

# CSSTEAP Newsletter

January, 2013



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

*..... 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.*

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## NEW DIRECTOR



Dr. Y.V.N. Krishna Murthy, Director of the Indian Institute of Remote Sensing (IIRS), Dehradun has also taken over charge as Director CSSTEAP from Dr. Samam Singh Director (In-charge), CSSTEAP w.e.f. December 20, 2012. He has worked as Deputy Director, Remote Sensing Application Area (DD-RSA), National Remote Sensing Centre (NRSC). He has spearheaded major remote sensing application projects under the umbrella of NRSC. During his tenure as DD-RSA the Wastelands Atlas of India (Change Analysis) was released by Honourable Minister for Rural Development and the Land Degradation Atlas was released by Chairman, Planning Committee-National Natural Resources Management System (PC-NNRMS). He has contributed in the Disaster Management System (DMS) programme and has initiated the Aerial Hyperspectral Campaign for data acquisition. As Project Director for a national level project titled "Space Based Information System for Decentralized Planning (SIS-DP)", he has achieved the task of ortho-rectified high resolution satellite image base preparation for the whole country and facilitating the concerned Ministries and State Governments to utilize the SIS-DP inputs for effective implementation of developmental projects under Integrated Wastelands Development Programme (IWMP), Mahatma

*Wishing all the readers a Very Happy & Prosperous 2013*





*17th Governing Board meeting chaired by Dr. K. Radhakrishnan, Chairman CSSTEAP GB in progress in New Delhi*



*Dr. K. Radhakrishnan Chairman CSSTEAP GB addressing the GB meeting*

Gandhi National Rural Employment Guarantee Act (MGNREGA), Pradhan Mantri Gram Sadak Yojana (PMGSY), etc. Prior to this as Deputy Director, Regional Centres of NRSC, he has led a team of young scientists in five distributed Regional Centres across India in: (i) promoting community-based applications such as watershed development, disaggregated poverty mapping; (ii) customized products and services development with indigenous software, developed using Open Source tools; (iii) technology promotion at the grass-root level; (iv) developing a strong linkage with Government Departments, Industries and academia. He has also directed Regional Centres from ISRO Hqrs, Bengaluru and also had been the Head of Regional Remote Sensing Centre (RRSC) Central at Nagpur. He undertook research work on information systems for Municipal & Small Towns and District Planning at the International Institute for Aerospace Survey and Earth Sciences, ITC, The Netherlands. His expertise extends to the field of Remote Sensing, Image Processing, GIS and their applications for various natural and cultural resources management. As Project Director of Integrated Mission for Sustainable Development (IMSD) program in Maharashtra, India he ensured the outreach of space inputs to the common man.

Dr. Krishna Murthy has about 175 technical papers and 150 reports to his credit. He has guided five Ph.D. scholars and guided in the development of nearly 25 customized open source software tools. He is the recipient of "Hari Om Ashram Prerit Dr. Vikram Sarabhai Research Award" (2003), "Indian Society of Geomatics award" (2009), "ISRO Team Excellence Award (2009)" and "Astronautical Society of India Team Achievement Award" (2009). Currently as Director IIRS, Dr. Krishna Murthy is engaged in research, development, capacity building and technology promotion in various disciplines of applied sciences and geospatial technology.

## PAST DIRECTORS

Dr. P.S. Roy, Director, CSSTEAP and Director, IIRS and Outstanding Scientist, ISRO after serving more than 35 years of service superannuated as Director, IIRS and Director CSSTEAP on August 31, 2012. Dr. Roy was also holding additional responsibility as Director, CSSTEAP since July 30, 2010. Consequent of Dr. P.S. Roy's superannuation, Dr. Samam Singh, Senior Scientist and Programme Coordinator, CSSTEAP and Course Director, RS & GIS CSSTEAP was given additional responsibility as Director (In-Charge), CSSTEAP from September 1, 2012 till December 20, 2012 and after that Dr. Y.V.N. Krishna Murthy took over.

## GOVERNING BOARD MEETING OF CSSTEAP

The 17th meeting of Governing Board (GB) of CSSTEAP was held on November 21, 2012 at New Delhi. The GB was chaired by Dr. K. Radhakrishnan, Chairman Governing Board CSSTEAP and Secretary, Department of Space, Govt. of India. Members of Governing Board participated were: Dr. Mazlan Othman of United Nations-OOSA, Vienna represented by Dr. Shirish A. Ravan; Dr. Hong Pong Gi,



