



❖ CSSTEAP Newsletter ❖

Quarterly Newsletter of Centre for Space Science and Technology Education in Asia and the Pacific (Affiliated to UN)

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FUNDING BY UNESCAP TO CSSTEAP

About UNESCAP

The regional arm of the United Nations Secretariat for the Asia and Pacific region is the Economic and Social Commission for Asia and the Pacific (ESCAP). It is located in the United Nations Building, Ratchadamnoen Nok Avenue, Bangkok, Thailand. The functions of ESCAP have been defined by the Secretary-General as follows:

- Promoting economic and social development through regional and sub-regional cooperation and integration;
- Serving as the main economic and social development forum within the United Nations system for the ESCAP region;
- Formulating and promoting development assistance activities and projects commensurate with the needs and priorities of the region while acting as an executing agency for relevant operational projects;
- Providing substantive and secretariat services and documentation for the Commission and its subsidiary bodies;
- Carrying out studies, research and other activities within the terms of reference of the Commission;
- Providing advisory services to governments at their request;
- Developing and executing programmes of technical cooperation;
- Coordinating ESCAP activities with those of the major departments/offices of the United Nations

at Headquarters and specialized agencies and inter governmental organizations.

To carry out these functions, the ESCAP secretariat comprises the office of the Executive Secretary, the Office of Deputy Executive Secretary, the United Nations Information Services and the following divisions in Bangkok:

- ❑ Development Research and Policy Analysis
- ❑ Environment and Natural Resources Development
- ❑ International Trade and Industry
- ❑ Population and Rural and Urban Development
- ❑ Programme Management
- ❑ Social Development
- ❑ Statistics
- ❑ Transport, Communications, Tourism and Infrastructure Development
- ❑ Administrative Services



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Wish all the readers of the CSSTEAP Newsletter a very happy and prosperous 2003.

UNESCAP financial support to CSSTEAP

Since the inception of Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) in 1995, the Centre has organized 13 long and 7 short term courses in the various fields of Space Science, Technology and Applications such as Remote Sensing & Geographic Information System (GIS); Satellite Meteorology and Global Climate (SATMET); Satellite Communication (SATCOM) and Space & Atmospheric Science. The UNESCAP has supported the above educational programs over the years and significantly contributed in the prime

objective of CSSTEAP - capacity building in application of space science and technology in Asia - Pacific region by providing financial support in international travel for joining the course and return journey to the home country, to several course participants belonging to this region. CSSTEAP express its gratitude to UNESCAP for their generous contribution made to CSSTEAP. The details of support provided by UNESCAP are presented in the table given below -

COURSE	COUNTRY (No. ofParticipants)	ORGANIZATIONS
RS & GIS	Bangladesh- 5	<ul style="list-style-type: none"> ● Bangladesh Space Research & Remote Sensing Organisation ● Geological Survey of Bangladesh
	Bhutan - 2	<ul style="list-style-type: none"> ● Department of Survey & Land Records
	Cambodia - 1	<ul style="list-style-type: none"> ● United Nations Development Program
	DPR Korea-1	<ul style="list-style-type: none"> ● Central Information Agency of Science & Technology
	Indonesia - 2	<ul style="list-style-type: none"> ● National Coordination Agency for Survey & Mapping
	Kyrgyzstan - 2	<ul style="list-style-type: none"> ● Kyrgyz State National University ● Osh State University
	Mongolia-3	<ul style="list-style-type: none"> ● Ministry of Nature & Environment ● National Committee for Combating Desertification
	Myanmar-1	<ul style="list-style-type: none"> ● Ministry of Science & Technology
	Nepal - 1	<ul style="list-style-type: none"> ● Tribhuvan University
	Sri Lanka - 5	<ul style="list-style-type: none"> ● District Survey Office, Kendy ● University of Peradeniya ● Wayamba Farmer Development Foundation
	Vietnam -3	<ul style="list-style-type: none"> ● Cantho University ● Ho Chi Minh University of Technology ● Vietnam National Centre for Natural Science & Technology
	Uzbekistan - 3	<ul style="list-style-type: none"> ● Ministry of Agriculture & Water Management ● Scientific & Production Association of Saniin ● Tashkent Research Institute for Space Engineering
SATMET	Bangladesh-1	<ul style="list-style-type: none"> ● Bangladesh Meteorological Department
	Kazakhstan - 3	<ul style="list-style-type: none"> ● Remote Sensing Centre
	Kyrgyzstan - 1	<ul style="list-style-type: none"> ● National Meteorological Organisation
	Mongolia-2	<ul style="list-style-type: none"> ● Institute of Meteorology & Hydrology ● National Remote Sensing Centre
	Nepal - 1	<ul style="list-style-type: none"> ● Tribuvan University
	Vietnam-3	<ul style="list-style-type: none"> ● Centre for Hydrolometeorology of South Vietnam ● Southern regional Hydrometeorological Centre
	Uzbekistan-1	<ul style="list-style-type: none"> ● Central Asian Hydrometeorological Research Institute

