Committee on the Peaceful Uses of Outer Space *Script*
Fifty-seventh session

685th Meeting
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Vienna

Chairman: Mr. A. Oussedik (Algeria)

The meeting was called to order at 10.10 a.m.

The CHAIRMAN: Good morning distinguished delegates. I now declare open the 685th meeting of the Committee on the Peaceful Uses of Outer Space.

Distinguished delegates, I would first like to inform you of our programme of work for this morning.

We will continue and hopefully conclude our consideration of agenda item 11, Space and Water, and agenda item 12, Space and Climate Change. We will also continue our consideration of agenda item 13, Use of Space Technology in the United Nations System.

There will be two technical presentations this morning by a representative of India entitled "Use of Earth Observation Data for Water Resources Assessment and Management in India", and by a representative of Burkina Faso entitled "Presentation of the Continuous Operations GNSS: Reference Stations Network".

I will then adjourn the meeting so that the Working Group on the Long-Term Sustainability of Outer Space Activities can hold its fourth meeting.

This evening, the Austrian delegation have organized an evening in a traditional Austrian Heuriger at Murer's Heurigen, Cobenzlgasse 38, in the Nineteenth District, starting at 7.00 p.m. Invitations to this event were distributed to delegations last week.

Are there any questions or comments on this proposed schedule?

I see none.

Space and water (agenda item 11)

Distinguished delegates, I would now like to continue and hopefully conclude our consideration of agenda item 11, Space and Water.

The first speaker on my list is the distinguished delegate of Chile, on behalf of GRULAC, Mrs. Teresita Alvarez.

Ms. T. ALVAREZ (Chile) *(interpretation from Spanish)*: Thank you very much Chairman. This statement refers to items 11 and 12 on the agenda.

GRULAC recognizes the global scope and the negative impact on climate change that we are acquainted with. Various meteorological anomalies, droughts and floods have affected our region and subsequent mitigation of these impacts, therefore, is a key objective for our countries. To that end, we are aware that the application of space technology, through the use of satellite observation from space, provides us with tools and instruments in order to better understand these phenomena and be able to manage them.

In turn, we also recognize the valuable contribution made by COPUOS through the UNSPIDER platform in terms of natural disaster management. And here, we welcome the capacity-building activities that have been undertaken in the areas of natural disaster management by UNSPIDER in 2014 and would like to thank the United Nations Office for Outer Space Affairs, as well as the co-sponsoring countries for their cooperation.

On this point, GRULAC wishes to reiterate to the United Nations Office for Outer Space Affairs the important need to enhance coordination and international cooperation through capacity-building programmes in the areas afore-mentioned, in particular among developing countries.

Today, GRULAC would like to thank UNSPIDER for the convening of the Group of Experts on the Use of Satellite Information in National Early Warning Systems, held in the city of San Salvador in El Salvador on 31 March and 1 April 2014. More than 30 experts from North, Central and South America attended this meeting as well as an expert from the Dominican Republic who were given an opportunity to identify the strategies in order to institutionalize early warnings at the national level and in order to integrate the use of satellite information in these systems.

Finally, we encourage the United Nations Office for Outer Space Affairs and UNSPIDER to continue undertaking these activities in our region.

Thank you very much Chairman.

The CHAIRMAN: I thank the distinguished delegate of Chile on behalf of GRULAC, Mrs. Teresita Alvarez, for her statement.

The next speaker on my list is the distinguished delegate of the Republic of Korea, Mr. Young Kyu Kim.

Mr. Y. K. KIM (Republic of Korea): Thank you, Mr. Chairman for giving me the floor. My delegation agrees that the application of space technology becomes more important to water security issues and water-related risks. In order to make use of satellite information more effective and efficient to resolve the variety of social problems, the Government of the Republic of Korea established the Comprehensive Plan for Satellite Information Applications in May 2014, last month, and I would like to introduce it here briefly.

The Plan is to collect, integrate and manage the satellite information data and to make data available to the relevant public services and business enterprises in a proper and timely manner. This Plan consists of three objectives: first, expand satellite-information applications to improve the quality of life; second, create a higher value-added business by fostering the creative ecosystem of the satellite information industry; and, third, enhance the capabilities of managing and utilizing satellite information to keep pace with the multi-satellite age.

The main projects under this Plan include the establishment of a National Support Centre for Satellite Information Applications and the development of an open type integration platform for satellite information. This Plan also emphasizes the importance of international cooperation and specifies the participation in international efforts to resolve global problems, including water security issues and water-related risks, by using satellite information.

Last year, the Korea Aerospace Research Institute, KARI, as a member of the International Charter on Space and Major Disasters, provided 12 disaster-affected countries in 2013 with 32 KOMPSAT-2 satellite images and will perform the role of the leading agency of the International Charter from October 2014.