Councillor, Embassy of DPR Korea; Dr. Bambang Setlewan Tejasukmana Chairman, LAPAN, Indonesia represented by Dr. Thomas Djamaluddin; Prof. A. A. Abdykalykovich, President, International University for Innovation Technologies, Kyrgyzstan represented by Dr. Ulugbek Begaliev; H.E. Mr. Dato Tan Seng Sung, High Commissioner, Malaysia High Commission New Delhi represented by Mr. Faizal Shani; Mr. Kartar Singh Bhalla, Honorary Consul General of Nauru, New Delhi; Mr. Tirtha Raj Wagle Minister Counsellor, Embassy of Nepal, New Delhi; H.E. Mr. Benito B. Valeriano, Ambassador, Embassy of Philippines New Delhi represented by Mr. Robert O Ferrer Jr.; Dr. Sanath Panawennage, Director & CEO ACCIMT, Sri Lanka; Executive Director, GISTDA, Thailand represented by Dr. Surachai Ratanasermpong; Dr. Kamol M. Muminov, Ulugbek Astronomical Institute, Uzbekistan represented by Dr. Vladimir Rijkov. Others who participated include Dr. A.S. Kiran Kumar (Director, SAC, Ahmedabad; Dr. V.K. Dadhwal, Director, NRSC, Hyderabad; Dr. J.N. Goswami, Director, PRL, Ahmedabad; Dr. V. Koteswara Rao, Scientific Secretary, ISRO, Bengaluru); Dr. Y.V.N. Krishna Murthy, Director, IIRS, Dehradun; Dr. Saman Singh, Director (In-charge), CSSTEAP Dehradun; Dr. J.R. Sharma OSD, New Delhi; Mr. G.R.K. Murthy, CCA, DOS, Bengaluru; Mr. Shantanu Bhatawdekar, Associate Director, EOS & Assistant Scientific Secretary, ISRO, Bengaluru); Course Directors of all Courses and higher officials of various centers of Department of Space, Government of India.

#### Highlights of Address by Chairman, GB

While welcoming the GB members, representatives, Directors of host institutions and special invitees, Dr. K. Radhakrishnan, Chairman CSSTEAP GB apprised the members about the recent activities of the Centre and ISRO's current and future space programmes. The highlights in brief are as below:

- In his welcome address he welcomed Mr. Tirtha Raj Wagle, Minister-Counsellor, Embassy of Nepal, New Delhi to the board as a successor of M. Yagya B. Hamal and appreciated their contributions and also informed the board about signing of the agreement by Iranian Space Agency, Iran to join the CSSTEAP Governing Board.
- He also put on record the excellent contributions and guidance provided by members and Directors of the host institutions in organizing the academic programmes of the Centre.
- He informed GB members of the over-whelming response and successful organization of two short courses for capacity building on 'Navigation and Satellite Positioning System' at SAC, Ahmedabad which will be useful for navigational purposes and also on 'Small Satellite Missions' at IIRS, Dehradun and ISAC, Bengaluru for awareness, designing, developing, launch, potential benefits, etc. in the year 2012.
- He apprised august gathering about the achievements of ISRO's Space programmes during the last one year such as launching of satellites like MEGHA-TROPIQUES to study water cycle and energy exchanges in the tropics for climate research, RISAT-1 (microwave remote sensing satellite for all weather condition observation applicable particularly for flood management), GAGAN (GPS Aided GEO Augmented Navigation) for navigation.



*Governing Board members during 17th meeting in New Delhi*



*Governing Board members alongwith dignitaries during 17th meeting in New Delhi*





*Special invitees during the 17th Governing Board meeting*



*Special invitees in 17th Governing Board meeting*

- He also informed about the future launches such as SARAL (Satellite with ARGOS and ALTIKA) for oceanographic studies, ocean circulation and sea surface elevation and GSAT series (communication satellite) etc. to be launched in the year 2013.
- He highlighted successful launch of 100<sup>th</sup> space mission by ISRO and also about India's 'work-horse' Indian Polar Satellite Launch Vehicle (PSLV) over the years for successfully launching of several remote sensing satellites.
- He mentioned that the launch of Indian Earth Observation satellites would provide impetus to the host of applications in the areas of natural resources management, climate research and disaster management in the region. He informed that the data and its products from both polar orbiting and geostationary satellites are available to the participants from Asia-Pacific countries for their research work and immensely useful to the participants of the CSSTEAP courses.
- He also added that in next five years about 33 satellites and 25 launch vehicle missions are planned by ISRO.
- Chairman, GB urged the member countries to actively contribute in the activities of the Centre and come forward to provide financial support in the academic programmes of CSSTEAP and to begin with it can be in the form of International travel to the PG & short course participants from their country and /or award of fellowships.

#### Highlights of Opening Remarks by UN-OOSA:

- Dr. Shrish A. Ravan mentioned that UN is extremely proud and satisfied with the performance of the Centre and expressed unclenching support to the Centre.
- He expressed that UN-OOSA feels gratitude to ISRO specifically to Government of India for providing all financial, man-power and Infrastructural support for running the activities of the centre.
- He also apprised that CSSTEAP scientists were invited to the technical and advisory missions in the Asia-Pacific region and CSSTEAP could hold alumni meets there.
- He emphasized that UN-OOSA is committed to continue its financial support to the Centre. He urged GB members to enhance their support & contribution in the capacity building activities of the Centre.
- He also apprised few initiatives to GB members such as to provide feedback on utilization of the knowledge gained by the alumni; to identify specific needs of the member countries; to encourage countries that have large number of alumni for joining the GB.

#### Highlights of Director (In-Charge), CSSTEAP remarks:

- Dr. Samam Singh, Director (In-Charge), CSSTEAP presented brief report of the major achievements of the Centre in academic programmes, activities, host country support etc in the last on year.
- He mentioned that apart from regular PG courses in RS & GIS, SATCOM, SATMET, Space & Atmospheric Science, Centre had conducted three new short courses on Disaster Risk Reduction, Navigation & Satellite Positioning System and Small Satellite Missions and one workshop on Open source Geo-spatial tools. These



short courses have been appreciated well and would be continued in future also.

