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Space and Climate Change

# Space and Climate Change

**Note by the Secretariat**

1. The capacity to use space-based information and services is essential to a range of activities having a direct impact on sustainable development. Access to, and use of such information for prevention and mitigation of natural disasters, and monitoring of land degradation, land-use changes, desertification and deforestation, all having a direct or an indirect impact on climate change, constitute examples regarding how such information and services can play an indispensable role in the promotion of sustainable development around the globe. International cooperation has a prominent role to play in the promotion of the capacity to use space-based information and services in the context of climate change, where applications range from monitoring natural phenomena and hazards to monitoring impacts of climate in vulnerable communities.

2. The present document provides an overview of recent activities conducted by the Office for Outer Space Affairs on the topic of climate change, which reflect the recommendations that emanated from UNISPACE III in 1999 and the Committee in recent years. The document also includes a brief section on efforts conducted by the United Nations, and concludes with a review of potential activities which could be conducted by the Office.

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## Setting the Stage: UNISPACE III

In the scope of the UNISPACE III Conference held in Vienna from 19 to 30 July 1999, Member States recognized[1] the contribution of space science and space applications to the well-being of humanity and development in areas such as disaster management, meteorological forecasting for climate modelling, satellite navigation, and communications. Such recognition led to the proposal of a nucleus of a strategy to address global changes in the future, which highlighted among others[2]:

- Protecting the Earth's environment and managing its resources, with particular focus in the enhancement of weather and climate forecasting by expanding international cooperation in the field of meteorological satellite applications;
- Using space applications for human security, development and welfare, through the implementation of an integrated global system based on international cooperation to manage natural disaster mitigation, relief and prevention efforts; and to assist States, especially developing countries, in applying the results of space research with a view to promoting sustainable development of all people;
- Strengthening and repositioning of space activities in the United Nations system, encouraging the increased use of space-related systems and services by specialized agencies and programmes of the United Nations system and by the private sector around the world, where appropriate, in order to support United Nations efforts to promote the exploration of peaceful uses of outer space.

Taking into consideration the consequences of deforestation, desertification, land degradation, depletion of the ozone layer, acid rain, and a reduction in biodiversity on climate change, UNISPACE III recognized the role of international space law, as developed by COPUOS, in providing the framework for international cooperation in targeting environmental monitoring and disaster management.

The use of satellites to monitor processes and trends at the global scale is essential in the context of climate change. Areas foreseen in this context are:

- Continued observations and long-term monitoring of solar spectral irradiation to improve our knowledge and understanding concerning the influence of the electromagnetic radiation of the sun on Earth's environment, including the climate.
- Continued observations to characterize changes in the atmosphere, oceans, and land surface, and use such information for climate change modelling.
- Continued observations of the change in the ozone layer and its effects on the environment and human health.

## The United Nations: Acting on Climate Change, the UN SYTEM delivering as one

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 UN system so as to deliver as one in the critical area of climate change*". His initiative is based on the fact that the United Nations can be defined as a unique international mechanism set up by its Member States to discuss and solve global problems in a coordinated fashion.

Recognizing no political boundaries, climate change is being addressed at the highest international level through the United Nations Framework Convention on Climate Change (UNFCCC). Based on the Assessment Reports elaborated by the network of scientists belonging to the International Panel on Climate Change; UNFCCC is seeking ways to pave the way for countries to agree on strategies to promote adaptation, such as the Kyoto Protocol. Through a concerted action within the framework of international

[1] United Nations. Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space. Vienna, 19-30 July 1999. Document A/CONF.184/6. Resolutions adopted by the Conference, page 1.
[2] Ibid, pages 2 & 3.

conferences, meetings, and high-level panels; UN-FCCC is spearheading the efforts on behalf of all UN agencies.

As an outcome of the effort to collect and systematize activities conducted by the different UN agencies, funds and programmes in the context of climate change, the UN System Chief Executives Board for Coordination elaborated a report entitled: ACTING ON CLIMATE CHANGE: THE UN SYSTEM DELIVERING AS ONE. This report divides such activities in two parallel tracks: focus areas and cross cutting areas. The following tables provide information on how the agencies, funds, and programmes are involved:

## Focus areas:

| Focus areas | UN Organizations involved |
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| **Adaptation and Mitigation:**<br>The United Nations system is working to help people and communities in countries, especially those most vulnerable, to adapt to the adverse effects of climate change while continuing to grow and achieve their development goals and aspirations.<br><br>Large number of activities mandated by the system's governing bodies in areas such as agriculture and food security, disaster risk reduction, health, water, tourism etc. are central to the challenge of adaptation work. Adaptation strategies are being developed including in these areas, as climate change considerations get further streamlined in UN system activities. The Least Developed Countries, Small Island Developing States and countries in Africa are the main focus of such activities, as they face the most difficult challenges and urgently need the assistance of the international community in order to successfully safeguard the lives and livelihoods of their peoples, while attaining their development goals. | FAO, IAEA, IFAD, ILO, ITU, UN-DESA, UNDP, UNEP, UNFCCC Secretariat, UNFPA, UN-HABITAT, UNHCR, UNICEF, UNIDO,UNISDR, UN-OCHA, UN Regional Commissions, World Bank Group, WFP, and WHO. |
| **Technology transfer**<br>Technology transfer and development activities by the UN system to promote the diffusion and uptake of environmentally-friendly and climate-friendly technologies and practices towards achieving objectives of mitigation and adaptation at the country level.<br><br>Transfer of technologies to developing countries is central to pursuing meaningful adaptation and mitigation actions, as well as more broadly advancing sustainable development goals and objectives. This issue has been highlighted in discussions on the post-2012 framework for international climate policy, with the Bali Action Plan highlighting the importance of technology transfer. The framework under the UNFCCC has five main themes: technology needs and needs assessments; technology information; enabling environments; capacity building; and mechanisms for technology transfer. The UN system is supporting enhanced implementation of the Convention through increased collaborative and mutually reinforcing actions within these five themes.<br><br>The UN system activities are sensitive to the reality that the support for the development and transfer of technology requires not only "hard" technology, but also support for national capacity and systems to facilitate the transfer, development and deployment of technologies. Future work will need to build on, and then move beyond, national technology needs assessments to in-depth analyses of the actual market and trade barriers that prevent technology transfer and uptake from taking place. | FAO, GEF, ITU, UN-DESA, UNDP, UNEP, UNESCO/IOC, UNFCCC Secretariat, UN-HABITAT, UNIDO, UN Regional Commissions (UN-ECA), UNFCCC Secretariat, and UN-HABITAT. |

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| **Reduction of emissions from deforestation and degradation (REDD)**<br>REDD-related activities of the UN system aspire to contribute to global reductions in greenhouse gas emissions, while at the same time advancing sustainable management of forests that enables their economic, environmental and social goods and services to benefit countries, communities and forest users.<br><br>Ongoing work, which would benefit from further intergovernmental guidance, includes: formulation/ implementation of national REDD policies and practices through capacity building and policy/technical assistance; creating incentive/payment schemes that encourage national level action on mitigation measures in the forest sector combined with international support mechanisms; identification, development and promotion of REDD activities that are compatible with other international objectives, for example, the MDGs. | UNDP, FAO, UNEP, UN-DESA, UNFCCC Secretariat, UNESCO, and the World Bank Group. |
| **Financing mitigation and adaptation action**<br>The UN system, including the Bretton Woods Institutions, is assisting developing countries in better leveraging finance from a variety of sources to help them adapt to climate change impacts and undertake nationally appropriate mitigation actions in the context of sustainable development. Moreover, the UN system has an important role to play in supporting and enabling developing countries to participate in the carbon market and benefit from its enormous potential as well as prepare for future<br>funding opportunities to catalyze climate action. | World Bank Group, GEF, IFAD, FAO, IAEA, UNCTAD, UNDP, UNEP, UNFCCC Secretariat, UNISDR, WFP, UN-DESA, UNESCO, UNIDO, and UN Regional Commissions. |
| **Capacity building:**<br>The United Nations system works to strengthen national institutions and human capacity to better analyze the impacts of climate change, develop courses of action for greater resilience and implement relevant adaptation and mitigation activities.<br><br>The need for capacity building to assist national authorities, especially in developing countries, to respond to climate change has long been recognized in the UNFCCC work. Capacity building cuts across many of the issues under consideration in the climate change process and these activities prioritize support for all stages of national planning — from assessing climate change impacts and available responses, to setting policy and implementing institutional changes, to making informed investment decisions, accessing additional sources of finance and implementing critical activities for adaptation and mitigation. Emphasis is placed on ensuring that capacity building is issue-based and country-driven, tailoring strategies to reflect regional, national and local needs. Customization of global knowledge for local conditions and building on local knowledge to guide global responses and action is another guiding principle for UN system activities related to capacity building. | UN-DESA, UNDP, UNEP, UNFCCC Secretariat, UNFPA, UN-HABITAT, FAO, UNICEF, UNISDR, UN-OCHA, UNCTAD, UNITAR/CCP, UNWTO, IAEA, IFAD, ILO, UN Regional Commissions, World Bank Group, WHO, and WMO. |

