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.

ADVISORY AND GOVERNING BOARD MEETINGS OF CSSTEAP

The tenth meeting of Advisory Committee (AC) and thirteenth meeting of Governing Board (GB) of CSSTEAP were held on November 24 and 26, 2008 respectively at Space Applications Centre (SAC), Ahmedabad. Dr. Viktor Kotelnikov of United Nations-OOSA, Vienna chaired the AC meeting. Dr. Bambang Koesoemanto (LAPAN, Indonesia), Prof. K.I. Oyama (ISAS, Japan), Mr. Sjaak Beerens (ITC, The Netherlands), Prof. P.C. Aggarwal (TIFR, Mumbai), Dr. K.N Shankara (Bangalore), Dr. Ajit Tyagi (IMD, Delhi), Prof. Parvateeswara Rao (Andhra University), Mr. Bhaskaranarayana (Scientific Secretary, ISRO), Dr. R.R Navalgund (Director, SAC), Prof. J. N. Goswami (Director, PRL), Dr. V. Jayaraman (Director, NRSC), Dr. George Joseph (Director, CSSTEAP), Dr.V.K Dadhwal (Dean, IIRS), Mr. Gowri Shankar (Programme Director, Intl. Cooperation, ISRO, Bangalore), Course Directors, Program coordinators, CSSTEAP and course coordinators attended the meeting. The committee took a review of the Centre's technical and academic activities since last one year.

Various issues like revised course curricula, implementation of Board of Studies (BOS) recommendations, research activities in the form of M.Tech & Ph.D program at the centre, designing short focused courses, highlighting the societal benefits from

Inside this issue .....

Wishing all the Readers a very Happy & Prosperous New Year 2009

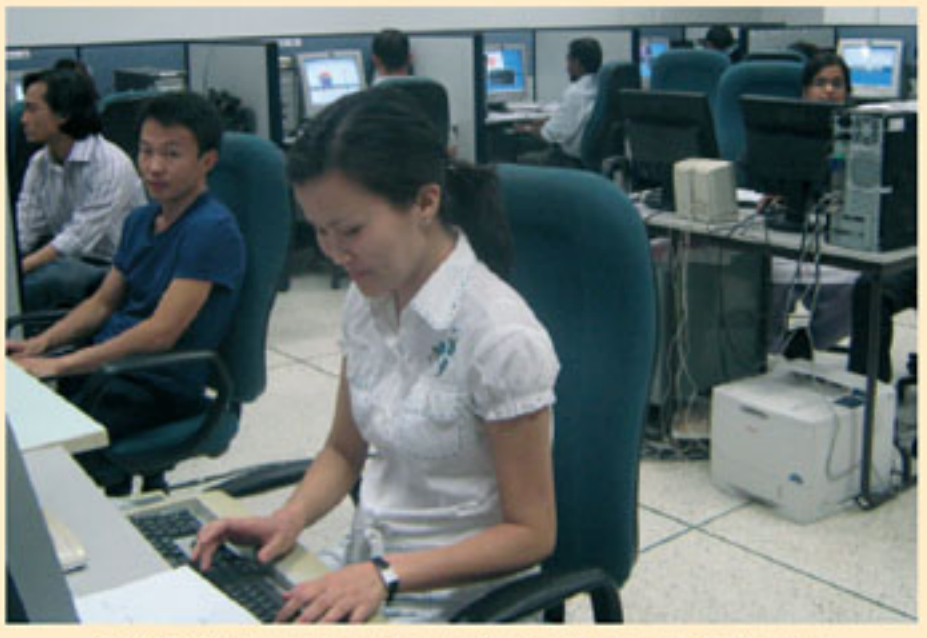
SIXTH POST GRADUATE COURSE ON SATELLITE METEOROLOGY & GLOBAL CLIMATE

The Sixth SATMET course of CSSTEAP, commenced on the August 1, 2008 at Space Applications Centre (SAC), Ahmedabad. Sixteen participants from 13 different Asia-Pacific countries are attending the SATMET course and has representation from Azerbaijan -1, Bangladesh-1, India-2, Indonesia-1, Kazakhstan-2, Malaysia-1, Mongolia-1, Nepal-2, Papua New Guinea-1, Sri Lanka-1, Tajikistan-1, Thailand-1, Vietnam-1. The participants were welcomed by Dr. R. R. Navalgund, Director, SAC, Dr. J. S. Parihar, Deputy Director, RESA/SAC, Dr. B.M. Rao, Course Director, SATMET - 6, Mrs. Yagna Mankad, Course Coordinator, and the Faculty Members of the course. Dr. B.M. Rao, Course Director presented brief outline of the course. He also spoke about the facilities and the arrangements at the New SAC Campus, Bopal for the participants.