- He apprised that till date Centre has conducted 38 PG courses and 26 short courses during last 16 years In the four disciplines and around 1140 participants from 25 countries of Asia-Pacific region has have been benefitted. In the last one year three students have been awarded M.Tech. degree.
- He mentioned about the ongoing academic activities of the Centre. He apprised about the organization of Alumni meets held in Nay Pyi Taw, Myanmar on March 22, 2012 and the presented the highlights of the feedback emerged out of the alumni meet.

**Important issues emerging out the meeting were:**

- Chairman, GB proposed the name of Dr. YVN Krishna Murthy Director, IIRS as the Director, CSSTEAP which was endorsed unanimously by all the GB members
- Centre's strategy for academic activities, M. Tech. research programmes, short courses to continue.
- GB members agreed to review & provide feedback on utilization of knowledge gained by the CSSTEAP students.
- GB members were urged to suggest themes of training programmes based on the needs of the region.
- To continue efforts to persuade other countries of the region to become a part of the Governing Board.

## SEVENTEENTH POST GRADUATE COURSE IN REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM

The seventeenth Post-Graduate Course in Remote Sensing and Geographic Information System (RS&GIS) of CSSTEAP commenced on July 1, 2012 at Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun, one of the host Institutions of CSSTEAP. This course aimed at learning and skill development in the field geospatial technologies for natural resources and disaster management. Total 21 participants from 12 countries of Asia-Pacific Region viz. three each from Mongolia, Uzbekistan and Vietnam, two each Bangladesh and India and one each from Kazakhstan; Kyrgyzstan; Myanmar; Nepal; Sri Lanka; Tajikistan; Thailand have joined the course. The participants are mainly from Geology, Urban & Rural Planning, Ecology and Environment, Geoinformatics, Meteorology, Hydrology, Surveying, Forestry, Marine Science, Cartography and Soil Science background.

The inauguration of the 17th PG course was held on July 3, 2012 at IIRS, Dehradun. Director, CSSTEAP was the Chief Guest of the function. Semester-I dealt with fundamental of geospatial technologies, recent trends in RS & GIS technology, Natural disasters, Environmental analysis, monitoring and management. Several field excursions were taken up during this module for ground truth collection and for interpretation and analysis of satellite data. The module ended on September 30, 2012. To Improve the English language



*Visit to Doppler Radar station at Visakhapatnam by 17th RS & GIS Course participants*



proficiency of some of the students, English language classes beyond office hours in the evening were arranged for three months duration. Module-1B Semester-I was of one month duration on recent trends in RS & GIS and environmental analysis & management from October 1-15, 2012. Dr. P.C. Joshi, Emeritus Professor, CSSTEAP delivered lectures on 'Metrological satellite and sensors', 'weather analysis, forecasting and modelling'. Guest lectures were also arranged on topics 'Earth observation system for climate and climate change', 'Forest fire & forest information system' 'Climate change dynamics' and 'EO satellite for climate change'.

In module-II of semester-II eight optional electives such as Agriculture & Soils, Forest Ecosystem Assessment & Management, Geosciences and Geo-hazards, Urban & Regional Planning, Marine & Atmospheric Science, Water Resources, Satellite Image Analysis & Photogrammetry and Geoinformatics are being offered. Out of 21 participants, 4 each have opted in 'Agriculture & Soils' and 'Geo-informatics', 3 participants in 'Water Resources' while 2 each in 'Geosciences & Geohazard', 'Forest Ecosystem Assessment & Management', 'Marine & Atmospheric Science', 'Satellite Image Analysis & Photogrammetry' and 'Urban & Regional Planning' disciplines.

The subject experts were invited from various Indian Organizations/Institutes/Universities such as India Meteorological Department (IMD); Indian Institute of Technology (IIT), Roorkee; National Remote Sensing Centre (NRSC), Hyderabad; Indian Agriculture Statistical Research Institute (IASRI), New Delhi; Aryabhata Research Institute of Observational Research (ARIES), Nainital; Space Application Centre (SAC), Ahmedabad; Andhra University, Visakhapatnam, etc. to deliver specialized lectures.

Educational visits to Andhra University, Visakhapatnam and National Remote Sensing Centre, Hyderabad were undertaken during October 27-November 6, 2012. A field visits for urban and rural landscape of East Coast, Eastern Ghats and Seescape were also organized. The participants had opportunity to visit the Integrated Multi-mission Ground Segment for Earth Observation Satellites (IMGEOS) which is a state-of-art multi-mission ground segment processing enterprise for earth observation satellites and watched the real time acquisition of EO data at Shadnagar, Hyderabad. IMGEOS provides emergency data products in hours, most of standard products in less than a day, significantly ramp up product throughput per day. They had also visited the technical facilities at NRSC, Hyderabad. During educational visit the course participants explored Indian rich heritage and cultural diversity. In order to provide a state-of-the-art exposure in the field of geospatial technologies and applications nine meritorious participants were deputed to participate annual convention of Indian Society of Remote Sensing held at New Delhi during December 3-7, 2012. Thirteen participants of the PG course & one participant of M.Tech. participated in the National symposium on 'Frontiers of Meteorology with special reference to the Himalayas' for TROPMET 2012 held during



*Course participants at ISRS symposium in New Delhi*



*17th RS & GIS Course participants with officials of Andhra University Visakhapatnam*



November 20-22, 2012 at IIRS Dehradun. Two participants participated in another seminar on 'Geo-enabling Uttarakhand: Opportunities and the way forward' at IIRS Dehradun on November 30, 2012. On the social front, the participants had glimpses of Indian festivals by their active participation in various festivals such as Dussehra, Diwali, Id-ul-Fitr, Christmas, etc.



