

CSSTEAP Newsletter

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**Centre for Space Science & Technology
Education in Asia and the Pacific (CSSTEAP)
(Affiliated to the United Nations)**

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..... on a mission of capacity building, under the initiative of the United Nations, for Asia and the Pacific Region in Space Science and Technology, through Excellence in Education, Training, and Research.

NEW CHAIRMAN OF CSSTEAP GOVERNING BOARD AND ISRO

Inside this issue

Dr. K. Radhakrishnan has taken over as Chairman, ISRO/Secretary, Dept. of Space, Govt. of India from Dr. G. Madhavan Nair on October 31, 2009. Consequently, Dr. Radhakrishnan has been nominated as Chairman and Indian representative to the Governing Board of CSSTEAP.



Dr. Radhakrishnan held several decisive positions in ISRO including Member Space Commission, Director of Vikram Sarabhai Space Centre, Director of National Remote Sensing Agency (now NRSC), Director of National Natural Resources Management System-Regional Remote Sensing Service Centres.

Dr. Radhakrishnan held many international positions such as the founder Chairman of the Regional Alliance in Indian Ocean for the Global Ocean Observing System (IOGOOS) and currently he is leader of the Indian Delegation to the UN Committee on Peaceful Uses of Outer Space (UNCOPUOS) as well as chairman of the Working Group of S&T Sub-committee.

As Director NRSA, Dr. Radhakrishnan has contributed

- New Chairman of CSSTEAP GB 1
- Dr. George Joseph, Director CSSTEAP completes tenure 2
- New Director of CSSTEAP 2
- ISRO PSLV launches Oceansat-2 3
- Governing Board Meeting of CSSTEAP 4
- CSSTEAP adopts a logo 5
- 14th PG course on RS & GIS 6
- 7th PG course on SATCOM 7
- Brief history of development of CSSTEs 8
- Global warming : Our planet is in Peril 11
- Forthcoming symposia/workshops 15
- Alumni Speaks 16
- Recognition conferred to Dr. George Joseph 17
- UNESCAP financial support to CSSTEAP 18
- CSSTEAP Performance Assessment and outlook for the future 19
- Background of CSSTEAP 19
- Ongoing Courses 20
- Forthcoming Courses 20

Wishing all the readers a Very Happy & Prosperous 2010

significantly in guiding the CSSTEAP academic programmes in the capacity of Member, Advisory Committee of CSSTEAP.

CSSTEAP delightfully welcomes Dr. K. Radhakrishnan, the new Chairman of CSSTEAP Governing Board!

DR. GEORGE JOSEPH, DIRECTOR, CSSTEAP COMPLETES TENURE

Dr. George Joseph was given a fond farewell on December 4, 2009 on completion of his tenure at CSSTEAP. Dr. Joseph was Director from December 6, 2006 to December 4, 2009. Dr. Joseph has been associated with activities of CSSTEAP right since its inception. As Director SAC he was instrumental and a part of the Centre from the initial phase of establishment of CSSTEAP. As Director CSSTEAP he gave shape to the vision of UN-OOSA in enhancing the capability in space science and technology in the Asia-Pacific region. He has contributed professionally, academically as well as administratively to the growth of the Centre. During his tenure as Director his significant contribution related to issuing of registration number to all the students, persuaded students to register to do MTech research work, revamped the CSSTEAP website, Newsletter, reviewing the course syllabus, electronic documentation of student related documents, video recording of lectures for benefit of students, CSSTEAP-ITC Agreement for exemption of modules for CSSTEAP PG alumni at ITC, CSSTEAP logo. He has also put forwards his vision and outlook for the future to enable the centre to be "Centre for Excellence" in the form a document. He always and



regularly interacted with students and was loved by students. A farewell function was organized by CSSTEAP students & faculty of IIRS on December 4, 2009. Many speakers including Dr. V.K. Dadhwal, Dean IIRS and Director CSSTEAP, Dr. S.K. Saha, Course Director RS & GIS and faculty members of IIRS recalled their association & immense contribution of Dr. George Joseph in providing impetus for excellence of CSSTEAP.

NEW DIRECTOR OF CSSTEAP



Dr. V.K. Dadhwal, Dean, IIRS and Deputy Director, (Capacity Building) NRSC has taken over the additional charge of CSSTEAP from Dr. George Joseph upon completion of tenure of the latter on 4th December 2009. Dr. Dadhwal joined Space Applications Centre (ISRO), Ahmedabad in year 1983 and was Head, Crop Inventory and Modelling Division (1998-2004). He is an agricultural scientist and Fellow of National Academy of Agricultural Sciences (NAAS).

Earlier also Dr. Dadhwal held the position of Director-in-Charge CSSTEAP from September 2005 to December 2006 and Dy. Director, CSSTEAP from July 2005 to November 2006.

CSSTEAP welcomes Dr. V.K. Dadhwal, the new Director of CSSTEAP.

ISRO's PSLV LAUNCHES OCEANSAT-2 SATELLITE INTO ORBIT

In its sixteenth flight conducted from Satish Dhawan Space Centre (SDSC) SHAR, Srihanikota on September 23, 2009, ISRO's Polar Satellite Launch Vehicle, PSLV-C14 successfully launched 960-kg Oceansat-2 and six nano satellites all together weighing 20 kg.

Oceansat-2 is the sixteenth remote sensing satellite of India. The state-of-the-art Oceansat-2 carries three payloads and has the shape of a cuboid with two solar panels projecting from its sides. The satellite collects data over the entire globe once in two days. The three payloads it carried are:

- Ocean Colour Monitor (OCM)
- Ku-band Pencil Beam scatterometer (SCAT) developed by ISRO
- Radio Occultation Sounder for Atmosphere (ROSA) developed by the Italian Space Agency.

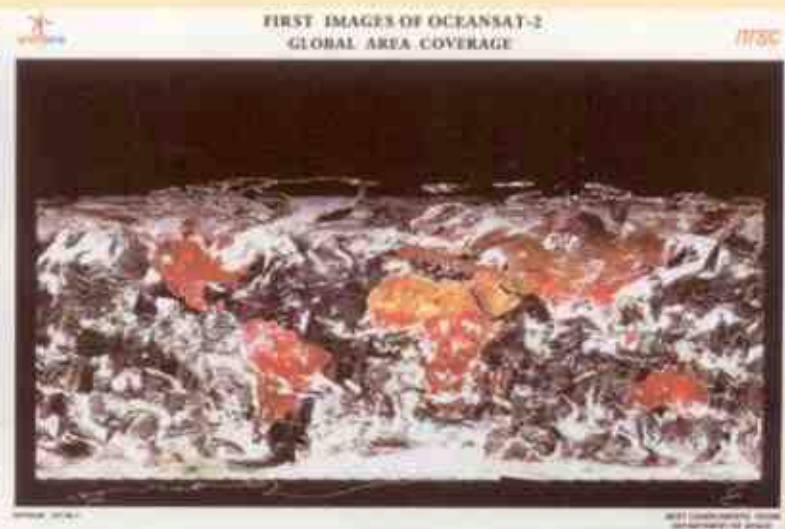
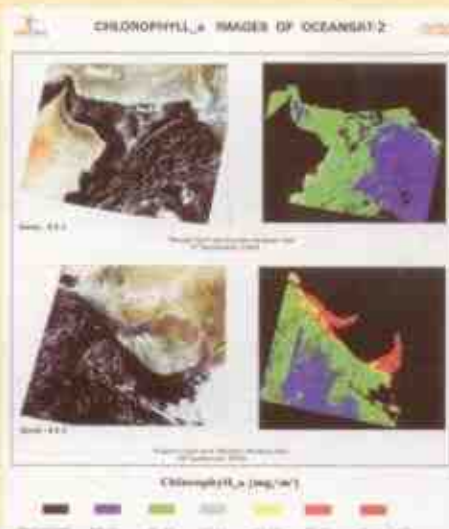
The Ocean Colour Monitor (OCM), a multi-spectral imaging radiometer, provides information on chlorophyll concentration, and helps locating Potential Fisheries Zones. The Scatterometer, an active microwave sensor, facilitates retrieval of sea-surface wind speed and direction, and monitoring polar sea-ice. The Radio Occultation Sounder measures the parameters pertaining to lower atmosphere and ionosphere. The data provided by the different sensors on-board Oceansat-2, will also facilitate monitoring of turbidity and suspended sediments, sea-state and sea-surface winds, and meteorological/climatological studies.