A one-week orientation course consisting of lectures providing a wide spectrum of various themes in Astronomy, Satellite communications, Remote sensing were delivered by eminent speakers from SAC and Physical Research Laboratory, Ahmedabad. During the afternoons they were also introduced to basic concepts in Computer Programming, MOG Computer systems etc. From the second week, the Module 1 dealing with the Basics in Meteorology, Climatology and Physical Oceanography, Basics in Satellite Remote Sensing - Radiative Transfer, Orbits and Instrumentation and Image Interpretation was introduced. The afternoon sessions were devoted to hands-on-exercises on meteorological Satellite data processing and analysis. INSAT-VHRR and NOAA-AVHRR data sets were extensively used by the participants. Various advanced software tools (visualization packages) like ERDAS, FERRET, Grads, EDL etc are being used by the participants. Periodic tests were conducted as part of the evaluation process. A number of tutorial sessions involving computations, problem solving etc by the participants were conducted. The follow up discussions with the faculty members were very lively and interesting. The weekly weather discussions (using satellite imagery, surface and upper air charts etc) also provided an unique learning opportunity to them. At the end of the module I, examinations (both theory and practical) were conducted. The Module 1 concluded on October 31, 2008. The core faculty consisted of senior scientists of SAC, besides, well known experts from India Meteorological Department, National Institute of Oceanography and Indian Institute of Tropical Meteorology were invited to deliver lectures on specialized topics.

The Second module dealing with advanced topics like Radiative Transfer, Geophysical parameter retrievals, Satellite data applications with emphasis on monsoon studies and tropical cyclones, Green House gases and global warming etc began from November 2, 2008. Dr. Ae-Sook Suh of Korea Meteorological Administration, Seoul visited SAC during November 11-14, 2008 and delivered a number of lectures on Parameter retrievals from Geo/Leo satellites and their applications. The first meeting to brief the participants about the Pilot Project topics, satellite data sets available in SAC to carry out

Governing Board members during their technical visit to Bopal campus, SAC.



SATMET course participants during their practical session

Beatrice Motella from Instituto Supeiore Mario Boella, Italy. Indian faculties were from Osmania University, Survey of India, Air Port Authority of India, M/s. ML Info Map and M/s. Accord in addition to SAC, ISTRAC and ISRO HQs.

Each participant was provided with a book and a CD containing utility software, and the lecture materials. For quick reference, some of the frequently used and important terminologies used in this subject and web references were also given in the CD.

The valedictory function was held in a function at SAC Bopal campus auditorium on July 19, 2008. Chief Guest for this function was Shri N. Pant, Member Space Commission. Director DECU, Senior Scientists from SAC, course faculties and instructors, and all the participants of the course attended the function. Dr. Ramrattan, Associate Director SAC welcomed the audience.

Dr. George Joseph, Director CSSTEAP in his address told the participants that they should make the best use of the knowledge gained from this training course for development of their countries. He further stressed that they are part of the Alumni of CSSTEAP and they can be in touch with CSSTEAP for any further technical help.

Shri N. Pant, Chief Guest, gave a very broad overview of natural navigation and its improvement by humans into satellite navigation.

Two of the participants gave their feed back on the course. The students appreciated the overall organization of this course and assured that the knowledge gained by them will be useful in their country. Participants received their course completion certificates from the Chief Guest. The valedictory function came to an end with a vote of thanks by Course Coordinator.

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Short Course on Space Technology for Drought Monitoring, Desertification and Crop Yield Prediction

Indian Institute of Remote Sensing (IIRS) organised a short-term training course on "Application of Space technology for Disaster Management Support with Emphasis on Drought Monitoring, Desertification and capacity building in space applications for addressing issues of drought, desertification and crop forewarning in Asia-Pacific region.

ICG will be held from 8 to 12 December 2008 at Jet Propulsion Laboratory, Pasadena, United States of America. The fourth meeting will be held in 2009 in the Russian Federation.