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### EIGHTH POST GRADUATE COURSE IN SATELLITE METEOROLOGY & GLOBAL CLIMATE

The objectives of the course are to develop skill in meteorology and climatology, interpretation, monitoring and timely and real-time distribution of Meteorological information in the Asia-Pacific region and to develop the ability to predict the quantitative aspects of the weather to judiciously plan and manage resources. The course commenced on the August 1, 2012 at Space Applications Centre (SAC), Ahmedabad. Fourteen participants are attending three from India, two each from Kazakhstan, Mongolia, Sri Lanka and Tajikistan, and one each from Malaysia, Vietnam and Thailand. The participants are mainly from Meteorology and Physics background.

A Joint Inaugural function for SATMET & Space and Atmosphere Sciences (SAS) was organized at Physical Research Laboratory (PRL), Ahmedabad on August 3, 2012 by Space Applications Centre (SAC) and PRL to welcome the participants of the 8<sup>th</sup> course on Satellite Meteorology and Global Climate hosted by SAC and the 8<sup>th</sup> course on Space and Atmospheric Sciences hosted by PRL. Mr. Kiran Kumar, Director SAC mentioned in his address that, these kind of courses are learning experience even for the scientists who are in imparting knowledge to the students. Dr. J.N. Goswami, Director, PRL also welcomed the participants coming from distant countries. Dr. P.S. Roy, the then Director, CSSTEAP gave an overview of the courses offered by CSSTEAP.

A one-week orientation course consisting of lectures providing a wide spectrum of various themes in Space Science, Satellite Communications and Remote Sensing were delivered by eminent speakers from SAC and the Physical Research Laboratory. The participants were also taken for a visit to Meteorology and Oceanographic Satellite Data Archival Centre (MOSDAC) at Space Applications Centre. Module-I dealing with the basics in Meteorology, basics in satellite Remote Sensing including active and passive remote sensing, Orbits and Instrumentation and Image Interpretation were introduced. From this course onwards Meteorological Data



*Inaugural Function of SATMET-8 on 3rd August 2012 in Ahmedabad*



*Deepawali Celebration by SATMET-8 students in SAC Ahmedabad*





*Participants visiting the SATMET Division at IMD in New Delhi*



*Prof Ad Stoffelen, KNMI, Netherlands, delivering a lecture in SAC Ahmedabad*

Processing and Meteorological image Analysis System (MIAS) related practical were incorporated. All the course participants were provided access to Meteorological and Oceanographic Satellite Data Archival Centre (MOSDAC) of SAC. This facilitated real-time access to various satellite products from Kalpana and INSAT-3A, Automatic Weather Station and model weather forecasts. The Module- I concluded on October 30, 2012. During the module, the core faculty consisted of senior scientists of SAC besides well known experts from India Meteorological Department (IMD), Cochin University & MOES. Lectures were also delivered by foreign Guest faculty on topics like "winds from space" by Prof. Ad Stoffelen, KNMI, The Netherlands. Practical and Demonstration on "Marine Weather Applications of satellite Derived Ocean Winds and Waves" was given to SATMET-8 students by NOAA Professors, Dr. Joseph Sienkiewi and his team. The second module started from November 12, 2012. Guest lectures on specialized topics on Ionosphere, earth atmosphere, Meteorology, climatology, climate change, tropical cyclones, space weather, Paleo climatology, Marine weather application for winds etc. were covered by invited guest speakers. Prof. Harish Chandra, PRL; Prof. Shyam Lal, PRL; Dr. NK Vyas, SAC; Prof. PV Joseph, CVSAT (Retd.); Dr. RR Navalgund, Ex-Director, SAC; Dr. M. Rajeevan, MOES; Dr. George Joseph, Ex-Director, SAC; Dr. R. Suresh, IMD; Prof. P. Janardhan, PRL; Dr. Ad Stoffelen, NOAA, USA; Dr. Joseph Sien Kiewicz, NOAA, USA. The final module of pilot project with three months duration will start from February, 2012.

The course participants undertook one week technical & educational visit to Indo-Gangetic Plains and Lesser Himalayas Dehradun during first week of November. In Delhi they visited India Meteorological Department (Satellite Meteorology Division) and were briefed about the operational setup and the use of various satellite products in operational weather forecasting. They also visited the CSSTEAP HQ at Dehradun and IIRS. The visit to world famous cultural features in Indo-Gangetic Plains and Lesser Himalayas was enjoyed by all the participants. The course participants attended the workshop on "Meteorological Satellite - Kalpana-1: A decade of service to the nation" on October 8-9, 2012 hosted by IMS, ISRS, INCA, SSME and GCSC. On the social front, the participants actively participated and enjoyed the "Navratri-festival of dancing (Garba)" being organized by National Institute of Design, Ahmedabad and School of Architecture, Ahmedabad. "Deepawali"-the festival of lights was celebrated with full zest.



