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उत्तर पूर्वी अंतरिक्ष उपयोग केंद्र
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Reflections

TRIANNUAL NEWSLETTER

Hon'ble Deputy Chief Minister of Tripura, Shri Jishnu Dev Varma addressing the gathering during the inaugural session of State Meet for Promoting Space Technology based Tools and Applications in Governance and Development for the state of Tripura

From the Director's Desk

On behalf of Team NESAC, I wish a very Happy and Prosperous New Year 2020 to everyone. Last year has been very eventful and memorable at NESAC. Several new infrastructures and facilities were created like the outreach facility with hostels, upgradation of Edusat facilities across NE states, setting up of lightning detection network, etc. We took up and completed several new and innovative projects cutting across different domains. Election e-Atlas for NE states, Remote Sensing (RS) & Geographic Information System (GIS) applications in Sericulture – Phase II, mapping of coal mines in Meghalaya on request from National Green Tribunal, rolling out lightning early warning system, expansion of flood early warning system to entire NE region, use of unmanned aerial vehicles (UAV) in new application areas, use of Machine Learning and Deep Learning for application projects, etc. are some of the major activities. We have also given more focus on capacity building and outreach activities by running short duration certificate courses on RS and GIS, UAV RS, and thematic applications in addition to tailor made courses. We have successfully conducted the maiden ISRO YUva VIgyani KAryakram (YUVIKA, Young Scientist Program) along with three other major ISRO centres. Additionally, we hosted three workshops and symposiums during the year. The year 2019 has been very satisfying and fruitful and we are very committed to carry forward these activities in 2020 as well. We have several major activities planned during the year 2020 covering creation of new facilities, augmentation of human resource, new projects, etc.

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In this Issue

We wish a Happy and Prosperous New Year 2020 to all our readers

Applications of RS & GIS in Sericulture Development

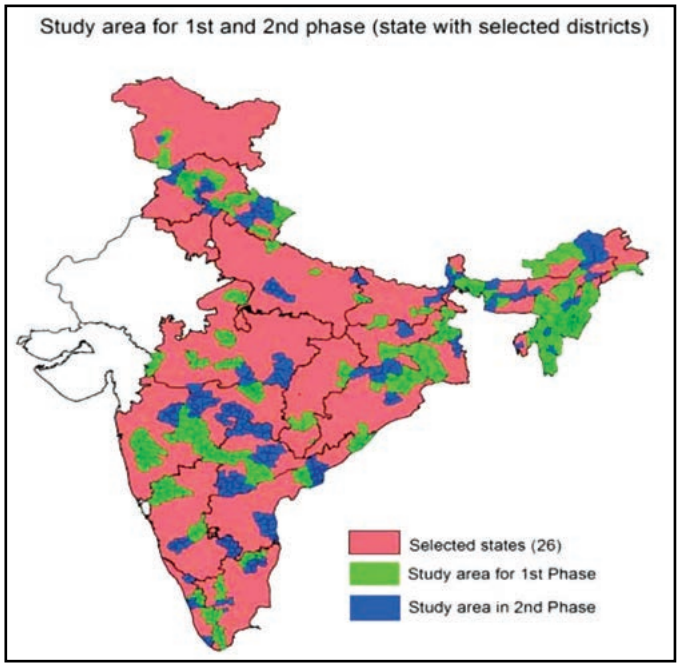
Dr B K Handique, Dr J Goswami, Ms P T Das, Shri C Goswami

Sericulture is a source of livelihood and provides gainful employment in the rural areas, especially for the women. The Central Silk Board (CSB), Ministry of Textiles, Govt. of India, Bengaluru has placed greater emphasis on improving the productivity at all stages of silk production to ensure higher returns to the stakeholders. Realizing that the space technology in the past has provided valuable inputs to the sericulture development, CSB requested the Department of Space (DOS) to suggest appropriate inputs for expansion of sericulture activities particularly in the non-traditional sericulture states with a special emphasis on NE states.

North Eastern Space Applications Centre (NESAC) took the lead on behalf of DOS and came up with the project proposal titled Applications of Remote Sensing and GIS in Sericulture which has two major components: i) Identification and mapping of potential areas on 1: 50,000 scale for development of silkworm host plants covering 178 selected districts in 25 States of India. ii) Development of a network of Sericulture Information Linkages and Knowledge System (SILKS) for the selected districts. The first phase of the project was implemented in 108 districts from 25 states in the country, where 45 districts were selected from 8 NE states. Based on the success of the first phase of the project, a second phase of the project was implemented in 70 priority districts in the country, where 20 districts were from 7 states of NER and 50 districts from other states.