In 2007, a Providers Forum was established at the second meeting

Each satellite carries one or more very stable atomic clocks, so that the satellite can transmit synchronous timing signals. The signals carry coded information about the transmission time and position of the satellite. Relativistic effects are much larger than a part in 10^{12}. For example, satellite speeds v are al

FROM MEMBER COUNTRIES

ISRO MARCHES TO MOON

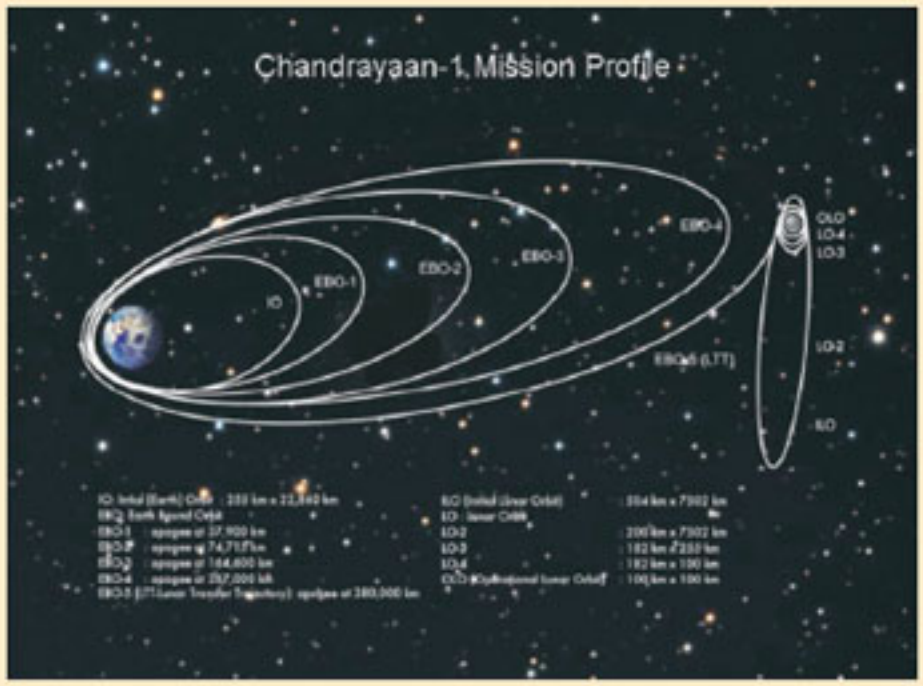
The launch of CHANDRAYAAN-1 ("Moon craft" in Sanskrit), the first Indian mission to the Moon on 22 October 2008 has been a historic event thus bringing the realms of imagination of the Indian Space scientists to reality. In its fourteenth flight conducted from Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota, Indian Space Research Organisation's (ISRO) Polar Satellite Launch Vehicle, PSLV-C11, successfully launched the 1380 kg Chandrayaan-1 spacecraft into a transfer orbit with a perigee (nearest point to Earth) of 255 km and an apogee (farthest point from Earth) of 22,860 km, inclined at an angle of 17.9 deg to the equator. PSLV-C11 is the up graded version of ISRO's Polar Satellite Launch Vehicle in its standard configuration.

ISRO accomplished a significant milestone when after a series of orbit raising (Fig. 1), CHANDRAYAAN-1 left the Earth's gravitational field behind and entered the lunar orbit on November 8. The highly complex 'lunar orbit insertion maneuver' to capture the spacecraft in the lunar gravity was performed from the Chandrayaan-1 Spacecraft Control Centre of ISRO Telemetry Tracking and Command Network (ISTRAC) at Bangalore.

Chandrayaan-1 spacecraft is 1.5 m cuboid with a single solar panel projecting from one of its sides (Fig. 2). The spacecraft is powered by the solar panel generating electrical power of 700 W. A Lithium ion battery supplies power when the solar panel is not illuminated by the sun. Liquid propellants needed for Liquid Apogee Motor (LAM), to perform the orbit maneuver as well as for the thrusters are stored onboard the spacecraft. Chandrayaan-1 spacecraft's Dual Gimbaled Antenna transmits to Earth the scientific data gathered by the payloads/ instruments.

The Chandrayaan-1 mission is aimed at high-resolution remote sensing of the Moon in visible, near infrared, low energy X-ray and high-energy X-ray regions. Chandrayaan-1 has indigenously developed four core payloads/experiments onboard: TMC, HySI, LLRI and HEX and a Moon Impact Probe (MIP) to impact on a predetermined location on the lunar surface.