OCM (Ocean Color Monitor), is a solid-state radiometer providing observations in eight spectral bands in the VNIR region. The instrument employs pushbroom scanning technology with linear CCD detector arrays. A swath width of 1420 km is provided. An along-track instrument tilt

capability of $\pm 20^\circ$ is provided to avoid sun glint. OCM optics is based on one lens per band (wide angle telecentric lens design, refractive system). The ground resolution is 360 m in the along-track and 236 m in the cross-track direction.

SCAT (Scanning Scatterometer), an active microwave device designed to monitor ocean surface wind speed and directions. The instrument is a pencil beam wind scatterometer operating at Ku-band of 13.515 GHz. The Ku-band Scatterometer with a 1 metre diameter antenna rotating at 20 rpm, works at a frequency of 13.515 GHz. SCAT is being utilized for the estimation of the radar backscattered power and subsequent local and global wind vector (velocity magnitude and direction) retrieval over the ocean, from the normalized radar cross-section, for cell resolution grids of 25 km x 25 km over a swath of 1400 km. The aim is to provide global ocean coverage and wind vector retrieval with a revisit time of 2 days.

ROSA (Radio Occultation Sounder for Atmospheric Studies), a new GPS occultation receiver is to characterize the lower atmosphere by radio occultation and the ionosphere, opening the possibilities for the development of several scientific activities exploiting these new radio occultation data sets. It is built by Italian Space agency (ASI).



PSLV-C14 mission carried six nano satellites - Cubesat 1, 2, 3 and 4 as well as Rubin 9.1 and 9.2 - as auxiliary payloads along with Oceansat - 2. The weight of these nano satellites was in 2-8 kg range. Oceansat - 2 and the six auxiliary payloads were placed in a polar Sun Synchronous Orbit inclined at an angle of 98.28 degree to the equator.

The auxiliary payloads of PSLV-C14 are educational satellites from European Universities and are intended to test new technologies. After the separation of Oceansat - 2 from

PSLV - C14, the four cubesats were also separated, while Rubin 9.1 and 9.2 remain permanently remain attached to the upper stage of PSLV-C14.

This was the sixteenth mission of ISRO's workhorse launch vehicle PSLV and its fifteenth consecutive success. From October 1994 onwards, PSLV has repeatedly proved its reliability, robust design and versatility by launching satellites into polar Sun Synchronous, Geosynchronous Transfer, Low Earth and Highly Elliptical Orbits.

Source : www.isro.gov.in

GOVERNING BOARD MEETING OF CSSTEAP

Fourteenth meeting of Governing Board (GB) of CSSTEAP was held on September 9, 2009 at New Delhi. The GB meeting was chaired by Dr. G. Madhavan Nair, Chairman, Governing Board CSSTEAP and Secretary, Department of Space, Govt. of India. Several members of Governing Board of CSSTEAP viz., Dr. Hans Haubold of United Nations-OOSA, Vienna, Dr. Bambang Koesoemanto (LAPAN, Indonesia), Mr. Hong Yong IL (Councilor, Embassy of DPR, Korea), Mr. Kairat Akhmetlimov (Charged' Affaires, Kazakhstan), Mr. Yagya B Hamal (Minister-Counsellor, Embassy of Nepal), Dr. S. Panawennage (Director, ACCIMT, Sri Lanka), Dr. Surachai Ratanasermpong (Dy. Director, GISTDA, Thailand), Dr. Sabit Ilyasov (Uzbekistan) attended the meeting. Others who participated include Dr. George Joseph the then Director, CSSTEAP; Dr. R.R Navalgund (Director, SAC), Dr. V. Jayaraman (Director, NRSC), Dr. A. Bhaskaranarayana (Scientific Secretary, ISRO), Mr. GRK Murthy (CCA, ISRO), Dr. V.K Dadhwal Dean, IIRS, Course Directors of all courses and higher officials of various centres of Department of Space, Govt. of India. Several important issue like expansion of CSSTEAP in the Asia-Pacific region, review of the action items from the last GB meeting, the Centre's strategy for the M.Tech research programme, budget allocation for the centre, etc were discussed. Director, CSSTEAP presented brief report on the achievements of the centre in the past one year. Director mentioned that centre is continuing the process of issuing registration numbers to all the students and M.Tech registration for those who are eligible and interested to pursue their M.Tech research. Dr. Joseph also informed some of the other activities such as guidelines for preparation of M.Tech thesis, standardizing PG diploma certificates, revamping of CSSTEAP website, which included introduction of Alumni forum and discussion forum for students to exchange technical issues. He also mentioned that Newsletter has become rich in terms of content and



Governing Board members alongwith dignitaries during meeting at New Delhi.

information having a popular article, article/report from UN-OOSA, from member countries, alumni speaks, information on symposium in the area of space technology and application. He requested GB members to contribute regularly report/articles or information about seminar on any space related activities in their country/region for the Newsletter. He also apprised that expert committee was setup for each discipline to review the CSSTEAP course syllabus. They have submitted the reports and the same have been sent to UN-OOSA for approval. Dr. Joseph submitted that not all countries in Asia-Pacific region have taken full benefit of the CSSTEAP academic programmes and hence the outreach is limited. Dr. Joseph called upon the GB members to kindly help to circulate the information in various institutions in their country. He also gave suggestions to GB members to send the list of institutions/organization/academic institutions in their respective countries involved in space technology and application with their contact details which would help in sending the information to them directly. He also emphasized the members to embark on obtaining international funding for the academic activities of the

Centre, identification of specific steps to increase visibility of training and education in space science and technology areas. Dr. Haubold lauded India's contribution towards the United Nations International Heliophysical (IHY) and the International Year of Astronomy (IYA) which not only had the public outreach component but also research component. He also praised the Indian space programme particularly the Chandrayaan mission and the future missions. Dr. Haubold praised Dr. George Joseph for his document "Assessment for performance and outlook for the future" which summarizes the vision for the Centre and outlook for the future. This document presents future strategy of the Centre and viable recommendations to make the Centre broad based with the involvement as many countries of Asia-Pacific region. He strongly recommended that this document be made available in print to be shared with UN and rest of the world and UN would be proud to send to various sub-committees and General Assembly.

Various issues like research activities in the form of MTech, short courses, alumni feedback, GB meeting to be biennially organized from year 2010, CSSTEAP budget, audit report and appointment of new Director, CSSTEAP

were discussed. Dr. Madhavan Nair mentioned that he is satisfied with the performance of Dr. George Joseph as Director, CSSTEAP which is clearly visible from the activities of the centre. He informed that Dr. Joseph has showed his inability to continue for the next term. Dr. Nair said that Dr. V.K.Dadhwal, Dean IIRS has been a key person for CSSTEAP and is fully aware of the activities of the centre and has been Director-in-charge from September 2005 to December 2006 and suggested that Dr. Dadhwal to take charge as Director, CSSTEAP till the appointment of a new Director which was also endorsed by the Governing Board.