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## EIGHTH POST GRADUATE COURSE IN SPACE AND ATMOSPHERIC SCIENCE

This course is intended to train manpower in space and atmospheric science, physical concepts relating to astronomy, solar system, its interaction with earth, space and atmospheric science; understanding with space probes & space observatories. The host institute for the course is Physical Research Laboratory (PRL), Ahmedabad. The course started on 1 August 2012 and will end on 30 April 2013. A warm welcome by Prof. J.N. Goswami Director PRL was given to the participants during the inaugural function. Mr. A.S. Kiran Kumar, Director, SAC highlighted the need for training in underdeveloped countries and for bringing them at par with the developed world. The course started with a joint inaugural function held in the K. R. Ramanathan auditorium of the Physical Research Laboratory, Ahmedabad on 3 August 2012. Fourteen participants from 7 countries of Asia-Pacific region viz., four from India; three from Kyrgyzstan; two each from Mongolia and Myanmar; and one each from Sri Lanka, Tajikistan and Uzbekistan are attending the course. The participants are mainly from Astronomy, Meteorology, Physics and Aeronautical background.

The regular teaching of the first four technical papers on (a) Atmosphere, (b) Ionosphere, (c) Ground based space science instruments and (d) Space based systems and their application for space science and astronomy started from second week of August 2012. In each of these had 50 lectures by the specialized faculty. There were also special guest lectures by 6 senior scientists on the related topics of space science. Major emphasis was given to experimental work, interaction and scientific discussions in variety of ways. Six space science experiments were conducted as a part of the course by each student. The experiments were conducted under the guidance of Scientists from PRL and Saurashtra University Rajkot. Guest faculty delivered series of lectures on satellite Science were Prof. Raj Kumar and Prof. P.K. Pal, SAC, Ahmedabad; Prof. K.N. Iyer, Saurashtra University, Rajkot; Prof. Sharad Seth, Prof. Harish Gadhavi; Prof. BM Pathan, IIG Mumbai; Prof. S Tripathy and Prof. DP Choudhary, California state University, USA. The experience of the work in all aspects of science, teaching, experiments, seminars, group discussions and visits during the Semester-I was very good. It ended on December 13, 2012. From December, 14 Semester-II started and is in progress. The participants would enter in final module of 3 months duration from February 1, 2013 towards their pilot project work.

A technical visit was organized during December 1-12, 2012 to visit urban set-up of Jaipur. There is an excellent example of astronomical interest in India in ancient times like modern planetarium, Radio Science experiments and time and frequency standards at National Physical Laboratory, New Delhi and Dehradun to Indian Institute of Remote Sensing, CSSTEAP Head Quarters, Forest Research Institute and its wonderful museums, Semi Conductor Laboratory, Chandigarh and International Centre for Radio Science. A visit to Lesser Himalayas in Doon Valley was also arranged.



*SAS-8 students during the inaugural function in Ahmedabad*



*SAS-8 students at Jaipur ancient astronomy centre*





*Course participants of NAVSAT at SAC, Ahmedabad*



*Course participants of NAVSAT with dignitaries at Bopal Campus SAC in Ahmedabad*

## SPACE SCIENCE WORKSHOP

One-day workshop was organized on 29 October 2012 by the course participants. Prof. J. N. Goswami, Director PRL inaugurated this workshop and distributed the abstract booklet prepared by the students. There were four technical sessions each of these sessions was chaired by the students. The students took entire responsibility to organize and conduct the workshop. Students made scientific presentation on solar radiation; dynamics of atmosphere; aerosols, GHG and radiation budget; atmosphere of Terrestrial planets; Ionospheric plasma dynamics of planets and satellites; optical techniques; lasers; airglow; space exploration and Remote Sensing. Their contribution was evaluated by a committee consisting of academic and technical faculty. The organization and presentations by students demonstrated the knowledge acquired by the students during the course. Committee members in their concluding remarks congratulated the students for their maturity and very good quality of presentation.



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## INTERNATIONAL TRAINING COURSE IN NAVIGATION AND SATELLITE POSITIONING SYSTEM

Satellite positioning has become a necessary part of several operations. Currently the US GPS and Russian GLONASS are the only systems in the Global Navigation Satellite Services (GNSS). Along with this, other countries/unions like India, Japan, France and Europe are coming up with their own Satellite Positioning Systems. These initiatives by different countries are likely to increase Satellite Launch Vehicles, Signals and their coverage providing higher accuracies even in bad weather conditions. This development along with miniaturization of GNSS receiver has exploded its applications in many fields. Capacity building would be the next step for efficient use of the technology along with other remote sensing techniques for monitoring of various natural resources and for societal development. There has been a large gap between the technology developing and application communities by which efficient use of positioning technology is lagging behind. This gap can be reduced by training the professionals, researchers and user groups at different levels by transferring the state of art technology to application community through capacity building. With this in view, first International training course on Navigation and Satellite Positioning System was conducted at Space Applications Centre (SAC), Ahmedabad during June 18, 2012 to July 13, 2012.

The objective of the course was to create an awareness of existing and upcoming satellite positioning technology and to update on going activities related to the use of GNSS



technology and to maximize the benefits of the use and applications of GNSS to support sustainable development. Twenty participants from 12 countries of Asia Pacific region namely three each from Mongolia and Philippines, two each from India, Indonesia, Kazakhstan, Nepal and Uzbekistan and one each from Afghanistan, Bangladesh, Sri Lanka, Tajikistan, and Vietnam attended the course. The formal inaugural session of the course was held on June 18, 2012 at SAC, Ahmedabad. Mr. A.S. Kiran Kumar Director, SAC inaugurated the course. CSSTEAP was represented by Dr. Sarnam Singh, Program Coordinator, CSSTEAP.