Encouraged by the newly-established Comprehensive Plan for Satellite Information Applications, the Republic of Korea will expand its participation in international efforts to resolve the global problems including water security issues and water-related risks.

Thank you, Mr. Chairman.

The CHAIRMAN: I thank the distinguished delegate of the Republic of Korea, Mr. Young Kim, for his statement.

The next speaker on my list is the distinguished delegate of Iraq, Mr. Yassin Abbas.

Mr. Y. ABBAS ALI (Iraq) *(interpretation from Arabic)*: Thank you Sir for the opportunity to deliver our statement.

Sir, water is the basis for the cultures of Iraq since time memorial. Iraq is facing major challenges because of the drop of available water resources and the rise in their salinity and the increase in the face of drought. These challenges are presented by the encroachment of deserts in the marshes area in the southern part of Iraq. However, we are certain that space technology and its applications are important that could enable Iraq to utilize its water resources more efficiently and to understand future changes related to water resources.

I will address the role of space technology and the measures taken by the Iraqi Government in the management of water resources and the importance of international cooperation in the provision of such technology.

Iraq has signed with the European Union the Advanced Survey of Hydrological Resources in Iraq, which aims at providing space and Earth data in order to establish important databases for ground water in Iraq. This information will provide important water resources for Iraq. The enterprise is funded by the Iraqi Government and the European Union. UNESCO is the implementing agency. The implementation will stretch over 30 months. This project is a good example of international cooperation to benefit from the capabilities and from space technology to face up to the drop in the water resources in Iraq. Iraqi institutions and buddies(?) are conducting a comprehensive study on Iraqi resources in cooperation with SIG, MED Concarter(?) to survey until 2035 by the following.

Preparation of maps of all irrigation projects by space images, World View-1 and World View-2, and with great precision.

Preparation of maps for land cover by utilizing SPOT-5M and accordingly a scenario has been established in order to estimate the agriculture crops utilizing water resources by Agriculture Export Zone, AEZ.

The production of models for floods by the utilization of five kilometres and by the use of DGPS and RASS.

The Centre is also utilizing images from ASTER and LANDSAT.

The Centre for the Rehabilitation of Iraqi Marshes is utilizing images from the satellite MODIS regularly in order to rehabilitate the marshes in the southern part of Iraq.

In addition to the preparation of, and establishment of, maps by utilization of LANDSAT and Quick Bird satellites, I wish to refer to what has been submitted by the representative of the United States in relation to space and water by the utilization of the Gravity Recovery and Climate Experiment, GRACE. This is an innovative and unprecedented technology to estimate the consumption of ground water for agriculture, especially during the drought periods. Both ATAL, which is a study that was published last year on the depletion of ground water in Iraq, Turkey and Iran between 2003 and 2009, and by utilization of GRACE, it showed that the depletion was huge which accounts to 91 cubic kilometres of water resources which requires great efficiency in their management. We call for the application of this Experiment and that its outcome and results should be available to all States. Water resources is one of the significant subjects that requires international cooperation in order to optimally manage it and space technology would provide great potential and capacities in this respect.

Thank you.

The CHAIRMAN: I thank the distinguished delegate of Iraq, Mr. Yassin Abbas, for his statement.

Are there any other delegations wishing to make a statement under this agenda item at this time?

I see none.

We have, therefore, concluded our consideration of agenda item 11, Space and Water.

Space and climate change (agenda item 12)

Distinguished delegates, I would now like to continue and hopefully conclude our consideration of agenda item 12, Space and Climate Change.

The first speaker on my list is the distinguished delegate of Egypt, Mr. Alaaeldin El Nahry.

Mr. A.H.M. EL NAHRY (Egypt) *(interpretation from Arabic)*: Thank you. *(interpretation in French?)* …

The CHAIRMAN: Excuse me, there is no interpretation, I think.

Again? Is it OK?

(interpretation suspended)

The CHAIRMAN: It is OK, the distinguished delegate of Egypt, you have the floor. Sorry.

Mr. A.H.M. EL NAHRY (Egypt) *(interpretation from Arabic)*: In the Name of God, the Merciful, the Compassionate, Mr. Chairman, ladies and gentlemen. One of the key factors when it comes to climate change is solar activity. From 19 October to 10 December last year, we had exceptional solar activity. This culminated on 23 October last year. There were 330 solar flares on that day. The wavelength was 10^7 centimetres. This was a record level of solar activity.