Chairman, GB thanked UN and all the GB members for their active participation and for their support and cooperation. He mentioned his sincere gratitude to all the GB members for their continued support and encouragement provided to the growth of the Centre and to ISRO-DOS staff, Directors of NRSC, SAC, PRL, Course Directors, Course Coordinators of all the four courses for their dedicated support. Dr. Hans Haubold, UN-OOSA expressed his satisfaction with the academic programmes of the centre. The GB expressed satisfaction of the functioning of the Centre and they also extended whole hearted support to the future activities of the Centre.

CSSTEAP ADOPTS A LOGO

During the 12th GB meeting held on April 27, 2007 at Kovalam, Director, CSSTEAP suggested that CSSTEAP should have a logo depicting its function, affiliation etc. Director was asked to prepare a logo and submit for the approval of GB. Subsequently, Director sent out a note to a number of individuals associated with the activities of CSSTEAP requesting their input. A number of design/ suggestions were received. A professional company was also approached. All the inputs were received and one short listed was presented during the 13th GB meeting held on November 26, 2008 at Ahmedabad. The logo was further modified incorporating the suggestions made by the members in the 13th GB meeting. The 14th GB meeting held at New Delhi on September 9, 2009 accepted the logo as shown.



All the Blue colours in the logo in RGB format are in the following ratio:

R = 00 G = 100 B = 255

While the imaginary orbit depicted in Red colour is in the following ratio:

R = 255 G = 00 B = 00

The fonts used are Ethnocentric.

The logo is designed by Mr. S. Ramdass, a senior Engineer at Space Applications Centre, Ahmedabad. He was also associated with CSSTEAP activities for a long time. CSSTEAP is thankful to Mr. Ramdass for this contribution.



Mr. S. Ramdass is being felicitated by dignitaries

FOURTEENTH POST GRADUATE COURSE ON REMOTE SENSING & GIS

The Fourteenth Post-Graduate Course on "Remote Sensing and Geographic Information System (RS&GIS)" of CSSTEAP, commenced on July 1, 2009 at Indian Institute of Remote Sensing (IIRS), National Remote Sensing Centre (NRSC), Dehradun, one of the host institutions of CSSTEAP. Total 17 participants from 11 countries of Asia-Pacific Region viz. China-1; Cambodia-1; India-1; Kyrgyzstan -2; Mongolia- 2; Myanmar - 2; Nepal-1; Sri Lanka-1; Thailand-2; Uzbekistan-1 and Vietnam-3 are attending this course.

The course duration is of 9 months and divided into two Semester. Semester-I consists of Module IA of 3 months and Module IB of one months and semester II consist of Module II of 2 months and Module III of 3 months duration. In the first week of the course an orientation module consisting of lectures on overview of Satellite Meteorology, Satellite Communication, Space Science and Technology and Remote Sensing & GIS applications in Natural Resources Management and Environmental Assessment followed by an introduction of Social, Cultural and historical aspect of India were organized. Director, CSSTEAP gave a lecture on the overview of Remote sensing and its application and on Indian space program. Participants were also familiarized about Dehradun city and surrounding by conducting one day local sight seeing trip. The module IA covering theory, practicals and tutorials on principal of Remote Sensing, GIS & GPS has completed on September 30, 2009. Module 1 B on Recent trends in RS & GIS and environmental assessment and monitoring was held for one month and completed on October 31, 2009. Module - II (optional elective) was completed in December 31, 2009. This year the elective disciplines pertaining to Agriculture and Soils, Marine Science, Water Resources and Advances in RS & GIS are offered.

Semester-1 and Semester-II examinations were held from 16th to 23rd October 2009 and December 28 to 31, 2009, respectively. To improve the English Communication and writing skill of the course participants, evening English classes are organized beyond office hours. These classes is conducted by an English



Participants at Ramoji, Film City, Hyderabad

teacher of Dehradun having experience in teaching of national and international students.

Several field excursions are also arranged during this module for ground truth data collection for interpretation and analysis of satellite data. On educational tour, participants were taken to Delhi, NRSC Hyderabad, satellite data receiving facility at Shadnagar near Hyderabad, Andhra University Visakhapatnam. In Andhra university participants attended lectures on application of RS & GIS on Coastal studies. A field visit was also conducted for the benefit of the participants. On the social front, the participants had glimpses of Indian festivities by their active participation in various festivals such as Dussehra, Diwali, Id-ul-Fitr, Christmas etc.

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Participants with dignitaries at Andhra University

SEVENTH POST GRADUATE COURSE IN SATELLITE COMMUNICATIONS

The Seventh Post Graduate course on Satellite Communications started on 1st August 2009 at Bopal Campus of Space Applications Centre, Ahmedabad. Seventeen participants viz., Bhutan-1, DPR Korea-2, India-4, Maldives-1, Mongolia-2, Myanmar-3, Nepal-2, Sri Lanka-1, Tajikistan-1 from nine countries are attending this course. The inaugural function of the course was held on 3rd August 2009 in conference hall, Bopal campus. Dr. R.R. Navalgund Director, SAC, Shri. A.S. Kiran Kumar, Associate Director, SAC, Focal persons of the course and participants attended the inaugural function. Director, SAC welcomed the participants. Dr. A.S. Durai, Course Director SATCOM-7 introduced the course and the profile of students. Each of the participants introduced themselves with a brief introduction of their organization and nature of work carried by them. Mr. Kiran Kumar Associate Director, SAC briefed the students about the activities of SAC. Director, SAC introduced the focal persons for different themes who in turn briefed the students about their modules.

This PG course consists of two semesters to be conducted between August 2009 and April 2010. Each Paper covers specific areas of Satellite Communications. Broad structure of these Papers is;



Participant at SHAR

Semester – I

- Orientation module
- Introduction to Communications
- Satellite communication system
- Earth station Technology.
- Modulation, multiplexing and multiple-access.
- Seminars

Semester – II

- Digital Signal Processing.
- Broadcasting using communication Satellites
- Applications and trends in Satellite Communications
- Operational Communication Satellite Systems, Network Planning, Management and Operational Issues.
- Pilot projects, the topics covered in the pilot project will be oriented towards the one year project to be carried out in the Home country.

(All papers except Orientation module, Seminars and Pilot project have separate papers on the Laboratory work)

Till now Semester-I course has been completed, which includes theory, practical experiments and evaluation. Semester-I theory and practical examinations were completed on November 27, 2009. Students are asked to give seminars on societal applications using satellite communication. The topics chosen for the seminar are communication for disaster management in Myanmar, Village Resource Information System for Tajikistan, Tele-health for Mongolia, Vehicular Tracking Information System for Sri Lanka and Entertainment system for Bhutan.

During this period Dr. R.R. Navalgund, Director SAC has given a guest lecture on "Basics of Remote Sensing and its Applications". Dr. M.Y. S. Prasad, Associate



Participant at Master Control Facility, Hassan

Director SDSC-SHAR, had delivered a guest lecture on "Economics, Space Law and Space Debris Scenario with respect GSO Communication Satellite" and Dr. George Joseph gave an overview of "CSSTEAP and its activities".

During this course period the students attended the Independence Day Programme at SAC. They also had glimpses of Indian culture and community by attending Navaratri Garba festival. They also could attend a popular lecture on "Remote Piloted Vehicles" by Mr. P.P. Kale.

As a part of educational & technical tour the participants had the opportunity to visit some of the ISRO and other Scientific Organizations. They also visited Step-well, Gandhinagar Akshar Dham Temple in Ahmedabad.

