretary General of the United Nations, Mr. Ban Ki-moon, announced his initiative:

*“to bring together all the diverse perspectives, expertise and strengths of the United Nations system so as to deliver as one in the critical area of climate change”.*





**Some Efforts Conducted by United Nations Organizations and Programmes...**

**Areas of Action**

**FOCUS AREAS:**

- **Adaptation and Mitigation:**
- **Technology transfer**
- **Reduction of emissions from deforestation and degradation (REDD)**
- **Financing mitigation and adaptation action**
- **Capacity building**

**CROSS CUTTING AREAS:**

- **Climate knowledge: science, assessment, monitoring and early warning**
- **Supporting global, regional and national action**
- **Public awareness**
- **Climate-neutral UN**



<b>Areas of Action</b>	<b>UN Organizations involved</b>
<p><b>FOCUS AREAS:</b></p> <ul style="list-style-type: none"><li><b>Adaptation and Mitigation:</b></li><li><b>Technology transfer</b></li><li><b>Reduction of emissions from deforestation and degradation (REDD)</b></li><li><b>Financing mitigation and adaptation action</b></li><li><b>Capacity building</b></li></ul>	<p>FAO, IAEA, IFAD, ILO, ITU, UN-DESA, UNDP, UNEP, UNFCCC Secretariat, UNFPA, UN-HABITAT, UNHCR, UNICEF, GEF, UNDP, UNESCO/IOC, UN Regional Commissions (UN-ECA), UNIDO, UNISDR, UN-OCHA, World Bank Group, WFP, WHO, and other UN agencies.</p>

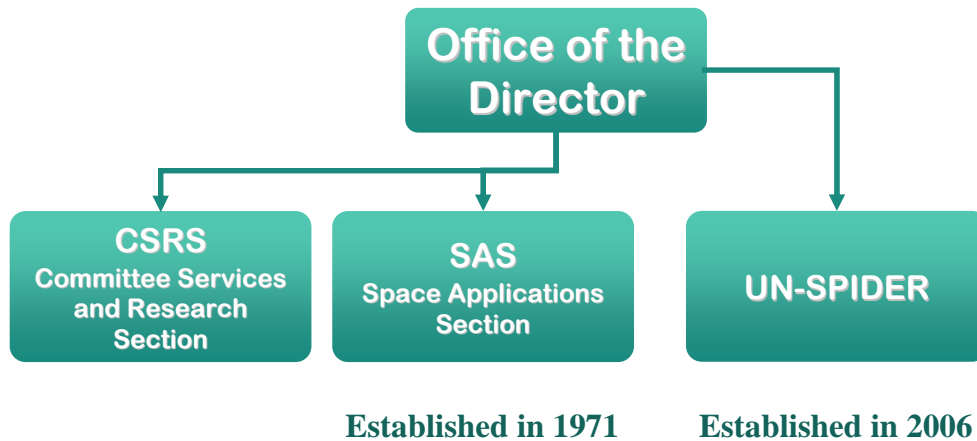


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## Office for Outer Space Affairs

- ▶ Established in 1962 within the Department of Political and Security Council Affairs
- ▶ Based in Vienna since 1992





## **Responsibilities**

The Office's responsibilities, as mandated by the General Assembly, are as follows:

- ▶ Servicing the intergovernmental process;
- ▶ Discharging the responsibilities of the Secretary-General under the United Nations Treaties and Principles on Outer Space;
- ▶ Implementing the United Nations Programme on Space Applications;
- ▶ Implementing the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER); and
- ▶ Coordinating space-related activities within the United Nations system.



## Programme on Space Applications

- **Supports capacity building in the use of space science, technology and its applications for sustainable development.**
- **Promotes the use of space-based solutions on a global and regional scale through:**
  - Organizing a series of annual activities (workshops, symposiums, training courses, fellowship programmes).
  - Supporting the work of the Regional Centres for Space Science and Technology Education, affiliated to the United Nations, located in Africa (Morocco, Nigeria), Asia (India) and Latin America and the Caribbean (Brazil/Mexico).
  - Developing education curriculums and education modules for use in the Regional Centres and other academic institutions.
  - Initiating and supporting relevant global initiatives: Basic Space Science Initiative, Basic Space Technology Initiative, International Committee on Global Navigation Satellite Systems.
- **PSA Website: <http://www.unoosa.org/oosa/en/sapidx.html>**





## UN-SPIDER Programme

### General Assembly A/RES/61/110

- The United Nations General Assembly agreed on 14 December 2006 to establish the “**United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER)**” as a programme within the United Nations to provide universal access to all types of space-based information and services relevant to disaster management by:
  - being a **gateway** to space information for disaster management support;
  - serving as a **bridge** to connect the disaster management and space communities; and
  - being a **facilitator** of capacity-building and institutional strengthening.