In May 2001, we also had another peak in solar activity. So over the past solar cycles, there have been two high points, all of this took place in the second half of the twentieth century and there was an average interval of two years between periods of high solar activity. We had a high point in 1989 and then we had a second high point in 1999. Solar eruptions and the rated solar flares were at their greatest level in 2003 and we were able to observe this using satellites. These are proton flares, because protons are the main type of matter that is ejected by the Sun during the solar flares, and the velocity can reach 10^{22}RG, generating very high levels of solar wind which entered the ionosphere and which lead to solar turbulence and solar storms in the Earth's atmosphere and this creates interference in radio and television and telecommunications. This is due to high intensity of ionizing radiation created when the protons enter the upper atmosphere.

Now, where major eruptions last October, 722 kilometres per second, there was a solar flare that reached the Earth or a solar wind that reached the Earth in October of last year.

On 31 October last year, we saw four ionizing radiation clouds that reached the Earth's atmosphere at very high speeds.

Another solar cloud reached the Earth's atmosphere on 4 October 2003, at a very high speed also.

These extremely violent solar flares and the solar clouds that they cause, which reached the Earth's atmosphere, cause magnetic storms which have major adverse effects and this is why we need to study them. Ionizing radiation clouds need to be studied and are being studied. Studies are being carried out in United States labs with a view to heading off the effects of ionizing radiation on the Earth's infrastructure.

Distinguished delegates, the main cause of climate change is intensified industrial activity by the major industrial powers. Following the beginning of the industrial revolution around 1750, we saw a major increase in carbon dioxide emissions. This was due to the combustion of fossil fuels. Carbon dioxide, of course, can be beneficial for plants but its effects are rather harmful for organisms that rely on photosynthesis. The increase in carbon dioxide is leading to the trapping of heat. It is warming the atmosphere. It is leading to increased precipitation and it is leading to the extinction of plant species.

In view of the increased industrial activity on Earth, we have seen an increase in temperatures and this, in turn, has led to an increase in sea levels by 1.8 millimetres a year over the past few decades. Since 1993, sea levels have been rising by three millimetres a year. This is, of course, due to man-made activities, these activities which are increasing the quantity of all kinds of greenhouse gases.

As a consequence of all of this, we expect to see a progressive increase in sea levels over the coming century. It is difficult to foresee the consequences of this phenomenon. It is difficult to state just by how much sea levels will increase because it is difficult to predict industrial activity.

Mr. Chairman, distinguished delegates, climate change is having a noticeable effect on the Delta Zone in Egypt, the Nile Delta. This is due to industrial activity within the major industrial countries. We are seeing a noticeable increase in the average temperature in Egypt and this is having knock-on effects in the Polar Zones and in other regions of the world. I personally have carried out a study, together with researchers from the University of Stuttgart, and we found that if sea levels rise by a meter, this will lead to the loss of more than 6,000 square kilometres of arable land in the Nile Delta region. If, on the other hand, sea levels rise by 1.5 metres, this will lead to the loss of more than 8,000 square kilometres of the most fertile land of the Nile Delta, and if it is a two-metres increase, then we will lose 12,000 square kilometres, so half of the arable in the Nile Delta, this will lead to the migration of more than 30 million people who will have lost their main source of income and it will worsen the plight of the Egyptian people.

Mr. Chairman, the major industrial powers who are the main cause of increasing global temperatures, owing to their activity, or rather intensive industrial activity, the bear the responsibility, geographical and human responsibility. It is up to them to provide aid, including financial aid. We live in a global village. Today's world is characterized by inter-dependency between countries. We live in the same world. We all depend on each other. We are all inter-dependent owing to the nature of our human condition.

Thank you.

The CHAIRMAN: I thank the distinguished delegate of Egypt, Mr. Alaaeldin El Nahry, for his statement.

The next speaker on my list is the distinguished delegate of the United States, Mr. Ken Hodgkins.

Mr. K. HODGKINS (United States of America): Thank you Mr. Chairman. Mr. Chairman, the United States, together with many other nations, has done extensive research into causes, current effects and predictions of future trends in global climate change. The latest report by the Intergovernmental Panel on Climate Change shows that global emissions of greenhouse gases have risen to unprecedented levels.

In May, the United States released its Third National Climate Assessment, which is the most comprehensive and authoritative scientific report about climate change that is happening now in the United States and further changes that we can expect to see throughout this century. The report translates scientific insights into practical, usable knowledge that can help decision-makers and citizens in the United States and around the world anticipate and prepare for specific climate-change impacts.

The National Oceanic and Atmospheric Administration recently released its global climate report for April 2014. The combined land and ocean average temperature for the month equalled the all-time record high for April, more than three-quarters of one degree Celsius above normal. Global precipitation varied widely. Some areas received record amounts of rainfall and some areas were much drier than normal. Another NOAA-led study determined that over the past 30 years, the location where tropical cyclones reach maximum intensity has been shifting toward the poles in both the northern and southern hemispheres at a rate of about 35 miles, or one-half degree of latitude, per decade.