## Cross-cutting areas

| Cross-cutting areas | UN Organizations involved |
|---|---|
| **Climate knowledge: science, assessment, monitoring and early warning**<br>The UN system plays a central role in this area, bringing together global resources for observation and analysis of climate change trends to provide sound and unbiased scientific information and climate services to enable evidence-based policy and decision making at all levels. | WMO, FAO, UNDP, UNEP, UNESCO, UNFPA, UN-HABITAT, WHO, UNCCD, UNISDR, OHCHR, IAEA, CTBTO, ICAO, IMO, ITU, WFP, UN Regional |

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| Some examples of these activities include the Global Climate Observing System that consolidates and makes available to countries information on essential climate variables collected through global atmospheric, oceanic and terrestrial observation systems that use in-situ, satellite and other remote sensing technologies; work of the Intergovernmental Panel on Climate Change (IPCC) which assesses the available scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation; coordination of worldwide seasonal-to-inter-annual climate predictions, outlooks, services, and weather and hydrological forecasts and early warnings on natural hazards, provided routinely by National Meteorological and Hydrological Services, Regional Climate Centres, Drought Monitoring Centres and Climate Outlook Forums, which are vital for people and communities, especially the most vulnerable to climate-induced risks. | Commissions, and the World Bank Group. |
| **Supporting global, regional and national action**<br>An effective response to climate-change-related challenges requires actions at the global, regional and national levels. The UN system is using its expertise and resources to ensure planning and delivery of coherent support to countries in their efforts at all three levels. | UN-DESA, UN Regional Commissions, and UNDP. |
| **Climate-neutral UN**<br>A UN Climate Neutral Strategy has been elaborated with the aim to achieve the following by 2009:<br>• Estimate greenhouse gas emissions consistent with accepted international standards;<br>• Undertake efforts to reduce greenhouse gas emissions to the extent possible; and<br>• Analyze the cost implications and explore budgetary modalities-including consulting with governing bodies as needed-of purchasing carbon offsets to eventually reach climate neutrality. | Majority of UN agencies |
| **Public awareness**<br>The Secretary-General has made it a top priority of his tenure to raise awareness at the highest level of the potential impacts of climate change and the necessity for taking urgent action. He is pursuing that personally, in cooperation with other UN system Executive Heads, as well as through his Special Envoys on Climate Change and other senior UN officials. | UNCG, UNEP, and other UN agencies. |

In the context of satellite observations, the Global Climate Observing System Secretariat (GCOS) elaborated an Implementation Plan in support of UNFCCC in 2004 which recognizes the benefits of such satellite observations and promotes these efforts to complement global observations of the climate system. The Plan was adopted by the Conference of Parties of UN-FCCC in its 10th session in 2004.

## OOSA activities

In recent years, UNOOSA has conducted a variety of awareness and training activities, some of which have included climate change as a topic. The topic has been addressed in workshops organized directly by UNOOSA, or co-organized with partners through specific thematic sessions, and most recently in a specific symposium during the 46th Session of the S&T Sub Committee of COPUOS in February 2009.

In addition, in December 2006 the UN-SPIDER programme was established by the General Assembly of the United Nations to address natural disasters, including those worsened by climate change. UN-SPIDER targets the promotion of the use of space-based information and services to support the full disaster management cycle. It has relevance to climate change in the context of natural disasters.

In the summer and in the fall of 2009, the UN-SPIDER Vienna and Bonn workshops will include climate change as a topic of discussion, and during the **International Astronautical Congress 2009**, to be held in

Daejeon, Korea, a side session co-organized by UNOOSA and the International Astronautical Federation will be conducted specifically addressing the issue of climate change. Table 1 presents a list of activities conducted by COPUOS and UNOOSA where climate change is addressed.