UN-SPIDER Portal: <http://www.un-spider.org>



## **International Space Weather Initiative**

- **Develop the scientific insight necessary to understand the science, and to reconstruct and forecast near-Earth space weather .**
  - **Instrumentation and data analysis.**
  - **Coordinate data products to provide input for physical modeling (Joint with other more extensive modeling efforts).**
  - **Coordinate data products to allow predictive relationships to be developed(Joint with Space Weather prediction organizations).**
- **Education**
  - **University and Graduate Schools**
    - **Encourage and support space science courses and curricula in Universities that provide instrument support.**
  - **Public Outreach**
    - **Develop public outreach materials unique to the ISWI, and coordinate the distribution.**



## Recent efforts conducted by UNOOSA...

<b>Month/ Year</b>	<b>Activity</b>
Sept. 2007	UN/Austria/ESA Symposium on Space Applications to Support the Plan of Implementation of the World Summit on Sustainable Development: <i>"Space Tools and Solutions for Monitoring the Atmosphere in Support of Sustainable Development"</i> .
Nov. 2007	United Nations/Vietnam/ESA Workshop on the Use of Space Technology for Forest Management and Environmental Protection.
March – April, 2008	IISL/ECSL Symposium on <i>"Legal Implications of Space Applications for Climate Change"</i> .
July 2008	United Nations/Indonesia Regional Workshop on Integrated Space Technology Applications to Water Resources Management, Environmental Protection and Disaster Vulnerability Mitigation.
Dec. 2008	United Nations/Kenya/ESA Regional Workshop on Integrated Space Technology Applications for Monitoring Climate Change Impact on Agricultural Development and Food Security.



## Efforts Conducted This Year...

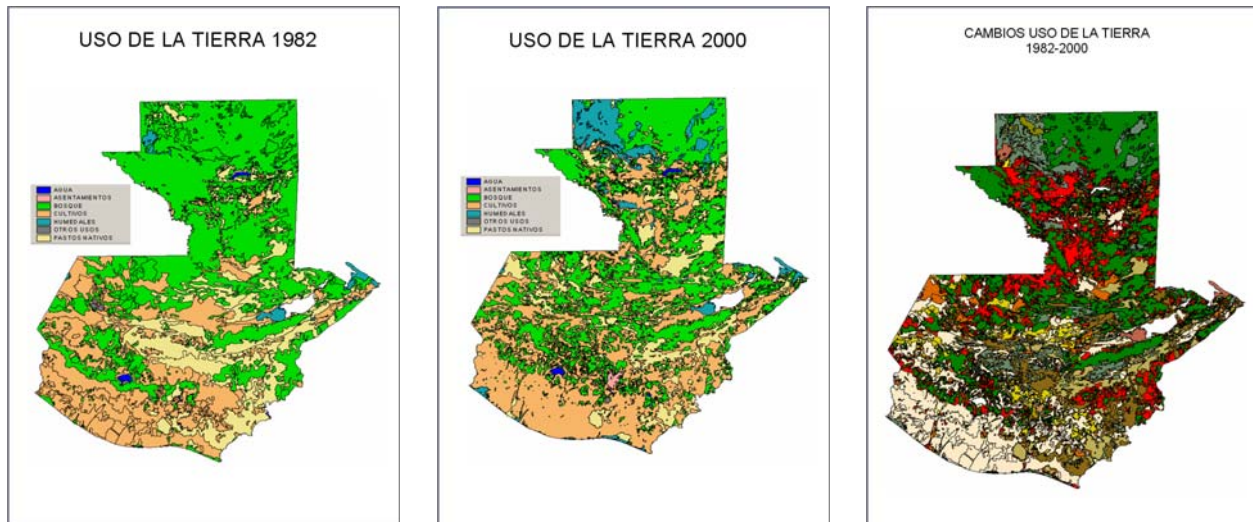
Month/ Year	Activity
Feb. 2009	Scientific Symposium, S&T Sub Committee: <i>“The role of Earth’s observation satellites in promoting understanding of and addressing climate change concerns”</i> .
June 2009	UN-SPIDER Vienna Workshop: <i>“Building Capacities to Reduce Disasters”</i> .
Oct. 2009	19th United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and Space-based information for Analysis and Prediction of Climate Change.
Oct. 2009	UN-SPIDER Bonn International Workshop “Disaster Management and Space Technology: From Concepts to Application”.



## INVENTORY OF GHG at the Country Level: Guatemala

### NATIONAL COMMUNICATIONS ON CLIMATE CHANGE

Historic satellite imagery (Landsat TM) are been used to calculate emission produced by landuse, landuse change and forestry (LULUCF) and agriculture, by 2000.



Reported by From Dr. Carlos Alberto Duarte, U.R.L., Guatemala, in the 19th UN-IAF Workshop – Daejeon, Korea, 9-11 October 2009



## **19<sup>th</sup> UN/IAF Workshop on “Integrated Space Technology and Space-based Information for Analysis and Prediction of Climate Change”**

**Participants form 40 different countries and 5 international organizations**

### **Major Conclusions in the Round Table Discussions:**

- 1. Satellite-derived climate data standards and systems that are globally available free or at a low price, should be developed and adopted.**
- 2. Regional centers with globally shared access to satellite data for developing and sharing regional and global climate change information could be identified and established.**
- 3. One-stop international coordination for climate change information is needed in order to respond to the needs defined at regional levels. This should provide standard-format data and support decision making processes in the regions.**



## **The Way Forward ...**

- **Promoting the use of space-based technologies and space-derived information for climate knowledge, science, assessment, monitoring and early warning.**
- **Facilitating capacity-building activities in the collection of, access to, and use of satellite-based data and information to support sustainable development in the context of climate change.**
- **Promoting the use of space-based information to assess the vulnerability of communities to climate change with a particular emphasis on natural disasters, and promoting the use of such information to monitor the effectiveness of adaptation strategies.**



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# THANK YOU

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