Space-based observations and environmental monitoring satellites are primary sources of global measurements that enable these findings and the peer-reviewed science that is fundamental to understanding climate change. Satellites flown by many nations have documented long-term global indicators of climate change, such as global land use and land cover changes since 1972, summertime depletion of Arctic sea ice since 1978, total solar irradiance since 1978, global sea surface temperature since 1981, and Greenland and Antarctic ice sheet volumes since 2002. These satellite observations have revealed alarming global trends.

Deforestation is accelerating rapidly, reducing the ability of our biosphere to absorb carbon dioxide from the atmosphere. Satellites have also measured global total ozone since 1978 and climate change will affect the recovery of the Antarctic ozone hole.

The world's oceans are suffering similar adverse changes. The summertime sea ice coverage in the Arctic is being dramatically reduced by warming ocean waters and by increased air temperatures. The Arctic Ocean is expected to become essentially ice-free in the summer before mid-century. The Greenland ice sheet mass, a key indicator of warming, is decreasing annually at a rate which is three times the total amount of ice presently in the Alps. Both the melting ice from Greenland and the world's glaciers and the thermal expansion of the oceans due to heating are major contributors to global sea level rise. Marine life is being adversely affected by increased heating of the ocean from the atmosphere and by increased acidification as the oceans absorb about a quarter of the carbon dioxide emitted to the atmosphere annually.

To ensure continuity of satellite-based observations, the United States relies on unique contributions of three agencies.

NASA operates 17 major satellite missions that provide sustained, high-accuracy, well-calibrated observations of the land, oceans, atmosphere and biosphere. They provide insights on Earth system change, climate change understanding and practical applications.

The majority of these missions are international partnerships, showing true collaboration in space activities. Up to eleven Earth-observing satellites to be launched between 2014 and 2020 are in development and many of those also involve international collaboration.

Most recently, NASA partnered with the Japanese Aerospace Exploration Agency to launch the Global Precipitation Measurement Mission Core Observatory in February 2014, which will provide significant enhanced measurements of global rainfall, continuing an important data set which began in 1997.

Additional NASA satellites provide data to characterize and address drought, air quality and extreme weather events.

Archived data from NOAA's weather satellites, in orbit since the 1970s, form the basis for consistent multi-decadal global climate data records. In 2013, NOAA delivered an additional five new Climate Data Records, increasing the total number sustained in operations to 18. These Climate Data Records provide improved precipitation estimates for agriculture, improved climate forecasts, improved human health forecasts for pollutants and improvements in infrastructure and investment planning by industry.

Since 1972, NASA and the United States Geological Survey have operated the LANDSAT series of satellites. LANDSAT monitors the Earth's land mass on a scale where natural and human-induced changes can be detected, characterized and monitored over time. This 40-year archive has become vital for agriculture and water management, disaster response and monitoring the effects of climate change. LANDSAT-8 became operational in 2013 and it, together with LANDSAT-7, provides continuity of these observations. LANDSAT-8 advancements include additional capabilities to enable detection of more subtle changes. President Obama has directed NASA, in collaboration with the USGS, to develop a sustained land imaging strategy to ensure these land observations are continued for decades to come.

Satellite observations and the increased scientific understanding enable improved international security, enhance economic prosperity, mitigate the impacts of short-term and climate-related hazards, and strengthen global stewardship of the environment. The United States provides all of our Earth observation data and products openly and freely to users throughout the world and the United States urges all countries to implement similar policies for open and transparent data-sharing.

Mr. Chairman, in conclusion, I note what President Obama said in his State of the Union address in January 2014, and I quote, “Climate change is a fact. And when our children’s children look us in the eye and ask if we did all we could to leave them a safer, more stable world, with new sources of energy, I want us to be able to say yes, we did.”

Thank you, Mr. Chairman, and thank you delegates, for the opportunity to speak on this important topic.

The CHAIRMAN: I thank the distinguished delegate of the United States, Mr. Ken Hodgkins, for his statement.

Are there any other delegations wishing to make a statement under this agenda item at this time?

I see none.

Use of space technology in the United Nations system (agenda item 13)

Distinguished delegates, I would like to continue our consideration of agenda item 13, Use of Space Technology in the United Nations System.

The first speaker on my list is the distinguished delegate of the United Nations Economic and Social Commission for Asia and the Pacific, ESCAP, Mrs. Shamika Sirimanne.

Ms. S. N. SIRIMANNE (United Nations Economic and Social Commission for Asia and the Pacific): Thank you Chair, distinguished delegates, good morning. While gearing towards sustainable development goals, the Asia-Pacific faces many daunting challenges. It is the most disaster-prone region of the world. It has faced a series of multiple shocks in recent years which transcend geographical boundaries and roll back the development gains made. Building resilience to multiple shocks is, therefore, one of the most pressing challenges for policy-makers in our region.