The methodology for identification of potential areas for sericulture development involves evaluation of soil and climatic parameters for growing silkworm food plants as well as rearing of silk worms. Multispectral and multi-temporal satellite imagery of Resourcesat-2 LISS-IV for the period of 2015-16 were used for updation of LULC at 1:10,000 scale and delineate the culturable westland areas. Again, Caro-DEM version 2.0 (10 m) data were used for delineation of elevation and slope in the study area. Climatic parameters were derived from Automatic Weather Station (AWS) data received from AWS installed by India Meteorological Department (IMD) and Indian Space Research Organization (ISRO).

Among the NE states, Assam is found to have maximum suitable areas (149442 ha) in the selected 7 districts that can be brought under Mulberry Sericulture. This is followed by Nagaland (27648 ha). Among non-mulberry sericulture, Assam and Meghalaya is having the highest percent of suitable areas in terms of Muga rearing in the selected districts (196212 ha and 82524 ha, respectively). Assam, which is traditionally well known for Muga, is having highest areas suitable for Muga in the selected 7 districts. The lowest suitable area for Muga has been found in Arunachal Pradesh. Assam has been found to have the highest areas suitable for Eri (218395 ha). Meghalaya occupies the second position with 48859 ha areas in the selected 2 districts.

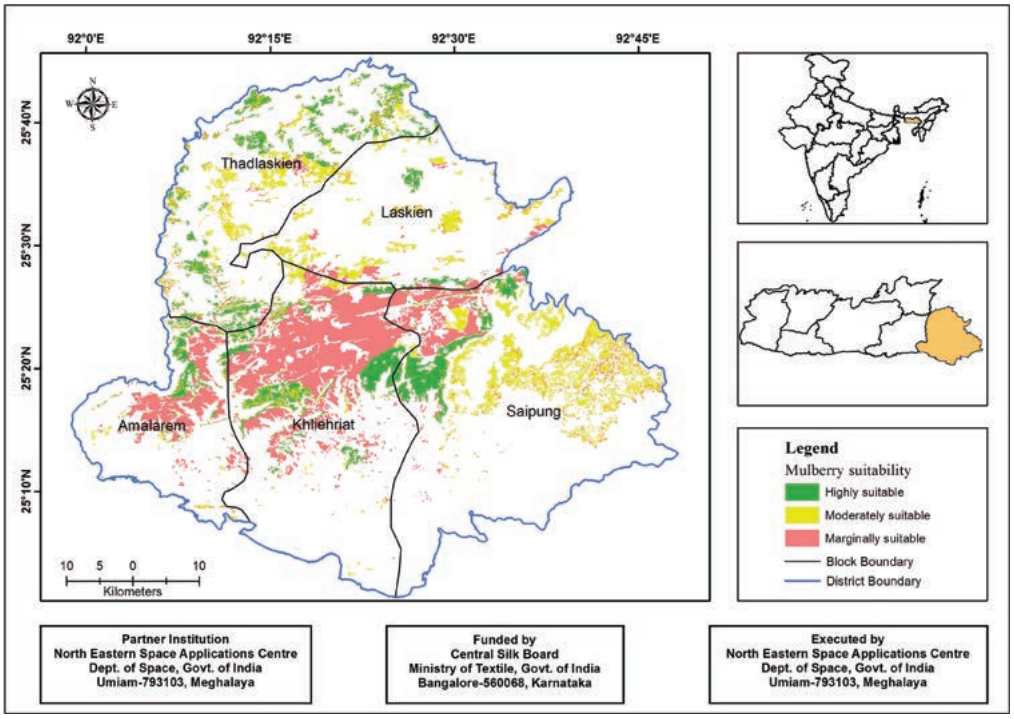


Study area (70 districts representing 26 states)

Among traditional sericulture states of rest of India, Andhra Pradesh is found to have as high as 8% of total geographical areas (TGA) suitable for Mulberry sericulture followed by of Karnataka (7%). The state of Jammu & Kashmir and West Bengal has been found to be least suitable for Mulberry sericulture with only 1168 ha and 4818 ha of areas in the selected districts. For non-Mulberry sericulture, West Bengal has significant suitable areas for Muga (92,696 ha). For tropical

Tasar, Odisha has the highest percent of suitable areas (23% of TGA) in the selected 2 districts followed by Uttarakhand (2% of TGA) in the selected district.