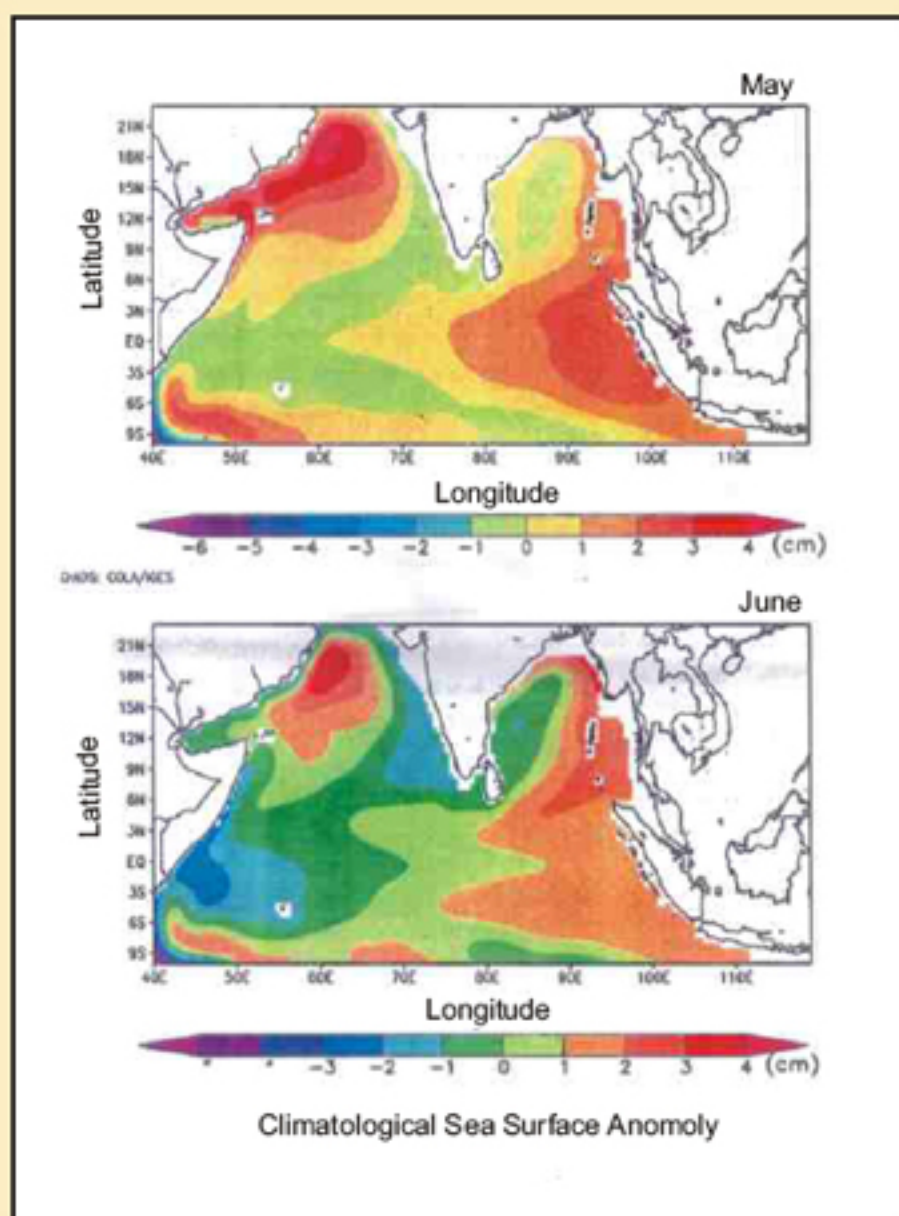
OCEAN CIRCULATION MODELLING USING SATELLITE DATA