Against this backdrop, member States have asked ESCAP to take the lead in implementing the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development for 2012-2017. I call it the Asia-Pacific Plan of Action. This was done at the regional level, through resolution 69/11 of ESCAP, and ESCAP is tasked to harmonize and enhance existing regional initiatives, to pool expertise and resources at the regional and sub-regional levels and to act as a clearing-house for good practices and lessons learned. Member States have requested the Secretariat to organize a Ministerial Conference to evaluate the progress made in implementing this resolution 69/11 on space and GIS applications in Asia and the Pacific.

Although the Asia and Pacific region has a growing number of space-faring countries, and despite the number of existing and planned remote sensing satellites in the region, these technologies are not yet fully benefiting the vulnerable in our societies because of the lack of capacity in terms of human, scientific, technological and institutional resources.

Regional cooperation, particularly South-South cooperation, is the solution and our way forward. ESCAP recognizes the importance of space technology applications for disaster risk reduction and sustainable development and its Regional Space Applications Programme emphasizes the effective use of space-derived technology and its generated information through a number of regional cooperative mechanisms. Part of our work is delivered through ESCAP’s long-standing Regional Space Applications Programme for Sustainable Development in Asia and the Pacific, RESAP. We also collaborate with our sister United Nations agencies, particularly with UNITAR/UNOSAT, UNSPIDER and others. And we also work very closely with our partners Charter, GEO, the Asia-Pacific Space Cooperation Organization, APSCO, Sentinel-Asia, CSSTEAP), and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia, which is RIMES, and other regional initiatives through SARK and ASEAN.

Let me now briefly outline our recent work in four areas, with your permission Chair.

One, ESCAP has been supporting the disaster-affected countries with the generous help of RESAP member countries and our UNITAR/UNOSAT partners to provide real-time satellite images during disasters. For example, when severe disasters struck Afghanistan, Bangladesh, China, Pakistan, the Philippines and the Solomon Islands in the recent past two years, ESCAP immediately mobilized near real-time satellite imagery upon receiving requests from member countries for support, resulting in more than 150 satellite images and damage maps being provided to affected countries for disaster early warning, preparedness, response, relief and damage assessment, in avoiding the loss of life and minimising economic losses.

Two, Regional Drought Mechanism. It is our flagship project of a regional cooperation mechanism. It is the Regional Cooperative Mechanism for Drought Monitoring and Early Warning. It has been initially operationalized in some pilot countries in our region. The Regional Drought Mechanism brings space-based data and products to building resilience of agrarian communities that are perennially affected by drought. At present, two regional service nodes of this Regional Drought Mechanism have been put in place in China and India to provide space-based data, products, knowledge and capacity-building to countries in need. Pilot countries such as Mongolia, Sri Lanka, Cambodia, Myanmar and Nepal, we hope, will improve their food security by assessing and adapting to drought conditions well in advance with this Programme in place. We are also developing partnerships with key national and international institutions critical for food security, climate modelling and monitoring, and disaster risk management, to develop the Regional Drought Mechanism into a robust and effective tool for countries in Asia and the Pacific. As per requests by the member States in Central Asia, the Mechanism is now exploring the wings to extend its services.

Three, let me brief you about our work in geo-reference information systems for disaster risk management, Geo-RDM. In the last two years, ESCAP has been assisting least developed, small islands and land-locked developing countries establish Geo-RDMs which combines socio-economic data with satellite imagery to ensure that the right information is available to the right person at the right time when a disaster strikes. Assistance has been provided under this Programme to Bangladesh, the Cook Islands, Fiji, Kyrgyzstan, Mongolia and Nepal as pilot countries to establish and use Geo-RDMs.

And, fourth, we also help countries to build institutional capacity. Just in the last two years, ESCAP has conducted a series of workshops and training courses in space technology and GIS applications for disaster risk reduction and sustainable development and this training has benefit around 400 policy-makers, officials, planners, professionals and researchers from 38 member States, United Nations entities and academic institutes and some NGOs.

In concluding, utilization of space technology for disaster risk reduction and sustainable development is now more accessible and affordable than ever. ESCAP will continue to develop its Programme for the Utilization of Space Technology for Sustainable Development, in particular disaster risk reduction, natural resource management, and we will enhance the collaboration with related United Nations agencies, the agencies that we are working with also our sister regional commissions such as ECA and ESCWAR to access and effectively use space-derived data for sustainable development for better implementation for this Programme.