The first week dealt on Introduction to GNSS in which overview of GPS, Galileo, compass, IRNSS with Introduction to MATLAB were covered. During the second week orbital dynamics of GPS orbit, Satellite & User position algorithms, concept of Fourier transformations, error source, new modulation schemes for navigation were covered. During the third week antennas, DGPS, GPS augmentation, GPS receivers were covered. In the last week applications relating to aviation, fleet monitoring, surveying, seismology etc were covered. The faculties for the course were drawn from experienced retired ISRO Scientists apart from scientists of SAC ISRO. Invited lectures were also delivered by scientists/engineers working at different ISRO Centres, experts from Indian navigation system Industries and Communications and aviation experts of Govt. of India. The participants made seminar presentations periodically. The valedictory function for the course was held on July 13, 2012. Shri A.S. Kiran Kumar, Director SAC, distributed the certificates. Shri. K.S. Parikh, Dy. Director, SATCOM and Navigation Applications Area, (SNAA) and Dr. Sarnam Singh, Program Coordinator, CSSTEAP were also present on the occasion. Course Director, Dr. A.S. Durai has superannuated from active service on October 31, 2012.



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### INTERNATIONAL TRAINING COURSE IN SMALL SATELLITE MISSIONS

Space-borne systems have found uses in many fields due to cost effectiveness as compared to terrestrial systems, distance independent communication links, remote sensing with large area coverage irrespective of terrain conditions, ease of configuring and expanding networks, space-based reference data of high accuracy, quickest reach independent of distance etc. Traditional space-borne systems or conventional satellites are very expensive as they require cost-intensive resources like large infrastructure, facilities, access to high-end technology, expertise, skilled man-power, radiation, etc. to build and launch them and they require dedicated launchers. With the advancement in



Dr. S.K. Shivakumar, Director, ISAC Chief Guest addressing the students during inaugural function of Small Satellite Missions Course



Course Participants briefing themselves during the inaugural function of Small Satellite Missions Course in IIRS Dehradun



technology, in each and every area, especially towards miniaturization of components, small satellites have become affordable and practical without a large resources build-up. Over the last few years, with ISRO's encouragement and guidance, many Indian Universities have made their own satellites and have been launched by ISRO.

CSSTEAP organized first International Training Course on Small Satellite Missions jointly conducted by Indian Institute of Remote Sensing (IIRS), Dehradun and ISRO Satellite Centre (ISAC), Bengaluru from October 29 to November 9, 2012. The objective of the course was to create awareness about small satellites technology and its applications and disseminate knowledge required for developing & launching of small satellites. The inaugural function of the course was held on October 29, 2012 at Indian Institute of Remote Sensing, Dehradun. Dr. S.K. Shivakumar, Director, ISAC, Bengaluru was the Chief Guest of the function and delivered Inaugural address on the occasion. Dr. Sarnam Singh, Director (In-charge), CSSTEAP and Dr. Y.V.N. Krishna Murthy, Director, IIRS; Mr. C.A. Prabhakar, Course Director and Mrs. Shefali Agrawal Course Coordinator were also present on the occasion.

A total 20 number of participants from 11 countries of Asia-Pacific region attended the course namely four each from Kazakhstan and Vietnam, two each from India, Myanmar, Uzbekistan and one each from Azerbaijan, Bangladesh, Indonesia, Mongolia, Philippines and Sri Lanka. Out of 20, one participant from Azerbaijan and two from India were self sponsored.

The first part of the training with more than 20 technical presentations was held at IIRS campus, Dehradun during the first week. The second part was held in Bengaluru during the second week and the facilities visits were made which includes: ISRO Telemetry, Tracking & Command Network (ISTRAC); Regional Remote Sensing Centre (RRSC); ISRO Satellite Integration & Test Establishment (ISITE); ISRO Satellite Centre (ISAC) and Visveswaraya Industrial and Technological Museum (VITM). During the second week, presentations were made by the course participants about their countries space programme and initiatives in small satellite technology. The lectures were delivered by the experienced faculty drawn from various ISRO centers ISAC, IIRS, ISTRAC, NRSC, SAC and ANTRIX Corporation. The valedictory function of the course was organized in ISAC, Bengaluru presided by Shri K. Shiva Kumar, Director ISAC and attended by Dr. Sarnam Singh Director (In-Charge), CSSTEAP, faculty along with Mr. C.A. Prabhakar, Course Director and Mrs. Shefali Agrawal, Course Coordinator. The Certificates were distributed by Director, ISAC.



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Small Satellite Missions Course participants with dignitaries during Inaugural function in IIRS Dehradun



Small Satellite Missions Course participant receiving certificate during Valedictory function in ISAC Bengaluru



## EXTRA CURRICULAR ACTIVITIES

All the participant were actively participating in the sports activities like cricket, badminton and in the campus and gymnasium. On the social front the participants are enjoying the Indian festivals along with Indian inmates and staff. The participants enjoyed the rich cultural heritage and diversity of Indian tradition like Dussehra, Diwali, ID-ul-fitr, Christmas, New Year and 'Rangoli' competition, 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 centre, 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 and ISRO Satellite Centre (ISAC), Bengaluru. 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 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 Science (e) Small Satellite Missions. 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 recognized by Andhra University, Visakhapatnam, India for awarding M.Tech. degree (after completion of one year project).