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The North Indian Ocean shows profound impact of variation in lower tropospheric winds. Climatological monthly winds have been used to force a nonlinear reduced gravity model of the North Indian Ocean to simulate surface circulation and sea surface height anomaly. The surface circulation in response to the atmospheric forcing shows a large variability in space and time. The monsoon drift sets up in May and intensifies with the strengthening of southwest monsoon. The study reveals that Somali current is the most intense current of the North Indian Ocean. During southwest monsoon it flows poleward with high intensity during July. This current is found to be strengthening from May to July and afterwards weakening till November. The overall circulation in the Arabian sea is anticyclonic during southwest monsoon and cyclonic during northeast monsoon. The eddies off Somalia and Arabia are well reproduced in the model results. The kinetic energy variation in the North Indian Ocean with special reference to equatorial region and the boundaries have been studied. The sea surface height anomaly obtained from the model run has been compared with TOPEX data. The model successfully simulates the varying eddy structure and current pattern of the North Indian Ocean. The kinetic energy along the coasts and equatorial wave guide region have been analysed. In the Figure we reproduce the model derived sea surface height anomaly in the months of May and June. In the month of May, the sea level anomaly is positive at the eastern and western regions of the southern limit of study region. In between a dip is seen. However, at the equatorial region the sea level anomaly shows a gradual downward slope in westward direction. The higher sea level anomaly along the equator, indicating the eastward current

(monsoon drift), is also seen. The sea surface topography off Somalia coast is characterized by a low. Along the Arabia coast, high sea surface height than the offshore, suggests north ward flow along the coast. Along the Indian coast, the sea level anomaly is negative. During the month of June, the sea level anomaly is positive at most of the regions of southern extent. The low sea level anomaly present along the coast of Somalia intensifies and extends along the coast of Arabia and western India. This also results in a stronger positive sea level anomaly off Arabia indicating the anticyclonic circulation of the Great Whirl.



THIRD SATELLITE METEOROLOGY AND GLOBAL CLIMATE COURSE

The third Nine-months' Course on Satellite Meteorology and Global Climate, which commenced on August 1, 2002 is being attended by 20 participants from 13 countries. The first module covering theoretical lectures on basic concepts of Satellite Meteorology, Climatology, Mathematical and Computational techniques, Image Processing etc. was completed on October 30, 2002. The laboratory sessions included familiarization with ERDAS Package for image processing, handling of INSAT-VHRR and NOAA-AVHRR data, Rainfall estimation using Arkin's method, Tropical cyclone intensity analysis and track prediction etc.

Module I concluded with Examinations (both theory and practical). Apart from the core faculty from SAC, a few scientists from reputed Institutes like Indian Institute of Science, India Meteorological Department also delivered lectures. Participants also visited a number of facilities in SAC which included Ahmedabad Earth Station (AES) and Communication System Laboratory (CSL). A visit to Meteorological office at Ahmedabad airport was also arranged to familiarize them with meteorological data collection and analysis.

During October 24 - November 2, 2002, the participants undertook a technical tour to New Delhi and Dehradun. In Delhi they visited the Satellite Meteorology Division of India Meteorological Department and were acquainted with the reception, processing and utilization of operational satellite data from INSAT and NOAA. The real time retrieval of various meteorological products like CMV, OLR, QPE and their use in operational forecasting generated lots of interest. They also visited National Centre for Medium Range Weather Forecasts (NCMRWF), where the Centre Director briefed them about the operational medium range modeling activities. The dissemination of these forecasts to the farming community and their verification and the

progress made by the modelers in generating the useful forecasts really fascinated the participants.

They also visited CSSTEAP Head Quarters, Indian Institute of Remote Sensing (IIRS), Regional Remote Sensing Service Centre and Forest Research Institute at Dehradun and were briefed about the scientific activities being carried out by them. The participants also visited the Centre for Atmospheric Sciences at Indian Institute of Technology, Delhi. A one-day excursion trip to World famous Taj Mahal at Agra and Mussoorie were also arranged.

The Second module, which would cover advanced topics like Radiative Transfer, satellite data applications, parameter retrievals, Global climate etc. began on November 7, 2002. The practical sessions involving satellite data analysis and applications (temperature and moisture profile retrievals, model analysis, scatterometer data, geophysical parameter retrieval using microwave radiometer data etc.) are being continued. Leading meteorologists from Florida State University (US), Japan Meteorological Agency (JMA), Bureau of Meteorology, Australia and a few others are expected to deliver lectures in Module II.

The fortnightly discussions related to weather



Course participants at Taj Mahal near bank of river Yamuna.

over India and Asia-Pacific using satellite imagery other ancillary data (surface and upper air charts etc) downloaded from various web sites have proved very useful. The much discussed event in the Media viz.; the failure of the Southwest monsoon 2002 was also studied in detail by the participants.

The participants are in the process of identifying the topics for the Pilot Projects to be carried out by them in Module III. Preliminary

discussions with Resource Scientists in SAC about the scope of the project, data availability, relevance to the participant's country etc have been held.