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FROM UN-OOSA

Brief History of Development of CSSTE's

The Committee on the Peaceful Uses of Outer Space (COPUOS) has build consensus and agreements on its programmes through three United Nations International Conferences on the Exploration and Peaceful Uses of Outer Space (UNISPACE).

The first UNISPACE Conference, held in 1968, was conceived as a forum for exchanging information on a global scale and recommended that a United Nations Programme on Space Applications should be established to disseminate the practical benefits of space applications and the opportunities, available through international cooperation, particularly focusing on the needs of developing countries. The Programme was duly established in 1971.

The second UNISPACE Conference was held in 1982. Its purpose was to exchange information and experience on recent developments in space science technology and to set in motion new ways of strengthening United Nations activities related to outer space. Among other

things, UNISPACE 82 recommended the expansion of the Programme on Space Applications and a broadening of its mandate. This resulted in the establishment of the UN-affiliated Regional Centres for Space Science and Technology Education in India, Nigeria, Morocco, and Brazil/Mexico.

The third UNISPACE Conference was held in 1999. Its purpose was to increase the benefits for humanity from the applications of space science and technology. The Vienna Declaration, emanating from UNISPACE III put forth 33 recommendations. A unique mechanism formulated for the implementation of those recommendations was the formation of Action Teams, which were led by member States. The work carried out by the Action Team on Global Navigation Satellite Systems (GNSS) lead the establishment of the International Committee on GNSS (ICG), involving both GNSS system providers and the GNSS user communities.

Regional Centres for Space Science and Technology Education

(Affiliated to the United Nations): Time line

- Meetings on Space Science and Technology Education
- 1985 India A/AC.105/365 (regional, Asia and the Pacific)
- 1986 Mexico A/AC.105/365 (regional, Latin America and the Caribbean)
- 1987 Nigeria A/AC.105/390 (regional, Africa)

First Expert Meeting on Education Curricula

- 1989 UK A/AC.105/438 Education Curricula: Dundee, UK

- 1990 UN SAP/90001, 002, 003, 004 Project Documents
- 1990 UN A/AC.105/456 STSC Report

- UN GA Resolution 45/72 of 11 December 1990 **(UN initiative)**
- 1990 UN GA COPUOS Report A/45/20

- 1992 UN A/AC105/498 A Progress Report
- 1993 UN A/AC.105/534 Updated Project Document

UN GA Resolution 50/27 of 6 December 1995 (UN affiliation)

1995 UN GA COPUOS Report A/50/20

1995 (November): CSSTE-AP established in India

Second Expert Meeting on Education Curricula

1995 UN A/AC.105/649 Education Curricula: Grenada Meeting (English, French)

1996 India: First Nine-month Postgraduate Course

Workshop on Data Management Units

1997 UN A/AC.105/687

1998 (October): CRASTE-LF established in Morocco

1998 (November): ARCSSTE-E established in Nigeria

FIRST Status Report

1998 UN A/AC.105/703

UNISPACE III

1998 UN A/CONF.184/BG/10 Background Paper UNISPACE III

1999 UN A/CONF.184/6 Report UNISPACE III

1999 (October): CRECTEALC established in Brazil/Mexico

2000 Morocco: First Nine-month Postgraduate Course

2000 Nigeria: First Nine-month Postgraduate Course

SECOND Status Report

2000 UN A/AC.105/749

2001 Funding and financing strategies for Regional Centres explored at the UN/IAF Workshop on Making Space Applications Operational: Opportunities and Challenges for Sustainable Development, Albi, France, 27-29 September 2001 (A/AC.105/775); list of 125 funding institutions

2002 Brazil: First Nine-month Postgraduate Course

Third Expert Meeting on Education Curricula

2002 UN A/AC.105/782, A/AC.105/L.238, L.239, L.240, L.241: Education Curricula: Frascati Meeting

2003 UN ST/SPACE/15, 16, 17, 18: Education Curricula (English, French, Spanish)

Annex III of the annual report of OOSA on the programme(s): Schedule of nine-month postgraduate courses starting with 2003 ... 2009

1. 2004 June 8, COPUOS: Regional Centres' Representatives address COPUOS

2004 August 11, Invitation letter from Ministry of Higher Education and Scientific Research of Jordan to visit Jordan for further deliberations on the Regional Centre for Space Science and Technology Education in Western Asia

2004 January 26 (Brazil/Mexico on 2007 August 27), Submission of Cooperation Agreements (Affiliation Agreements) between the United Nations and the Centres for Space Science and Technology Education in Asia and the Pacific (India): dated 7 May 1996

- Agreement for the Establishment of the Centre dated 1 November 1995

Africa (in English language; Nigeria): dated 26 November 2003

- Draft Agreement for the Establishment of the Centre dated 25 March 1999

Africa (in French language; Morocco): dated 26 November 2003

- Agreement for the Establishment of the Centre dated 23 October 1998

Latin America and the Caribbean (Brazil/Mexico): dated 11 June 2003

- Agreement for the Establishment of the Centre dated March 1997

2005 Meeting of representatives of all four Regional Centres at the UN/IAF Workshop on Space Education and Capacity-Building for Sustainable Development, Kitakyushu, Japan, 14 and 15 October 2005 (A/AC.105/854)

2005 Three Panels on the status of operation of the Regional Centres (see last issue published of the annual UN publication titled Seminars of the United Nations Programme on Space Applications: Selected Papers from Activities Held in 2005)

UN GA Resolution 60/99 of 6 December 2005

2005 UN GA COPUOS Report A/60/20

2006, 19-21 April: 7th Annual Meeting of the Working Group on Education, Training and Capacity Building (WGEdu), Vienna, Austria

2006 Invitation to all four Regional Centres to participate at and contribute to the educational outreach programmes developed for IHY 2007

1.1 2006 June 14. COPUOS: Regional Centres' Representatives address COPUOS

THIRD Status Report (reports for each of the Regional Centres Brazil/Mexico, India, Morocco, Nigeria distributed at COPUOS 2006 session)

2007 February 20, OIOS (Office of Internal Oversight Services) Final report on the inspection of programme management and administrative practices in the OOSA (findings paras 31-32 and recommendations para 48)

2009: 14th Meeting of the Governing Board of CSSTEAP

2008: 10th Meeting of the Technical Advisory Committee of CSSTEAP

2007: 4th Meeting of the Governing Board of CRASTE-LF

2009: 9th Meeting of the Governing Board of CRECTEALC

2009: 2nd Meeting of the Governing Board of CSSTE-E

2007 October, Request to Regional Centres to become ICG Information Centres

2007 November 1-2, GEO Members ITC and ISPRS organize Executive Seminar on the recognition of cross-border education: all Regional Centres participated in this Seminar

2007 December 3-4, United Nations Expert Meeting on Promoting Education in Space Law, OOSA, Vienna: all Regional Centres participated in this Meeting

Third Meeting of the International Committee on GNSS (ICG), JPL, Pasadena, USA, 8-12 December 2008. The Plenary of the ICG affirmed on its meeting that in the future the UN-affiliated Regional Centres would act as the ICG Information Centres

FOURTH Status Report ST/SPACE/39: brochure summarizing the status of achievements and operation of each of the Regional Centres; specifically printed for UNCOPUOS 2008 session

FOURTH Status Report ST/SPACE/41 (brochure summarizing the status of achievements and operation of each of the Regional Centres Brazil/Mexico, India, Morocco, Nigeria; distributed at STSC, LSC, and COPUOS 2009 sessions)

2009 June 02, ICG-4 preparatory meeting in conjunction with UNCOPUOS session initiated communication of Regional Centres with Providers Forum of ICG concerning Regional Centres acting as ICG Information Centres