### Educational Programme Coordination of CSSTEAP

Dr. Samam Singh - *Programme Coordinator, CSSTEAP*

#### RS & GIS PG Course

- Dr. Samam Singh - *Course Director*
- Dr. Yogesh Kant - *Course Coordinator*

#### SATCOM PG Course

- Dr. Raghunadh K. Bhattar - *Course Director*
- Mr. P. Satyanarayan - *Course Coordinator*

#### SATMET PG Course

- Dr. B. Simon - *Course Director*
- Ms. Yogini Vanikar - *Course Coordinator*

#### Space & Atmospheric Science PG Course

- Dr. Hari Om Vats - *Course Director*

#### Small Satellite Missions

- Dr. C.A. Prabhakar - *Course Director*
- Mrs. Shefali Agarwal - *Course Coordinator*



*Rangoli prepared by the course into national participants during Deepawali in IIRS Campus*



*CSSTEAP Hqrs. at Dehradun*



## Forthcoming symposia/workshops in area of Space Science & Technology

S.No	Theme	Duration	Location	Web address
1.	2nd International Conference on Climate Change and Humanity - ICCCH 2013	February 24-25, 2013	Rome, Italy	<a href="http://www.iccch.org/">http://www.iccch.org/</a>
2.	3rd International Conference on Future Environment and Energy	February 24-25, 2013	Rome, Italy	<a href="http://www.icfee.org/">http://www.icfee.org/</a>
3.	2nd Annual International Conference on Sustainable Energy and Environmental Sciences	February 25-26, 2013	Singapore	<a href="http://www.env-energy.org/">http://www.env-energy.org/</a>
4.	3D Virtual Reconstruction and Visualization of Complex Architectures	February 25-26, 2013	Trento, Italy	<a href="http://www.3d-arch.org/">www.3d-arch.org/</a>
5.	17th Annual International ISU Symposium: "Space Technology and Tele-Reach: Benefiting Humanity on Earth and Beyond"	March 5, 2013	Strasbourg	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>
6.	World Forests Summit event/world-forests-summit	March 5-6, 2013	Stockholm, Sweden	<a href="http://cemea.economiconferences.com/">http://cemea.economiconferences.com/</a>
7.	International Symposium of Regional Cooperation in Energy and Environment Technology	March 8-10, 2013	Shanghai, China	<a href="http://www.aief.or.jp/ARC/conference-program/">http://www.aief.or.jp/ARC/conference-program/</a>
8.	"Wavelength 2013" Organised by RSPSoc (The Remote Sensing and Photogrammetry Society)	March 11-13, 2013	Glasgow, UK	<a href="http://www.rpsoc-wavelength.org.uk/wavelength2013">www.rpsoc-wavelength.org.uk/wavelength2013</a>
9.	Geoinformatics 2013	March 13-15, 2013	Heidelberg, Germany	<a href="http://geoinformatik2013.de/index.php/en/">http://geoinformatik2013.de/index.php/en/</a>
10.	Geoinformatik 2013	March 13, 2013	Heidelberg	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>
11.	IGU Conference on Geoinformatics for Biodiversity and Climate Change	March 14, 2012	Rohtak, India	<a href="http://www.gisindia.com/directory/gis-events-in-india">http://www.gisindia.com/directory/gis-events-in-india</a>
12.	International conference on global scenario in environment and energy	March 14-16, 2013	Bhopal, India	<a href="http://www.icgsee2013.com">http://www.icgsee2013.com</a>
13.	National Conference on Environmental and Energy Aspects for Sustainable Development	March 15-16, 2013	Nanded, India	<a href="http://www.sggc.ac.in/departments/Chemical/Files/Conference%20Home_Chem%20Department%20_%20Department%20of%20Chemical%20Engineering.htm">http://www.sggc.ac.in/departments/Chemical/Files/Conference%20Home_Chem%20Department%20_%20Department%20of%20Chemical%20Engineering.htm</a>
14.	4th International Conference on Environmental Science and Technology	March 17-18, 2013	Macau, China	<a href="http://www.icsst.org/">http://www.icsst.org/</a>
15.	3rd Conference on Range, Watershed and Desert	March 28, 2013	Karaj, Alborz, Iran	<a href="http://3rwdconf.persianblog.ir">http://3rwdconf.persianblog.ir</a>
16.	International and Middle East conference on Sustainability and Human Development	April 2-4, 2013	Abu Dhabi, United Arab Emirates	<a href="http://imeah2013.wordpress.com/">http://imeah2013.wordpress.com/</a>
17.	9th IAA Symposium on Small Satellites for Earth Observation	April 8-12, 2013	Bedin, Germany	<a href="http://www.dlr.de/isa.symp">www.dlr.de/isa.symp</a>
18.	Water & Environment 2013	April 10-11, 2013	London, UK	<a href="http://www.ciwetm.org/events/annual-conference.aspx">http://www.ciwetm.org/events/annual-conference.aspx</a>
19.	JURSE 2013: the Joint Urban Remote Sensing Event 2013	April 21, 2013	Sao Paulo	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>