ESCAP member countries have noted that science and technology have not been well recognized in global agreements in the past. Hopefully this is about to change with the United Nations Conference on Sustainable Development in 2012, specifically emphasizing the role of innovative technology as one of the critical means of implementation of STGs. Several Member States of Asia and the Pacific have expressed their desire to see greater prominence of the applications of science, technology and innovation in the Post-2015 Development Agenda as well as the Hyogo Framework of Action-2 that is being discussed now and I urge you to take an active role in these important negotiations to reflect the importance of space technologies in sustainable development.

Finally, we look forward to hosting the thirty-fifth session of the Inter-Agency Meeting on Outer Space Activities, in Bangkok, Thailand, in 2015, and take forward the fruitful discussions that have begun here.

Thank you Chair.

The CHAIRMAN: I thank the distinguished delegate of ESCAP, Mrs. Shamika Sirimanne, for her statement.

Are there any other delegations wishing to make a statement under this agenda item at this time?

I see none.

We will, therefore, continue and hopefully conclude our consideration of agenda item 13, Use of Space Technology in the United Nations System, this afternoon.

Distinguished delegates, I would now like to proceed with the technical presentations.

The first presentation on my list is by the representative of India entitled "Use of Earth Observation Data for Water Resources Assessment and Management in India".

Mr. V. K. DADHWAL (India): Thank you Mr. Chairman and thank you very much for providing this opportunity for sharing our experience on water resource assessment and management in the country using Earth observation data.

We have an abundant water resource but for a population which is about 17 per cent of the world, four per cent of the freshwater resources available and currently we actually utilize 56 per cent of the utilizable water although the amount of water available per year is 4,000 billion cubic metres. The issue is that this water falls in just 15 days actually, less than 100 hours of rainfall, and especially you have areas where there is only 150 millimetres of water per year to 11,700 millimetres of water.

So managing this such diversity and huge application requires a large input. I covered the Indian satellite data which we are currently using so I will not spend this time. What we are using precisely is for water resource assessment, planning, development, monitoring and evaluation of various programmes and projects, and we have also established a comprehensive geo-spatial information and decision-support platform to support the water resource project. I will cover each one of them just briefly to give you a glimpse of our major activities.

We now feel that there is a need to re-assess the available water resources with new Earth observation inputs and then for many of the River Basins, we have carried out such a re-assessment, one such is shown here. Secondly, now given the advances in modelling, we now are able to do spatial modelling, distributed modelling, and do the actual correct assessment which can then help in improving the planning process.

The inventory of water bodies, which is roughly like cover 10 million hectares in the country, and glacial lakes which are a hazard as well as a resource, is important, since a large amount of water into the Indo-Ghangatic Plain in the non-Monsoon period comes because of snowmelt. The snowmelt run-off modelling to do resource planning is also important.

This is one example where you do spatial databases from a large number of input data which are given by Earth observation and then do the calibration, this is a run-off modelling, and then from this information, spatially you assess the various components of the water balance.

This is an example of a national scale daily between 1-15 June. The surface run-off, surface soil ____(?) and evaporator-transposition(?) which we operationally tried to make it available for various users in the country.

A set of glacial lakes which we have identified. They are classed into 10 hectares, about 50 hectares, and a monthly assessment of water which also helps us in doing the graph for the disaster. This is a regular activity which is done.

Next. For each Basin, given the amount of hydro-power and irrigation requirements, so what we do is we do a short-term and a long-term forecast of snowmelt which is then used by the Dam Authorities to apportion between electricity generation and irrigation. This is a regular exercise.

For water resource planning, interlinking of rivers, canal alignment, ranking of hydro-power sites, dam submergence, catchment areas and flood hazard prone. These are the various inputs in addition to hydro-geomorphological maps. Some examples I will show you. This is an example of a dam and the effective planning. This is submergence at various heights of the dam, how much the population will get affected and what is the advantage. This is a proposed link between the two, a very detailed topographic and dam analysis has been done.

These type of pre-feasibility studies are very important for water resource planning projects.

This is for drinking water for the city of Chennai. Various alignments are worked out with respect to the Visual Elevation Model and the effort required to put down the pipeline which helps us in bringing drinking water to a large area, basically we are talking of pipelines of 350-450 kilometres in length.

We have detailed information on various parameters and then a ground water information system. For this, we are moving towards preparing a National Programme on Aquifer Management which will also involve a 3-D mapping of the Aquifers which are underground aquifers into various categories for management.

As far as monitoring and hazard forecasting is concerned, reservoirs sedimentation, flood mapping damage and flood forecasting are of our major activities.

Basically, because of soil erosion, all the dams, the live storage and usable storage gets reduced, so you can use satellite-based actual coverage at the same height with the water coverage and clear the loss of capacity. This is one such example where we have computed in 40 years, 34 per cent of the capacity has been lost. We also used this information to put soil conversation measures, as well as continuously track the loss of the reservoir capacity.