2009 June 04, Directors and Secretary-General of Regional Centres addresses UNCOPUOS, ICG, and had informal meeting with OOSA/Space Applications Section;

G. Joseph: "CSSTEAP Assessment of Performance and Outlook for the Future" comprehensive report on operating CSSTEAP since its inauguration in 1995

Fourth Expert Meeting on Regional Centres: revising, updating, and upgrading four existing education curricula and finalizing draft education curricula in GNSS and Space Law (tentatively scheduled for 2010)

STSC 2009 informal request from Saudi Arabia to reconsider establishment of Regional Centre in Western Asia

On an annual basis, updated on the status of the establishment/operation of the regional Centres contained in Annual Reports

STSC Reports

COPUOS Reports

Office for Outer Space Affairs:

Sergei Chernikov: Nigeria

Sharafat Gadimova: Morocco

Viktor Kotelnikov: India

Werner Balogh: Brazil/Mexico

Hans Haubold: "Administration" for all Regional Centres

ALL colleagues in UNOOSA have contributed in one way or another to the course of the Regional Centres

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GLOBAL WARMING : OUR PLANET IS IN PERIL

1. Science of Global Warming

The Earth's surface temperature has been measured since about 1860 using various types of thermometers. Even earlier temperatures of the Northern Hemisphere have been reconstructed indirectly from lime caves, tree rings, ice cores, corals etc. It is seen that from year 1000 A.D. to about 1850 A.D. the temperature was largely stable, with fluctuation, on an average of the order of only + 0.1 deg. C. However, from 1850 to the present, the temperature has been increasing steadily and in about 150 years, there is an increase of about 0.8 deg. C which is significant in a climate sense. Such a steady and large increase in such a short span (on geological scales), is judged to be improbable from mere natural climate variations, and so some unusual 'agent' is indicated.

Let us now look at how the Earth's temperature is built up. The Earth is 'powered' by the Sun. The Sun at about 5800° K, has peak emission at about 0.5 micron (in the visible range). About one-third of the solar energy that reaches the top of the Earth's atmosphere is reflected back to the space and remaining two third is absorbed by the Earth's surface (to a lesser extent by the atmosphere). The Earth with an average temperature of about 17° C emits with peak wavelength at about 10 micron (in the infrared range). However, a simple calculation of the radiative balance between solar input and Earth's emission shows that the Earth ought to have a surface temperature of about - 18° C if there were no atmosphere. But the atmosphere plays a role, somewhat as the glass panes of a 'green house' garden. The atmosphere is practically transparent to solar 'shortwave' radiation (except of course, in cloud covered parts) whereas it has certain constituent gases (like H₂O, CO₂ etc.) which absorb the terrestrial 'longwave' radiation and re-radiate in the long wavelength. One half of the re-radiated energy is directed back to the Earth, which further warms the Earth's surface and lower atmosphere. This process continues till an equilibrium is reached. The rise in temperature the Earth experiences due to the absorption and re-radiation by certain gases in the atmosphere is called the 'greenhouse effect', and the gases responsible for this are called greenhouse gases (GHG) (the term greenhouse originally came from the greenhouse used for vegetation growing at a temperature higher than the ambient

temperature). The rise in global mean temperature due to terrestrial or thermal energy trapped by the rising concentration of GHG in the Earth's atmosphere is called 'global warming'. Remember that global warming is not about how this summer's temperatures were hotter than the last year's, but we are talking about changes that happen over decades.

Besides the above-discussed direct radiative effect, the Greenhouse warming, once initiated, also creates secondary feedback effect via several processes, which on the whole, adds to the warming - indeed, the Earth is in such a delicate balance that there could be even a danger of 'runaway' warming which could be large and may be irreversible. Some of these positive feedback processes are (i) more evaporation from warmer oceans, adding water vapour which itself is a greenhouse gas, (ii) melting of ice (polar caps, sea-ice, mountain glaciers), reducing Earth's 'albedo' (reflectivity) thereby absorbing greater fraction of solar radiation, (iii) release of long-dormant methane and CO₂ from old vegetation and soil buried under Polar ice, which is melting, (iv) coastal vegetation getting drowned or rotting under the influence of sea level rise - (the latter due to both, seawater's thermal expansion and the sliding/break up of polar ice-shelf) producing methane and also fixing less CO₂, (v) less CO₂ sinking in the polar oceans due to the lighter density of freshly melted ice-cap/sea-ice.

There are also a few negative feedback processes which can produce cooling but their total effect is feeble: (a) more vegetation exposed due to melting of frost, giving more photosynthetic fixation of CO₂, (b) changes in cloud pattern which have both albedo (negative feedback) and greenhouse effect (positive feedback), of which the former is slightly dominating over the latter, (c) the acceleration of photosynthesis, in general, due to higher CO₂. An important scientific issue is to distinguish greenhouse-induced warming from several other possible mechanisms of global warming, for example that due to any increase in the solar 'constant' itself. This has been now sorted out on the basis of unique 'signature' or patterns of warming due to greenhouse gases; stratospheric cooling; poleward increase in warming etc.

It will not be out of place to mention that while the

majority of mainstream scientists agree that global warming is a serious problem that is growing steadily worse, there are some who disagree. But it is better to be overcautious than to repent later!

2. The Culprits

The Earth's natural greenhouse gases – mainly water vapour and carbon dioxide – have made the Earth's temperature comfortable for our living. However, the industrial revolution and the anthropogenic (human-induced) roles, increased the natural GHG and added new ones such as N_2O , Halocarbons etc. The human activities, which increased GHG include clearing of land – especially deforestation – which results in reduction of photosynthesis (which would have captured some CO_2 from the atmosphere) and on the contrary part of the wood burned adds immediately more CO_2 . Further, burning of mineralized fossil fuels like natural gas, oils, coal etc. releases CO_2 . Some other human activity adds CH_4 into the atmosphere (e.g. rice farming, livestock/dairying, leakage in gas pipelines, land filling and oceanbed methane hydrates – being contemplated as fuel etc.). The halocarbons are attributed to refrigeration or air-conditioning industry and N_2O to agriculture (and earlier to open Nuclear

tests). Another subtle issue is that upon extracting groundwater for irrigation, part of the water is evaporated as additional greenhouse agent. Indeed agriculture and livestock are also responsible for greenhouse warming, although at a much slower pace than that due to industrialization. Table -1 gives increase in GHG over the past 30 years.

3. How 'Warm' is Global Warming

Computer modeling allows scientists to predict what could happen in the future under various assumptions. Scientists have tried to address future projections up to about 2100 A.D., by considering different scenarios of greenhouse injections – such as: 'Business As Usual' (BAU) (i.e. the present injection of 7 gigatons of carbon per year grows to 20 gigatons per year by 2100 A.D.), 'stabilized' (the injection rate is maintained flat at 7 gigatons per year), etc. The final concentrations in these 2 extreme cases are about 650 and 450 ppm (vs present 380 ppm). The resulting global average surface air temperature changes are about 3 deg. C and 1.5 deg. C respectively by 2100 A.D., albeit with a rather wide band of uncertainty of the order 30% or so. (These changes are from the present day onwards, but pre-industrial to present rise gets added to them). However,