On the social front, the participants had a glimpse of the dance and music during the festival of Navaratri-Garba. They also enjoyed Diwali- the festival of lights. They participated very actively in these events along with the faculty and their family members.

THIRD SPACE SCIENCE COURSE

The third Space and Atmospheric Science Course of the CSSTEAP started at the Physical Research Laboratory (PRL), Ahmedabad, India on August 1, 2002. This course is made up of four

assessment on all these topics have been almost completed. Following are the details of these topics :

Paper 3 :- Solar Wind, Magnetosphere and Space Weather

- 3.1 Elements of Solar Physics
- 3.2 Magnetic Field of Earth and Other Planets
- 3.3 Magnetospheres of Earth and Other Planets
- 3.4 Space Weather
- 3.5 Measurement Techniques for Solar and Geomagnetic Parameters

Paper 4 :- Astronomy and Astrophysics

- 4.1 Introduction to Astronomy and Astrophysics
- 4.2 Astronomical Instruments and Observation Techniques
- 4.3 Optical and Near IR Studies of Stars and Galaxies
- 4.4 High Energy Astrophysics
- 4.5 Radio Astronomy Studies

Paper 5 :- Basics of Spacecraft Design, Construction and Launch

- 5.1 Orbital Dynamics, Control and Guidance
- 5.2 Power Generation and Storage
- 5.3 Telemetry and Telecommand
- 5.4 Mechanical, Thermal and Payload Design Aspects
- 5.5 Space System Materials



At island site of solar telescope, Udaipur

modules (two dealing with the theory and two dealing with experiments) and a pilot project. First two modules dealing with theory and experiments were completed earlier and the next two modules started in the second week of November 2002. The second theory module consisted of three theory papers (Papers 3, 4 and 5) dealing with the following topics : A new topic on "Basics of spacecraft design, construction and launch" was introduced in the third Space Science Course as per the suggestion of the international review committee. This topic was introduced in the form of a paper in the theoretical module (Paper 5). The lectures and

During this phase all the participants had conducted the following four experiments at PRL :

- ❖ Mass of Suspended Particles using Quartz Crystal Microbalance
- ❖ Optical Depth Measurement using Filter Photometer
- ❖ Modeling Experiment on Atmosphere / Ionosphere
- ❖ Characterization of Interference Filters

In view of the recommendations made by the International Syllabi Review Committee for CSSTEAP Courses, some of the experiments had to be conducted at sites such as Udaipur Solar Observatory, PRL's IR Observatory at Gurushikhar,

Ooty Radio Telescope, etc. As a first step towards this, an experiment on "The Study of Solar Spectrum" was conducted at sites the Udaipur Solar Observatory, Udaipur. A few other experiments would be conducted when the participants are taken to PRL's IR Observatory at Mt. Abu and TIFR's Ooty Radio Telescope at Ooty. The assessment of the participants is made through class tests, seminars, written examinations, viva voce and practical examinations. Except Paper 5 and three experiments, which have to be conducted on site, all other assessments have already been completed. The participants would now be shown some of the state of the art facilities of space research in India in February 2003.

SEVENTH RS AND GIS COURSE

The seventh Post Graduate course on Remote Sensing and Geographic Information System (RS & GIS) of CSSTEAP is in progress at Indian Institute of Remote Sensing (IIRS), Dehradun. The course commenced on October 01, 2002 and is being attended by 23 participants from 13 countries of Asia and Pacific Region (Bhutan - 1; Bangladesh - 1; DPR Korea - 2; Indonesia - 1; Mongolia - 2; Myanmar - 1; Nepal - 1; Sri Lanka - 3; Thailand - 2; Uzbekistan - 2; Lao PDR - 2;

Vietnam - 1 and India - 4). The inaugural function of the course was held on October 01, 2002. Dr. V.B. Sawarkar, Director, Wild Life Institute of India, Dehradun inaugurated the course and delivered inaugural address. Director, CSSTEAP and Dean, IIRS also graced the occasion and addressed the gathering.

The phase - I of RS & GIS course is of nine month duration and is divided into three Modules each of three month duration. The Module - I covering theory, tutorials and practicals on Principles of Remote Sensing, GIS and GPS is ending during first week of January, 2003. The core faculty of this course consists of experienced faculty of IIRS. Several internationally reputed scientists viz. Prof. K. Jacobsen, University of Hannover (Germany); Prof. H. Moellering, Ohio State University (U.S.A.); Dr. Ing. R.A. De By, ITC (The Netherlands) were also invited to deliver lectures on specialized topics like Sensors for mapping; Mapping from Space; Advances in digital cartography; Recent trends in IT and its effect on databases and GIS etc. In the first week of the course, a introductory program consisting of lectures on Geographic perspective of India;



Guest Faculty Prof. H. Moellering delivering lecture

Social systems, Customs & Festivals of India; Overview of Space science and Technology and Applications, Natural Resources and Environmental assessment etc. was organized. Several field excursions were arranged during this module for ground truth collection and demonstration of various ground truth equipments and these information were utilized for interpretation and analysis of remotely sensed data. Academic performance of the participants was evaluated through periodic class tests, tutorials, written and practical examinations.