This is for irrigation potential. Basically, special funds are made available to clear the irrigation potential. India has 70 million hectares of irrigation potential created due to the canal network. To monitor this half yearly, the financial resources and the physical growth, what we do is to monitor the continuity of the irrigation infrastructure which is done at the central scale, done by the Central Water Commission, to ensure that projects are on time.

For flood management, we do the river morphological studies to identify new control structures, flood hazard zonation, use 10 to twelve years of the inundation data and make this for developing disaster risk resilience.

For flood forecasting, using the approach what has been described earlier, we try to predict the peak flow and convert the peak flow with the Visual Elevation Model into the area which is likely to be inundated. Such information is made available from 12-26 hours before the event.

A large number of water resources projects are actually in project so we do a performance evaluation of irrigation programmes. We also study the likely effects such as water logging and soil salinity, and also a very large amount of more than 500,000 small tanks also irrigate very small areas, so regularly tank rehabilitation which is de-silting, is taking place. So what we monitor is how much de-silting has led to improvement in the crop area around that. This is a case of some 750 tanks and the evaluation after a substantial amount of money was given for this siltation.

This is an example of an irrigation system performance evaluation where we studied the head to tail differences as well as the efficiency in terms of the number of multiple crops and the yield.

Based on the last large amount of data available in the country with the Ministry of Water Resources, we have now created a geo-portal which actually comprises 12 main information systems, 36 sub-systems and 95 spatial layers with various attribute data. All this has been made available in three access modes. The Central Water Commission has access to the entire data. The State Governments have access to their pertinent Basins and the public has access to the data what has been declared as publicly accessible.

Thank you Mr. Chairman. I have tried to summarize the major water resource projects and programmes in the country.

Thank you.

The CHAIRMAN: Thank you Mr. Dadhwal for your presentation.

Is there any delegate who has questions for the presenter?

I see none.

The second presentation on my list is by a representative of Burkina Faso entitled “Presentation of the Continuous Operation Reference System GNSS: Reference Stations Network”.

Mr. S. TIEMTORE (Burkina Faso) *(interpretation from French)*: Good morning everyone, distinguished participants, Chairman. It is a pleasure and an opportunity for us to be able to present our CORS Network to you, that is the Continuous Operating Reference System, and the use that we have made of this space system.

Our presentation will be structured as follows.

In the context of the Land Tenure Project, Burkina Faso has established a network consisting of nine permanent stations. The aim of the Land Tenure Project is to ensure the necessary conditions are in place to enhance security and efficiency in terms of granting access to land in order to thus contribute to increasing productivity and invest in rural areas. The CORS Network serves to strengthen basic geodetic infrastructure the term allowing us to better connect topographic and cartographic work carried out in the same reference work.

Here you can see an overview of the geodetic survey markers as distributed in our national territory of the first and second degree as well as of the twelfth parallel and astronomic survey markers.

In order to ensure coverage of all stations located on Burkina Bay territory, we have used a buffer of 150 kilometres allowing us to position the nine permanent sites. The choice of sites was based on the following technical criteria, the stability of the grounds, security of the sites, access to GPRS or to 3G, accessibility of the site, and also taking into account the immediate surroundings, ensuring that there are no antennae nearby or high tension lines nearby.

This image shows you the location of the nine permanent stations in our national territory with the buffer of 150 kilometres between them, covering Burkina Bay territory. And this shows you the nine permanent stations, on average, the distances between the stations is between 150 to 250 kilometres and each site is comprised as follows: a GNSS antenna, a GPRS antenna, a solar supplies system, a GNSS receiver, a radio, and a GPRS router.

To describe this equipment, the GNSS antenna captures satellite signals and transmits them to a receiver. Two types of antenna are used. We have a geodetic Zephyr antenna, as well as a Choke Ring antenna, which makes it possible to reduce multiple trajectories. The Choke Ring antennae is the antennae serving the BFO1 stations, which are used for the IGS. This radio allows us to take topographic readings in real-time, whereas the solar supply system also makes it possible to ensure back-up electric power for each site.

As for the router, this ensures the continual transmission of data from the receiver to the server at the Computing Centre, supporting two telephone chips, where a chip no longer functions automatically the other chip will then take over for the purpose of calculation.

The GNSS receiver has a storage capacity of 4 gigabytes.

For the establishment of the Calculation Centre and also for the Reference Data Receiving Centre, we have installed two servers, a principle server and a back-up server. In the Computing Centre, we are also planning to set up a VSAT link that will serve as a back-up in order to ensure continuous service.

This consists of the following equipment: a TPP-2.5, TPPWEB, which carries out data dissemination, as well as a TTP-2.5, which is responsible for storing and processing data on the server.