Greenhouse Gas	Concentration -1700	Concentration -2005	Percent change	Examples of Natural and Anthropogenic sources
Carbon dioxide	278 PPM	379 PPM	36%	Forest fires; Volcanoes; Burning fossil fuels; Deforestation; Landuse change
Methane	715 PPB	1774 PPB	152%	Wetlands; Organic decay; Termites; Natural gas and oil extraction;
Biomass				burning; Rice cultivation; Cattle; Refuse landfills
Nitrous oxide	270 PPB	319 PPB	18%	Forests; Grasslands; Oceans; Soils; Soil cultivation; Fertilizers; Biomass burning; Burning of fossil fuels
Chlorofluorocarbons (CFCs)	0	868 PPT	Not applicable	Refrigerators; Aerosol spray propellants; air conditioning; cleaning solvents
Ozone	Unknown	Varies with latitude and altitude in the atmosphere	Global levels have generally decreased on the stratosphere and increased near Earth's surface	Created naturally by the action of sunlight on molecular oxygen and artificially through photo-chemical smog production

Table 1: Gases involved in the Greenhouse effect: Past and Present concentration and Source (PPM= parts per million; PPB = parts per billion; PPT = parts per trillion) (source: from net)

even such models, are under continuous refinements! Some recent papers indicate considerably higher temperatures, with changes from today, about 4.5 deg. C (with a larger uncertainty of about 60% or so, however). Even this number should be further revised upward, in view of the huge positive feedback of CO₂ stores in sub-polar soil, uncovered very recently! These studies are consolidated by the Intergovernmental Panel on Climate Change (IPCC), set up by WMO and UNEP to provide decision-makers with an objective source of information on climate change. In recognition of "their efforts to build up and disseminate knowledge about man-made climate change", Al Gore and IPCC have been announced as co-winners of the 2007 Nobel Peace Prize.

4. The Impact and Vulnerability

A couple of degree centigrade increase of global temperature may appear benign for common people. However, scientists have modeled the implications of such a situation. If we allow to grow the GHG input to the atmosphere at the present rate (BAU), the climate change it produces, will alter the physical environment of our planet, threatening the existence of a large population around the world and causing socio-economic hardship for the rest. The highlights of these impacts as reported in the IPCC and other reports and some major issues are summarized below:

- Melting glaciers will initially increase flood risk and then strongly reduce water supplies.
- Increase in the frequency of droughts and floods affects the local crop production, especially in the tropical regions. Even important temperate zones (mid latitude) will produce less food due to adverse rise in temperatures – for example, wheat. Less food production in turn causes malnutrition and consequent disorders.
- Sea level rise will make millions of people in the coastal area homeless. Some of the islands could be submerged.
- Coastal ecosystem will be severely affected.
- Ocean acidification, a direct result of increase in carbon dioxide will have major effects on marine ecosystems, with possible adverse consequences on fish stock.
- Extreme weather events will become more intense or more frequent including increased frequency and intensity of cyclones. Some regions will experience droughts due to less rain and more evaporation.

- Temperature fluctuations can affect human health in many ways – influencing the spread of infectious disease and boosting the likelihood of illness-inducing heatwave and flood.

To summarise global warming threatens the survival of humanity, affecting all aspects of life.

5. International Concern

Climate change is global in its causes and consequences and only a coordinated international effort can save our planet. Having realized the risk to our planet and mankind due to the ongoing global warming and consequent climate change, countries have come together on common platform to work out a global strategy to avoid the catastrophe. The Kyoto Protocol and the recent similar meetings at Poznan (Poland) and Copenhagen (Denmark) are part of this process. The Kyoto Protocol is a voluntary agreement mainly by developed nations to cut their emissions of six greenhouse gases namely – carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. By contrast to Kyoto, the Poznan meet (Dec. 2008) focused on sinks of CO₂ (e.g. forests). On the whole, developing countries emit much lower greenhouse gas injections (per person) than the norm so one mechanism called 'Carbon Trading' has been evolved, whereby a country or company exceeding its quota can 'buy' some leeway from another country or company which is reducing carbon emission (or fixing some CO₂ by forest / plantation etc). Further, even carbon reduction in developing countries by solar/wind power, forests etc. can be 'credited' to richer country funding it. Please see box for a gist of the Copenhagen summit 2009.

6. What We Can Do To Mitigate The Problem

The immediately 'do-able' steps to reduce carbon emission include: solar-powered, fuel-efficient and hybrid/hydrogen vehicles, use of efficient power plants and industry (so that less fuel is used), shift to alternative and renewable energy sources (solar, wind, ocean, geothermal, nuclear, biofuel, hydro, etc.), reversing deforestation towards afforestation, raising photosynthesis in the ocean (by adding iron dust etc.) Better building design (to minimize air-conditioning/heating) can help also. In general, traditional simpler lifestyles (bicycles, natural cooling of apartments etc.) have to be embraced instead of

unsustainable luxuries. Even overall population control will help to reduce injection of the GHG. The more distant/futuristic ideas include carbon sequestration – in simple language, instead of allowing combustion product gases to escape freely into the atmosphere, somehow capture, transform, or at least 'hide' them! Storage underground or injection into down welling oceanic zones (to be dissolved) or even beneficial use of CO₂ in the oil/gas extraction cycle, are envisaged. Thus, the void left by removed oil/gas may be filled up with the unwanted CO₂. Plants with more long-lasting carbon (starch) may be planted. Another suggestion is to plan higher albedo crops - it is like wearing white clothes! Each individual has the responsibility to ensure that we have a habitable planet for the future generations.

7. Satellite – The Watch Dog

In order to assist the understanding of global warming and enforcement of agreed protocols it is necessary to have global as well as local observation platforms. While very localized data call for in-situ/ground based instruments, global data needs can be efficiently met by suitable satellite sensors/platforms. There are dedicated and specialized satellites, with suitable sensors for measuring the concentrations of several green house gases like methane, ozone, etc. and aerosol. Further, improved sounders for temperature and humidity profile are getting launched. The Microwave Sounding Unit (Oxygen absorption temperature sounder) on NOAA played a key role in confirming the extent and nature of global warming. Another phenomenon called 'Ozone Hole' is also well mapped efficiently by satellites. Atmospheric chemistry was advanced by the Upper Atmospheric Research Satellite and many similar/improved subsequent satellites.

The categories of satellites which assist an assessment of global warming, can be broadly classified as; Land observation, Ocean observation, Atmospheric observation, and a few specialized satellites such as for monitoring the Solar Constant.

The land features of interest are; Land cover in general, and in particular, vegetation cover, type and density (these have a bearing on CO₂ fixation), marshlands, water bodies and rice paddies (these play a role in methane injection), snow and ice cover and topography, and specific events like forest fires, volcanic eruptions etc. which can inject unusually large amount of CO₂.

Further, land surface temperatures can be measured with satellites. All the land-resource oriented satellites such as Landsat, IRS and SPOT, TERRA etc. can generate information on above parameters. These satellite observations have to be, ofcourse, supplemented with in-situ data – for example, ground based measurements can establish the fluxes of greenhouse gases from different types of land features. Ocean features of relevance are: sea-surface temperatures, chlorophyll/ phytoplankton (carbon fixation relates to these), sea-level, ocean circulation, and sea-ice. The thermal infrared channels are now routinely providing SST from both, polar and geosynchronous platforms. For biological oceanic features, ocean colour monitors are available with specific narrow spectral channels in the visible and near-infrared range (for example OCEANSAT). For corals (repository of carbon in solid form) sensors operationing in the VIS-NIR like are also useful. Altimeters provide the overall sea-level as well as relative sea-topography (from which, surface circulation can be derived). For sea-ice, microwave radiometers and scatterometers are found useful. The latter also provide sea-surface winds which play a critical role in air-sea exchange of heat and gases.