The course participants also attended the "Asian GPS Conference 2002" at New Delhi during October 24-25, 2002 and ISPRS TC - VII International Symposium on "Resource & Environmental Monitoring" at Hyderabad

during December 3-6, 2002. They also attended ISPRS TC - VII pre-symposium tutorials on "Sustainable Agriculture" and "Integrated Coastal Zone Management" at Hyderabad on December 2, 2002. In this module an educational visit to National Remote Sensing Agency (NRSA) and Earth Resources satellite data receiving Earth Station near Hyderabad was arranged. In order to have little diversion from the very hectic academic schedule, a trip to world famous Taj Mahal at Agra and Indian capital city Delhi was also arranged.

The participants also had glimpses of Indian festivities by their active participation in various festivals during this period such as Dusshera; Dewali - the festival of light; Id-ul-fitr, Christmas etc.

INAUGURATION OF SAC NEW CAMPUS FOR SUPPORTING CSSTEAP ACTIVITIES

A new campus for the Space Applications Centre (SAC) was inaugurated by Dr. K. Kasturirangan, Secretary, Department of Space, Government of India



Technical Complex

and Chairman, Governing Board, CSSTEAP on September 24, 2002. The new campus is located at a place known as Bopal, about 8 km. west of the present SAC campus. The Bopal campus comprises of two pieces of land, separated by about 500 m. from each other. The total area is about 27 acres. One part has been identified as the "Technical Area" whereas the other part is known as the "Residential Area". The Meteorology and Oceanography Group of SAC would be relocated from the present campus to the new campus to carry out all its activities there. Activities leading to establishment of a full fledged satellite Earth Station for communication purpose and to receive data from meteorological satellites have already been initiated. The Technical area would also be used for all training

programmes to be conducted by SAC, including those for the CSSTEAP. Three class rooms with all modern facilities have been designed to support simultaneous courses on Satellite Communications, Satellite Meteorology and Global Climate and on Space Sciences or any three simultaneous training programmes on any themes. The three class rooms are located in different parts of the building. Each class room has required laboratories in its vicinity so that the course participants can conduct practicals nearer to their class rooms and each area becomes self sufficient. The technical complex also has an auditorium to accommodate about 160 persons, Library, dining area, Office of Course coordinators, telephone exchange and administrative functionaries. The Residential Complex has well furnished accommodation to simultaneously



Residential Complex

accommodate participants of 3 independent courses, Guest house to accommodate 12 persons, canteen and dining areas, a recreation building and some houses for essential and related staff. Both the campuses are well connected to each other and with the main SAC campus through an optical fibre link. A dedicated internet facility has also been provided in both the campuses. The power supply is backed by full load standby D.G. sets. The buildings have been architecturally beautifully designed and furnished to international standards. These coupled with well designed horticulture work not only make the campuses a treat to eyes but also provide a congenial environment to work.

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 & technology that could 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. Government of India has made available appropriate facility and expertise to the Centre through the Indian Institute of Remote Sensing (IIRS) Dehradun, Space Application 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 applications programmes, linkages to global programmes/databases; execution of pilot projects, continuing education and awareness and appraisal programmes. The Centre offers Post Graduate level & Short courses in the fields of (a) Remote Sensing and Geographic Information Systems, (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.

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Courses in Progress

- ❖ Third 9-month Post Graduate Course in Satellite Meteorology and Global Climate at SAC, Ahmedabad from August 1, 2002.
- ❖ Third 9-month Post Graduate Course in Space and Atmospheric Science at PRL, Ahmedabad from August 1, 2002.
- ❖ Seventh 9-month Post Graduate Course in Remote Sensing and GIS(RS & GIS) at IIRS, Dehradun from October 1, 2002.

Forthcoming Course/Workshop

- ❖ Regional Workshop for Asia Pacific Astronomers on Data Processing from the Chandra & XMM-Newton Space Mission from January 13 to 24 2003 at Udaipur India
- ❖ Fourth 9-month Post Graduate Course in Satellite Communication at SAC, Ahmedabad from August 1, 2003.

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