Among non-traditional sericulture states, Himachal Pradesh has been found to have the highest percent of areas suitable for Mulberry sericulture, which is about 14% of total geographical areas in the selected 2 districts, followed by Uttar Pradesh (11%) and Bihar (8%). Among them, Madhya Pradesh (1168 ha) and Hariyana (4818 ha) has least suitable areas for the Mulberry.



Suitable area for Mulberry in Jaintia Hills district in Meghalaya

All these information have been integrated in the SILKS (Sericulture Information Linkages and Knowledge System) portal developed as a part of the project and has been put in the public domain under the domain name http://silks.csb.gov.in. SILKS is a single window, ICT-based information and advisory services system for the farmers, sericulture extension workers, administrators and planners working in the field of sericulture development.

A project atlas has been prepared for 20 districts of North Eastern states and it was released by Hon'ble Minister of Sericulture, Govt. of Assam on 22 October, 2018 at Guwahati in presence of Member Secretary, CSB, Secretaries and Directors of State Sericulture Dept. of NER, officers and scientists from CSB centres, scientist from NESAC & SRSACs. A national workshop was organized during August 05-06, 2019 at NESAC as part of the project and the project atlas for 50 districts representing 18 states other than NER was released by Member Secretary of CSB.

A number of sericulture expansion activities have been initiated based on the outputs emerged out of the project. In NER, it is estimated that around 14500 ha areas have been increased under silkworm host plants after the implementation of this project.

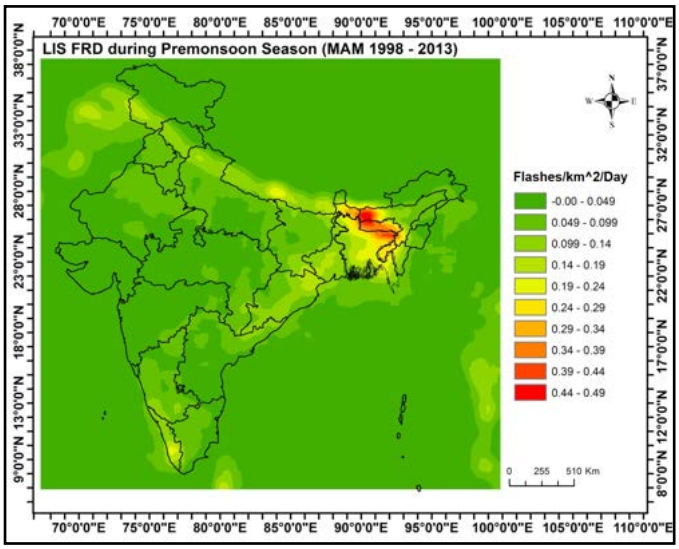
CSB, Bengaluru is initating another major activity on Geo-tagging of Sericulture assets created with the financial support from Ministry of textiles and assigned NESAC to coordinate the activity in the country. The work for NE-states have already been started and a mobile app and a dashboard visualization system have already been developed by NESAC.

Release of Project Atlas for 18 states of India by member Secretary of CSB on August 05, 2019 at NESAC, Umiam

Development of Lightning Early Warning System for NE region of India

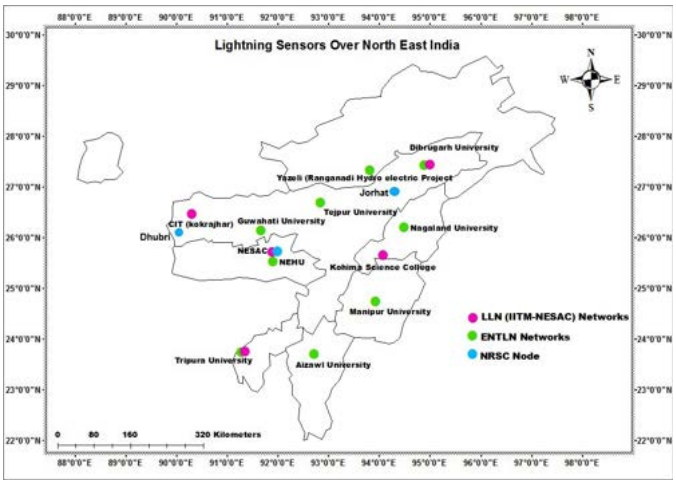
Dr Shyam S Kundu, Dr Trishanu Banik, Ms Rekha B Gogoi, Dr A Chakraborty