Atmospheric temperature and humidity profiles, which are indicators of global warming, are routinely monitored by sounders. The other important atmospheric instruments on satellites, from global warming perspective, are those measuring trace gases and aerosols. The trace gases relevant here, are methane, oxides of nitrogen, radicals like OH (a 'cleansing agent' for methane), chlorine/CFC, carbon-monoxide, ozone, sulphur-oxide etc. There are a number of satellites in the orbit carrying a range of instruments to study earth's atmosphere and water system. The satellites in the constellation include NASA's AQUA, CLOUDSAT, Frances AURA, PARASOL and CALIPSO. The latest to join in the constellation is Orbiting Carbon Observatory (OCO) launched on 24th February 2009. OCO will make globally 8 million carbon dioxide measurement, every 16 days. Japan's Greenhouse Gases Observing Satellite (GOSAT) launched on 23rd January 2009 also senses the global distribution of CO₂ and methane.

Finally, mention must be made of earth radiation budget sensors. These are broad-band, covering the entire (virtually) short and long wave ranges, so that the relative proportions of solar and terrestrial radiations

can be estimated. Albedo, emissivity and such radiative properties of earth/cloud are byproducts. To obtain subtle variations in the solar constant, it is better to place sun radiation sensor on a satellite, outside the interfering influence of the atmosphere. There are several sensors doing this job, on satellites.

The ability of satellites to have a global repetitive measurement will help scientists to give a better assessment of climate change.

'SAVE THE PLANET AND SAVE OURSELVES'



Dr. Pranav Desai was with Space Applications Centre, Ahmedabad since 1977. He was heading the Meteorology and Oceanography division. He has made significant contributions in applying satellite derived parameters to understand the atmosphere. He retired from SAC as Chief Scientist in 2004. Currently he is one of the members of the faculty for teaching CSSTEAP 9 month PG Diploma course in Satellite Meteorology and Global Climate.

The Copenhagen Climate Summit, Dec. 7-18, 2009 United Nations Sponsored Initiative

The world's major and small countries have met at Copenhagen (Denmark) from December 7 to 18, 2009 to work out commonly accepted path to reduce greenhouse emissions. However a consensus could not be reached due to diverse viewpoints. Nevertheless, seriousness towards climate was indicated by the presence of several Heads of state on December 18th and more importantly, by unilateral voluntary reduction targets by some large countries. These reductions are expressed as the % cuts in carbon intensity from 2005 to 2020 with the ultimate aim to limit the total warming (since pre-industrial era to 2050) to 2 degrees Centigrade. Here it should be mentioned that the 'Conversion' of temperature goal to permitted green-house gas concentration is not an

easy task, and understandably it calls for complex modeling.

Further, it was suggested by some countries that developed countries should provide finances for "technology switchover" by developing countries. Forest protection/reforestation/afforestation find special mention in the funding plan. This component is given the acronym REDD: Reducing Emissions from Deforestation and (Forest) Degradations.

In summary, the conference, while not adopting the Copenhagen accord, did take note of it and hoped that many countries would endorse it.

FORTHCOMING SYMPOSIUM/WORKSHOP IN AREA OF SPACE SCIENCE & TECHNOLOGY

S.No	Theme	Duration	Location	Web address
1.	2nd International conference on RF and signal processing systems (RSPS-2010)	January 7-9, 2010	Vijayawada, India	http://www.rsp2010.com
2.	Map-India 2010	January 19-21, 2010	Gurgaon, India	www.mapindia.org
3.	DGI Europe 2010 - The 6th Annual European geospatial intelligence conference & Exhibition	January 25-27, 2010	London, U.K	http://www.wbresearch.com/dgieurope/
4.	SEASAR 2010 workshop	January 25-29, 2010	Frascati, Italy	http://earth.esa.int/workshops/seasar2010/
5.	Geomatics for crisis management (G4DM) 2010 conference	February 2-4, 2010	Torino, Italy	http://www.g4dm-2010.org/
6.	National conference on coastal processes, resources and management	February 5-6, 2010	Trivandrum, India	http://www.cessind.org/images/conf-feb2010/first-circular.pdf
7.	International symposium on remote sensing and fisheries	February 15-17, 2010	Kochi, India	http://www.gemafari.org/
8.	National Conference on Climate Change: Coastal ecosystems	February 4-6, 2010	Ahmedabad, India	http://www.isgindia.org/

S.No	Theme	Duration	Location	Web address
9.	16th National Space science symposium (NSSS-2010)	February 24-27, 2010	Rajkot, India	http://www.nsss2010.org
10.	International Lidar mapping forum conference and exhibition	March 3-5, 2010	Denver Colorado, USA	http://www.lidarmap.org/
11.	GEO 2010	March 7-10, 2010	Bahrain	http://www.aeminfo.com.bh/Geo2010/about.html
12.	Earth & Space 2010 conference	March 14-17, 2010	Honolulu	http://content.asce.org/conferences/earthspace2010/index.html
13.	Hyperspectral workshop 2010	March 17-19, 2010	Frascati, Italy	http://www.congrex.nl/10c02/
14.	Map Middle East 2010 : 6th Annual Middle East conference & Exhibition on geospatial information technology and applications	March 22-24, 2010	Abu Dhabi, UAE	http://mapmiddleeast.org/2010/
15.	Oceanic Transformations - AAAPS Conference	April 8-11, 2010	Melbourne, Australia	http://aaaps-conference.ning.com/
16.	2010 Asia-Pacific Symposium on Electromagnetic Compatibility & Technical Exhibition on EMC RF/Microwave Measurement & Instrumentation	April 12-16, 2010	Beijing, China	http://www.emc-zurich.org/
17.	4th European Conference on Antennas and Propagation, EuCAP 2010	April 12-16, 2010	Barcelona, Spain	http://www.eucap2010.org/
18.	International Conference on Island Sustainability	April 19-21, 2010	Brac Island, Croatia	http://www.wessex.ac.uk/islands2010
19.	GITA 2010 Geospatial infrastructure solutions conference	April 25-29, 2010	Phoenix, USA	www.gita.org/ctf
20.	International Symposium on Climate Change Effects on Fish and Fisheries: "Forecasting Impacts, Assessing Ecosystem Responses, and Evaluating Management Strategies"	April 26-29, 2010	Sendai, Japan	http://www.pacificscience.org/meetings/international_symposia/2010/cc_effects_fish/default.aspx
21.	Space Propulsion 2010	May 3-6, 2010	San Sebastian, Spain	http://www.propulsion2010.com/
22.	Geohab 2010 : "Characterisation, Quantification and Diversity of Extreme Habitats"	May 3-7, 2010	Wellington, New Zealand	http://geohab2010.com/
23.	Microwave Technology and Techniques workshop	May 10-12, 2010	Noordwijk, the Netherlands	http://www.congrex.nl/10c01/
24.	Fourth IAASS conference	May 19-21, 2010	Huntsville, USA	http://www.congrex.nl/10a06/
25.	Small Satellites Systems and Services - The 4S Symposium 2010	May 31- June 4, 2010	Funchal, Madeira, Portugal	http://www.congrex.nl/10a03/

ALUMNI SPEAKS

Ms. Dolgorsuren Azzaya from Mongolia was a student of CSSTEAP during 1998 SATMET PG Course. She shares with us about her experience at CSSTEAP how she has used the knowledge gained at CSSTEAP back home.

I have participated in the First Satellite Meteorology and Global Climate PG course of CSSTEAP which was for nine months from March to December, 1998 at Space Applications Center (SAC), Ahmedabad, India. In the course there were 17 participants participating from 12 Asia-Pacific



Ms. Dolgorsuren Azzaya

countries.

During the course we have learned many subjects and topics such as Physics, Mathematics, Climatology, Tropical cyclones, etc. We got a lot of exposure from lecture, tutorials, seminars, practical and gained knowledge in Satellite Meteorology and its application. The knowledge which we have gained from CSSTEAP, is being used and applied in our research and operational work for weather forecasting,

argometeorological and hydrological applications, hydrometeorological information to the public and to different organizations and Government of Mongolia.