- Terrain Mapping stereo Camera (TMC) in the



Mission Sequence	Date (2008)	Time (hrs IST)	Orbit Parameters
Launch IO	Oct 22	06:22	255 km x 22,860 km
EBO-1	Oct 23	09:00	305 km x 37,900 km
EBO-2	Oct 25	05:48	336 km x 74,715 km
EBO-3	Oct 26	07:08	348 km x 164,600 km
EBO-4	Oct 29	07:38	465 km x 267,000 km
EBO-5	Nov 4	04:56	LTT 380,000 km
ILO	Nov 8	16:51	504 km x 7,502 km
LO-2	Nov 9	20:03	200 km x 7,502 km
LO-3	Nov 10	21:58	182 km x 255 km
LO-4	Nov 11	18:30	182 km x 100 km
OLO	Nov 12	18:33	100 km x 100 km

Figure 1

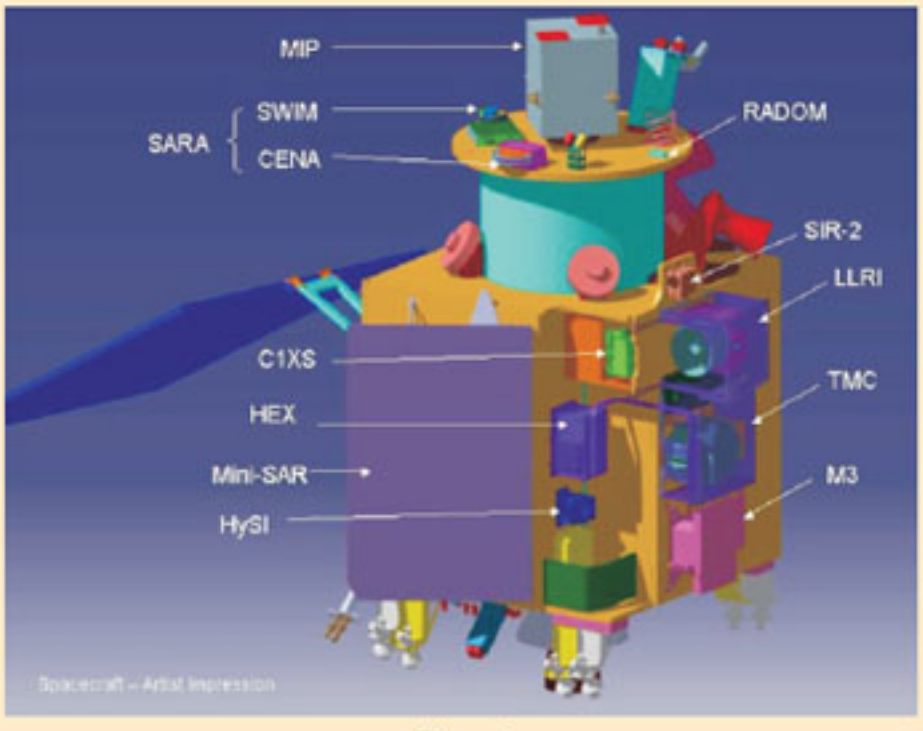


Figure 2

panchromatic band, having 5m spatial resolution and 20 km swath.

- Hyper Spectral Imaging Camera (HySI) operating in 0.4-0.95 µm band with a spectral resolution of 15 nm and a spatial resolution of 80m with a swath of 20km.
- Lunar Laser Ranging Instrument (LLRI) with height resolution of less than 5m.
- High Energy X-ray spectrometer (HEX) using Cadmium-Zinc-Telluride (CdZnTe) detector in the 30-270 keV energy region with spatial resolution of 33km.
- Moon Impact Probe (MIP) with a video imaging system, a radar altimeter and a mass spectrometer attached at the top deck of the Chandrayaan-1 main orbiter to impact on the surface of the moon. The suit Chandrayaan-1 scientific objectives.
- Near Infra Red spectrometer (SIR-2) from Max Plank Institute, Lindau, Germany through ESA.
- Sub keV Atom Reflecting Analyser (SARA) through ESA - a collaboration between Swedish Institute of Space Physics, Sweden and Space Physics Laboratory, Vikram Sarabhai Space Centre (VSSC), ISRO. The Data Processing Unit of this payload/experiment is designed and developed by ISRO, while Swedish Institute of Space Physics has developed the payload sensor.
- Radiation dose Monitor Experiment (RADOM) from Bulgarian Academy of Sciences.
- Miniature Synthetic Aperture Radar (Mini-SAR) from Applied Physics Laboratory, Johns Hop[illegible]

Quest for life outside the earth has given birth to a new discipline of "Astrobiology". This is an interdisciplinary subject encompassing astronomy and biology. Its scope includes search and study of

Phosphate) is found to be synthesized from this primeval soup. ATP is the major energy providing molecules in all the living things. Amino acids are

liquid oceans of water. Future exploration of Europa with a lander is necessary to search any form of life in it. Discovery of huge water rich plumes from geysers of liquid water erupting from the south pole region of Enceladus by the Cassini probe during its flyby ,has aroused excitement and hope that some type of life may exist on this moon.