**Table 1: Activities conducted by COPUOS/UNOOSA addressing Climate Change issues**.

| **Month / Year** | **Activity** | **Relevance to Climate Change** |
|---|---|---|
| Nov. 2007 | United Nations/Argentina/European Space Agency Workshop on Sustainable Development in Mountain Areas of Andean Countries. | The Workshop included case studies in the application of remote sensing to mountain areas of Andean Countries, some of them targeting climate change (reduction of ice on glaciers used as sources of potable water by communities in mountainous areas). |
| Sept. 2007 | UN/Austria/ESA Symposium on Space Applications to Support the Plan of Implementation of the World Summit on Sustainable Development: "*Space Tools and Solutions for Monitoring the Atmosphere in Support of Sustainable Development*". | Promoting the use of space tools and solutions for monitoring the atmosphere in support of sustainable development, with the aim to support or enable participants to develop and implement projects in this area and to provide reliable data and information for policy- and decision-making related to such issues as air quality, climate change, ozone and ultra-violet monitoring. |
| Nov. 2007 | United Nations/Vietnam/ESA Workshop on the Use of Space Technology for Forest Management and Environmental Protection. | The workshop included presentations and discussions on the use of space technology in climate change studies related to forest management and environmental protection. |
| March – April, 2008 | IISL/ECSL Symposium on "*Legal Implications of Space Applications for Climate Change*". | The symposium was held during the Forty-seventh session of the Legal Subcommittee (31 March-11 April 2008), and focused on legal aspects concerning the use of outer space for monitoring climate change (international treaties, coordination instruments, etc.). |
| July 2008 | United Nations/Indonesia Regional Workshop on Integrated Space Technology Applications to Water Resources Management, Environmental Protection and Disaster Vulnerability Mitigation. | The workshop included presentations and discussions on integrated applications of space technologies to address issues induced by climate change. |
| Dec. 2008 | United Nations/Kenya/ESA Regional Workshop on Integrated Space Technology Applications for Monitoring Climate Change Impact on Agricultural Development and Food Security. | Promoting the use integrated space technologies such as remote sensing and GIS, navigation and positioning, telecommunications, satellite meteorology, and Earth observations in applications that could contribute to the prevention and mitigation of global climate change induced issues. |
| Feb. 2009 | Scientific Symposium, S&T Sub Committee: "*The role of Earth's observation satellites in promoting understanding of and addressing climate change concerns*". | Organized by the International Astronautical Federation, the symposium focused on the use of space technologies to monitor climate change (atmosphere, land, oceans) and its impacts. |
| June 2009 | UN-SPIDER Vienna Workshop: "*Building Capacities to Reduce Disasters*". | The workshop includes explicit discussions on the impacts of climate change on Small Island Developing States, and potential adaptation strategies. |
| Oct. 2009 | 19th United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and | The workshop will focus on the use of space-related technologies and information for climate change monitoring and prediction, with ultimate goals of |

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| | Space-based information for Analysis and Prediction of Climate Change. | exploring ways to solve social and economical issues caused by the climate change and increasing regional and international cooperation among developing countries, and between developing and industrialized countries. |
| Oct. 2009 | UN-SPIDER Bonn International Workshop "Disaster Management and Space Technology: From Concepts to Application". | The workshop will include presentations and discussion on the contribution of space-based technologies to mitigate the impact and enhance adaptation to global climate change utilising innovative monitoring and analysing tools. |

Additional information on these activities can be found in the web page of UNOOSA: http://www.unoosa.org/

## OOSA: The role of UNOOSA in the context of addressing climate change issues:

The strengths of UNOOSA can be summarized as follows:

- Overall capacity to facilitate the use of space-based technologies in a variety of applications (health, disasters, environmental monitoring, location-based services, etc).
- Capacity to conduct outreach, awareness, and training activities with a variety of partners from the international to the national level.
- Capacity to reach decision makers through COPUOS and other relevant intergovernmental meetings.
- Capacity to facilitate negotiations in an intergovernmental forum (COPUOS and its Sub-Committees).
- Capacity to bring together international experts from different disciplines,

Taking into consideration these elements and the Implementation Plan in support of UNFCCC elaborated by GCOS, it is possible to identify five potential avenues of entry:

- Promoting the use of space-based technologies and space-derived information for climate knowledge, science, assessment, monitoring and early warning.
- Participate in the development of adoption of international standards concerning the measurement of the Essential Climate Variables (ECV) when using space-based instruments and promoting the establishment and operation of a global repository of satellite-based data to ensure access to such data by all Parties.
- 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.
- Facilitating the use of the global array of space-weather instruments to study the relationship between space weather and climate change.

As a next step, meetings would be conducted with UNFCCC, GCOS, and other United Nations agencies involved to identify elements where UNOOSA could provide substantive leadership or support taking into consideration its strengths and current mandates and efforts.