Since 1998 until now more than 10 participants have attended at the SATMET PG course from Institute of Meteorology and Hydrology (IMH), Mongolia, another 15 participants have attended the Space & Atmospheric Science PG course at Physical Research Laboratory (PRL) Ahmedabad and RS&GIS PG course at Dehradun, India. I appreciate the cooperation between our Institute and SAC, PRL, IIRS, CSSTEAP and very thankful to the institutes and coordinators of these courses for the support from ISRO, Government of India to Mongolian young officers and researcher to attend the courses.

I would like to mention that, during these courses Mongolian participants have not only gained knowledge in particular subjects and research topics but also improved their English proficiency, which is very helpful in their future research and cooperation at the regional and international levels.

During the first SATMET course we enjoyed field trips and education & technical visit to many places like Taj Mahal, Agra, Goa, Dehradun, Bangalore,

Mumbai, Mysore, Mussoorie, New Delhi, river Ganges, Arabian sea, Mahatma Gandhi's ashram etc.

Besides academic knowledge and English we have fully understood many things of Indian history, education, culture, tradition, religion, customs, real life, human relation etc.

Of course, during these long term training courses every participant has got very good friends from India and from participating countries. Still I have contact with Dr. Saraju Baidya from Nepal, Ms. Aisulu Darvekova from Kazakhstan and others from the first SATMET course. Always I remember our respected Indian lecturers, professors, teachers such as Dr. Joshi, Dr. P.K. Pal, Dr. B.M. Rao, Dr. Narayanan, Dr. George Joseph, Dr. V.K. Dadhwal, Ms. Rao and others.

Finally I hope that, we will continue and develop the cooperation between organizations and countries in the future and I will do the best for that.

Dr. Dolgorsuren AZZAYA

Institute of Meteorology and Hydrology, Mongolia
Participant of the First SATMET course, Ahmedabad,
India

CSSTEAP rejoices the Recognition Conferred to Dr. George Joseph

In recognition of outstanding contributions to the Ocean Sciences and Technology, the Ministry of Earth Sciences honours Dr. George Joseph with National Award in Ocean Sciences and Technology for the year 2009. On this occasion, the Minister of State for Science and Technology and Earth Sciences (IC), PMO, Personnel, Public Grievances & Pensions and Parliamentary Affairs, Shri Prithviraj Chavan presented the National Award in Ocean Sciences for the year 2009 to Dr. George Joseph, at the Earth Sciences Foundation Day, in New Delhi on July 27, 2009. The Member, Planning Commission Dr. K. Kasturirangan and the Secretary, Ministry of Earth Sciences, Dr. Shailesh Nayak were also present.



UNESCAP Financial support to CSSTEAP

Since the inception of Centre in 1995, the Centre has organized 31 Post Graduate and 21 short term courses/workshops in various fields of Space science, Technology and applications such as RS & GIS, SATCOM, SATMET and Space & Atmospheric science. UN Economic and Social Commission for Asia and the Pacific (UN-ESCAP) has been supporting over the years to the CSSTEAP educational programmes and significantly contributed in the prime objective of CSSTEAP-capacity building in application

of space science and technology in Asia-Pacific region by providing travel grants to good number of CSSTEAP course participants. Till date UN-ESCAP has provided financial support to around 100 participants for attending various educational programme at CSSTEAP. CSSTEAP express its gratitude to UNESCAP for their generous contribution made to the Centre. The details of support provided by UNESCAP are presented in the table given below:

COUNTRY	PG COURSES			SHORT COURSES	
	RS & GIS	SATCOM	SATMET	RS & GIS	SATMET
Afghanistan				1	
Azerbaijan	3			2	
Bangladesh	5	1	1	3	
Bhutan	2	1		1	
Cambodia	1			1	
DPR Korea	1				
Indonesia	2	2			
Iran		1			
Kazakhstan			2	1	1
Kyrgyzstan	5	2		1	1
Mongolia	7	2	1	2	1
Myanmar	3			1	
Nepal	3	4	1	1	
Sri Lanka	6				
Uzbekistan	6	3		2	1
Vietnam	4		2	2	1
<i>Total</i>	48	16	7	18	5

CSSTEAP Performance Assessment and outlook for the future

Dr. George Joseph brought out a document "CSSTEAP Performance Assessment and Outlook for the Future" that summarizes the vision of the Centre and outlook for the future. The document presents strategy of the Centre and viable recommendations to make the Centre broad based with involvement as many countries of Asia-Pacific region. The document is a compendium of the critical analysis of what the Centre has achieved and possible recommendation and ways to improve its performance to meet the goals intended by UN. The document touches upon various aspects of education programmes, outreach, research programmes, selection of students, focal point and national coordination at country level, management, administrative issues etc.



BACKGROUND OF CSSTEAP

In response to the UN General Assembly Resolution (45/72 of 11th December, 1990) endorsing the recommendations of UNISPACE-82 the United Nations Office for Outer Space Affairs (UN-OOSA) prepared a project document (A/AC.105/534) envisaging the establishment of Centres for Space Science & Technology Education in the developing countries. The Objective of the Centres is to enhance the capabilities of the member states in different areas of space science and technology that can advance their social and economic development. The first of such centres, named as Centre for Space Science & Technology Education in Asia & the Pacific (CSSTEAP) was established in India in November 1995. Department of Space, Government of India has made available appropriate facilities and expertise to the Centre through the Indian Institute of Remote Sensing (IIRS) Dehradun, Space Applications Centre (SAC) & Physical Research Laboratory (PRL) Ahmedabad. The Centre is an education and training institution that is capable of high attainments in the development and transfer of knowledge in the fields of space science & technology. The emphasis of the Centre is on in-depth education, training and application programmes, linkage to global programmes / databases; execution of pilot projects, continuing education and awareness and appraisal programmes. The Centre offers Post Graduate



CSSTEAP Hqrs. at Dehradun

level and short courses in the fields of (a) Remote Sensing and Geographic Information System, (b) Satellite Communications and GPS, (c) Satellite Meteorology and Global Climate, (d) Space and Atmospheric Sciences. A set of standard curricula developed by the United Nations is adapted for the educational programmes.

The Centre is affiliated to the United Nations and its education programmes are recognised by Andhra University, Visakhapatnam, India for awarding M.Tech degree (after completion of 1 year project).

ONGOING COURSES.

- 1) Fourteenth 9 month Post Graduate course in RS & GIS at IIRS, Dehradun from July 1, 2009.
- 2) Seventh 9 month Post Graduate course in Satellite Communications at SAC, Ahmedabad from August 1, 2009.

FORTHCOMING COURSES

- 1) Special short course on "Interpretation of high resolution aerospace imagery for environmental management and geo-hazard assessment" at IIRS, Dehradun from January 25 to February 12, 2010.
- 2) Short course on Disaster Management Support with emphasis on Geological Risk Management at IIRS, Dehradun from April 12 to May 7, 2010.
- 3) Fifteenth Post Graduate course in RS & GIS at IIRS, Dehradun from July 1, 2010 to March 31, 2011.
- 4) Seventh Post Graduate course in Satellite Meteorology & Global Climate at SAC, Ahmedabad from August 1, 2010 to April 30, 2011.
- 5) Seventh Post Graduate course in Space & Atmospheric Sciences at PRL, Ahmedabad from August 1, 2010 to April 30, 2011.

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CSSTEAP welcomes views and opinions of the readers of Newsletter. Short communications on space science and technology education which may be relevant to Asia Pacific Region are also welcome. Views expressed in the articles of the newsletter are those of the authors.

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