It can be safely inferred from all the planetary explorations so far that there is no possibility of existence of higher forms of life or any intelligent life in any other part of the solar system.

Discovery of Extrasolar Planets (Exoplanets) and existence of life in them

Our Sun is an ordinary star and there are at least a billions similar stars in our galaxy. It is, therefore, quite natural to think that planetary system like ours should be a common phenomenon among other stars. If this is correct, one should be able to detect the extrasolar planets and study their characteristics. It is very likely that these extrasolar planetary systems in other stars may have earth-like planets with environment favorable for the growth and evolution of higher forms of life. Given the vast numbers of stars in the universe, the existence of intelligent life in other stars may be widely prevalent.

Existence of extrasolar planets has been a subject of investigation and debate but till 1988 there was no report of detection of any such object. In the presence of glare of a bright star, detection of its faint planetary companions is an extremely difficult task even for the nearest star Proxima Centauri. Due to this the subject of exoplanet remained in the realm of speculation. The first report of detection of an extrasolar planet was made in 1988 by Bruce Campbell and his group in the star Gamma Cephei but this remained unconfirmed till 2002. Definitive detection of an exoplanet was reported in 1992 orbiting around the pulsar PSR 1257+12 and the first discovery of a planet around a main sequence star 51 Pegasi , was made in 1995 by M. Mayor and D. Queloz of Geneva Observatory. Since then the subject of Exoplanets has grown explosively and as of July 2008 discoveries of 307 extrasolar planets have been reported in the literature. The two most successful methods of detection of exoplanets are (i) measuring variations in the radial velocity of the star caused due to presence of a planet and (ii) measuring dimming of star due to the transit of a planet across its disc. Most of the detected planets are giant Jupiter-like massive objects. In recent years a significant number of earth-like planets have also been detected. It is possible to detect the presence of different molecules in the atmosphere of a planet by measuring the spectrum of the star when the planet transits across its disc. The spectrum will show absorption features due to the atoms and molecules present in the atmosphere of the planet. By using this technique Hubble Space Telescope (HST) detected presence of methane and water vapour in the atmosphere of the exoplanet known as HD 189733 b. This is a Jupiter size hot gaseous planet that has temperature of ~ 1000 degree C and orbital period of 2.2 days due to its closeness to the parent star. The observed brightness of the star is reduced by 2% when it is eclipsed by the orbiting planet. High temperature of this planet makes it unlikely that it is home to any kind of life.

Recently there is report of the discovery of an earth-like planet around the red dwarf star Gliese 581 (Distance = 20.5 ly) by HST. The temperature of this planet has been estimated to fall in a range of 0 – 40 degree C and is thus considered a habitable planet. It is thought that planets around red dwarf stars are the best candidates for existence of life as they have lower temperatures and hence even the inner planets around these stars may have moderate temperatures and favorable atmosphere for the germination and growth of life. NASA has planned Space Interferometry Mission (SIM) 'Planet Quest' and another mission "Terrestrial Planet Finder' for detection of earth-like exoplanets and study them in detail. A similar space interferometry mission known as 'Darwin' is under development by ESA for search of exoplanets. When these missions fly, it is hoped that hundreds of new exoplanets, possibly many earth-like, will be discovered. Study of their atmosphere by infrared imaging and spectroscopy will tell whether they contain oxygen, water vapor, carbon dioxide and ozone that are essential for the development and survival of rudimentary and advanced forms of life. It is hoped that in the coming decades we may have many surprising discoveries about the presence or absence of life on the planets around other stars.

Search for Intelligent Life in the Universe

Visits of Aliens to the earth and their invasion, has been a subject of many science fictions based on which severa.l famous films have been produced.

This fascinating subject has also attracted the attention of many well known scientists who wondered whether intelligent life indeed exists else

civilization if it is present any where in the universe. Neutral hydrogen is widely present in the universe and occasional flip of spin of its