S.No	Theme	Duration	Location	Web address
20.	35th International Symposium on Remote Sensing of Environment (ISRSE)	April 22-26, 2013	Beijing, China	<a href="http://www.isrse35.org">http://www.isrse35.org</a>
21.	ISPRS Workshop "Global Geospatial Information"	April 24-26, 2013	Novosibirsk, Russia	<a href="http://www.isprs.org/calendar/2013.aspx">http://www.isprs.org/calendar/2013.aspx</a>
22.	International Summer School on Mobile Mapping Technology 2013	April 29-30, 2013	Tainan, Taiwan	<a href="http://conf.ncku.edu.tw/mmt2013/">http://conf.ncku.edu.tw/mmt2013/</a>
23.	3rd Global Conference: Urban Popcultures	May 12-14, 2013	Prague, Czech Republic	<a href="http://www.inter-disciplinary.net/critical-issues/cyber/urban-popcultures/call-for-papers/">http://www.inter-disciplinary.net/critical-issues/cyber/urban-popcultures/call-for-papers/</a>
24.	6th International Workshop on Information Fusion and Geographic Information Systems: Environmental and Urban Challenges	May 12-15, 2013	St. Petersburg, Russia	<a href="http://iif-gis.com/">http://iif-gis.com/</a>
25.	Spatial World Forum 2013	May 13, 2013	Rotterdam, The Netherlands	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>
26.	SPIE Optical Metrology	May 13-16, 2013	Munich, Germany	<a href="http://www.isprs.org/calendar/2013.aspx">http://www.isprs.org/calendar/2013.aspx</a>
27.	29th Urban Data Management Symposium	May 15-17, 2013	London, UK	<a href="http://www.udms.net">www.udms.net</a>
28.	Fourth session of the Global Platform for Disaster Risk Reduction	May 19, 2013	Geneva	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>
29.	ISPRS Hannover Workshop 2013 High resolution earth information for geospatial information 2013	May 21-24, 2013	Hannover, Germany	<a href="http://www.ipi.uni-hannover.de/hannover2013.html">http://www.ipi.uni-hannover.de/hannover2013.html</a>
30.	ISPRS International Workshop on 3D Virtual City Modeling	May 28-31, 2013	Regina, Saskatchewan, Canada	<a href="http://www.geoict.yorku.ca/vcm2013">www.geoict.yorku.ca/vcm2013</a>
31.	8th International Symposium on Spatial Data Quality	May 31-June 1, 2013	Hong Kong	<a href="http://www.lgi.polyu.edu.hk/ISSDQ2013">www.lgi.polyu.edu.hk/ISSDQ2013</a>
32.	Joint Conference: the 2013 International Conference on Earth Observation for Global Changes (EOGC'2013) and the 2013 Canadian Institute of Geomatics Annual Conference	June 5-7, 2013	Toronto, Canada	<a href="http://eogc2013.blog.ryerson.ca/">http://eogc2013.blog.ryerson.ca/</a>
33.	Committee on the Peaceful Uses of Outer Space: 2012 Fifty-fifth session	June 6, 2013	Vienna	<a href="http://www.un-spider.org/events">http://www.un-spider.org/events</a>
34.	Geointelligence India 2013	June 12, 2012	New Delhi	<a href="http://www.gisindia.com/directory/gis-events-in-india">http://www.gisindia.com/directory/gis-events-in-india</a>
35.	6th International Conference on Recent Advances in Space Technologies "New Ways of Accessing Space" RAST 2013	June 12-14, 2013	Istanbul, Turkey	<a href="http://www.rast.org.tr">www.rast.org.tr</a>
36.	13th International Multidisciplinary Scientific GeoConference & EXPO SGEM2013	June 16-22, 2013	Albena Resort & SPA, Bulgaria	<a href="http://www.sgem.org">www.sgem.org</a>
37.	Multi Temp 2013 Out Dynamic Environment	June 25-27, 2013	Banff, Alberta, Canada	<a href="http://geog.ucalgary.ca/multitemp2013">http://geog.ucalgary.ca/multitemp2013</a>



### Ongoing Courses

- Seventeenth Post Graduate course in Remote Sensing & Geographic Information System at IIRS, Dehradun from July 1, 2012 to March 31, 2013.
- Eighth Post Graduate Course in Satellite Meteorology & Global Climate at SAC, Ahmedabad from August 1, 2012 to April 30, 2013.
- Eighth Post Graduate Course in Space and Atmospheric Science at PRL, Ahmedabad from August 1, 2012 to April 30, 2013.

### Future Courses

Eighteenth Post Graduate Course in Remote Sensing & Geographic Information System at IIRS, Dehradun from July 1, 2013 to March 31, 2014.

- Ninth Post Graduate Course In Satellite Communication at SAC, Ahmedabad from August 1, 2013 to April 30, 2014.
- International training course In 'Hyperspectral Remote Sensing' at IIRS, Dehradun during 3 June 2013 - 28 June 2013.
- International training Course In 'Navigation and Satellite Positioning System' at SAC, Ahmedabad during June 17, 2013 to July 12, 2013.
- International training course in 'Small Satellite Missions' at IIRS, Dehradun and ISAC, Bengaluru during October-November, 2013.

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CSSTEAP welcomes views and opinions of the readers on the 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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