Then in the following slide, you can see how the connectivity works, the networking within the Calculating Computing Centre where we have the GPRS and the GNSS system, as well as a specialized linkage permitting connection between distant sites which, in turn, allows for the easy transmission of data.

At site level, for data transmission from remote sites, we have also set up a VPN in order to ensure the securization of the data transmitted from the remote sites.

As regards the functioning of this system, when it comes to the remote sites, the data are sent on an hourly basis using the Internet to the Computing Centre. At the Computing Centre, the data received is then stored and published on a downloading platform for reference data. As far as the user is concerned, access is possible to the website, www.bfcors.net, where the data can be downloaded.

Moving on. Users of this network have two options for access to the network data provided by the station. There is the real-time mode, a point in real time using kinematics, and then there is a radio frequency of 428 megahertz which is allocated by the Burkina Bay Electronic Communication Regulatory Authority, in real time. The other mode for access is the post-processing mode where communication is no longer upheld between the mobile site and the reference station. And in this case, you can see that we have a reading that takes place in real time for a distance of less than five kilometres between the user and the reference station, where a connection is established and where the real-time reading can be taken.

This slide is a demonstration of post-processing where the distance between the base station and the user is more than five kilometres meaning that there is no longer a connection between the two posts and where the user is, therefore, forced to record observations and then download the reference data in order to carry out processing of this data.

This explains how the downloading site works for the reference data. To access this site, as I said previously, you simply enter the following address, www.brcors.net, and it is free access for the time being and the data can be downloaded, as you can see, in accordance with your working hours.

The CORS Network provides us with a number of advantages in various areas, such as the following. It serves to establish a reference station for topographical work, all cadastre(?), old land survey where it can be linked to the system to prevent duplication of efforts. It makes it possible to monitor public works or engineering works, dams, bridges and other significant constructions. It also enhances the security of monitoring of hydro-electric dams and makes it possible to adopt early warning measures.

It also has identified landmarks for aerial recording activities and has helped reduce the work time for a number of undertakings. It also allows us to take stock of any deterioration that has taken place by using Geographic Information System data. It also helps to reduce costs and ensure the accuracy of connectivity work and serves also to facilitate the work of delimitation and identification of land and, in turn, thus supports social peace and helps reduce land-base conflict.

This is a modern tool which requires further support by all protagonists in the geo-spatial area in order to promote the CORS Network and to facilitate its use among potential users. Burkina Faso organized a forum on the Usage of the CORS Network. This was attended by various public and private sectors as well as by international protagonists and was most successful. As a recommendation issued by this forum, participants have suggested that the Network be further supported by the international community through the provision of training, technical assistance, through further strengthening this Network through the acquisition of further stations, recalculating the coordinates used by the Network and providing support for the organization of upcoming fora that Burkina Faso will be holding on the CORS Network, also, supporting the transfer of knowledge between other countries or institutions that are operating in this area.

Here, you have an oversight of the Network on the left, as it currently stands, of the nine existing sites, and then an image of the future Network, once it has been further intensified.

And this brings me to the conclusion of my presentation.

Thank you very much for your attention.

The CHAIRMAN: Thank you Mr. Tiemtore for your presentation.

Is there any delegate who has questions for the presenter?

I see none.

Distinguished delegates, I will shortly adjourn this meeting so that the Working Group on the Long-Term Sustainability of Outer Space Activities can hold its fourth meeting.

Before doing so, I would like to inform delegates of our schedule of work for this afternoon.

We will meet promptly at 3.00 p.m. At that time, we will begin our consideration of agenda item 10, Spin-Off Benefits of Space Technology: Review of Current Status. We will also continue and hopefully conclude our consideration of agenda item 13, Use of Space Technology in the United Nations System. We will also begin our consideration of agenda item 14, Future Role of the Committee and, time permitting, continue agenda item 15, Other Matters.

There will be three technical presentations this afternoon by a representative of Japan entitled “Japanese Style Contribution on the International Space Station”, by a representative of China entitled “China Manned Space Programme”, and by a representative of Syria entitled “Water Resources Management Using Remote Sensing Techniques”.

Are there any questions to this proposed schedule?

I see none.

Finally, I wish to remind delegations that starting at 7.00 p.m., the Austrian delegation have organized an evening in a traditional Austrian Heuriger at Murer’s Heurigen, Coblenzlgasse 38, in the Nineteenth District of Vienna. Invitations to this event were distributed to delegations last week.

I now invite the Chair of the Working Group on the Long-Term Sustainability of Outer Space Activities, Mr. Peter Martinez, to convene the fourth meeting of the Working Group.

This meeting is adjourned until 3.00 p.m. this afternoon.

Thank you.

The meeting adjourned at 11.21 a.m.