Lightning is the deadliest disaster in India with more than 2500 fatalities every year. Lightning associated with severe storm is very common in north eastern region (NER) of India primarily during the pre-monsoon seasons of March to May. These events are more frequent over the western and southern parts of Assam, Meghalaya, Tripura, and part of Mizoram. Lightning takes more than 50 lives annually in NER with highest casualty reported in Assam. An actionable lightning early warning system has the potential to reduce this death toll significantly. NESAC therefore initiated research to develop a lightning early warning system which can forecast probable lightning locations in NER with actionable lead time.



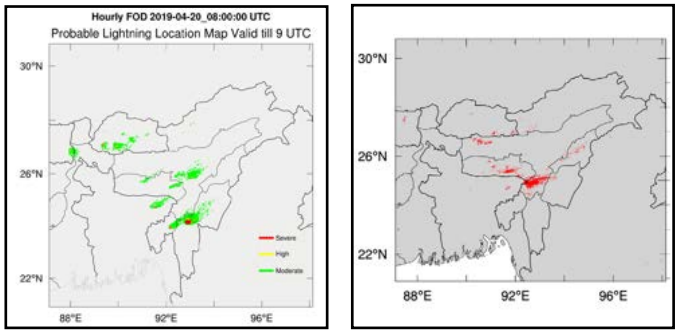
Spatial distribution of lightning climatology during March-May based on 15 years of data from Lightning Imaging Sensor (LIS) on board TRMM satellite.

Ground based lightning detectors are one of the best sources of lightning data. During last two years, various new ground based lightning detection sensors has been installed over NER with the initiative of NESAC and in collaboration with Indian Institute of Tropical Meteorology (IITM), Pune and National Remote Sensing Centre (NRSC), Hyderabad. Five new lightning detection sensor under IITM, Pune network are installed at Dibrugarh University, Assam; Kohima Science College, Nagaland; Tripura University, Tripura; NESAC, Meghalaya; and in Central Institute of Technology (CIT), Kokrajhar, Assam. Three nodes of lightning sensor from NRSC are being installed at NESAC, Jorhat, Assam and Dhubri, Assam. In addition, NESAC also procured the lightning data from ENTLN (Earth Network Total Lightning Network) for cross platform validation of lightning data.



Locations of lightning detectors over NER set up in collaboration with different agencies.

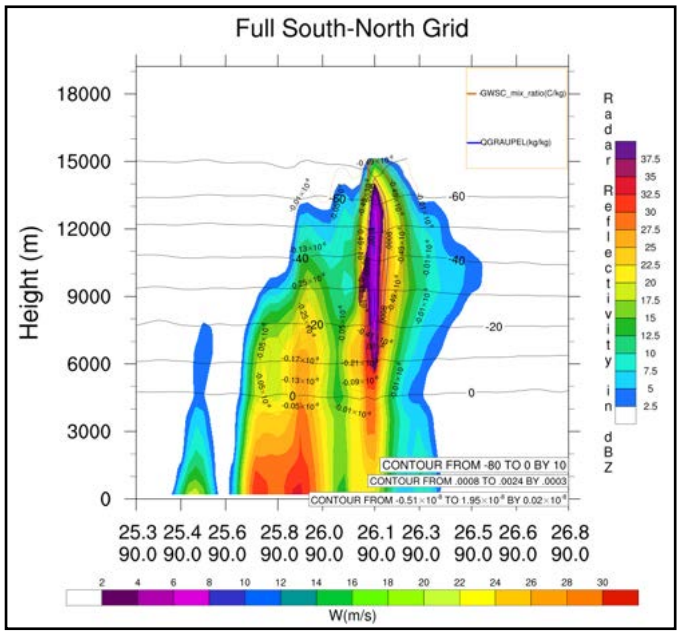
Early warning of lightning with such ground data alone is possible, but with a lead time of only 30 minutes. NESAC focused on improving this lead time to 3 hours. With lightning data from different devices, the lightning forecasting system was developed by implementing the assimilation of ground based lightning data in the weather research and forecasting (WRF) model. This is the fast ever successful effort in India to implement such ground based lightning data assimilation into the model. The model was run three times a day to provide forecast for next 3-4 hours from the time of issue of forecast.



Forecasted lightning with 3 hours lead time (left) and observed lightning location (right).

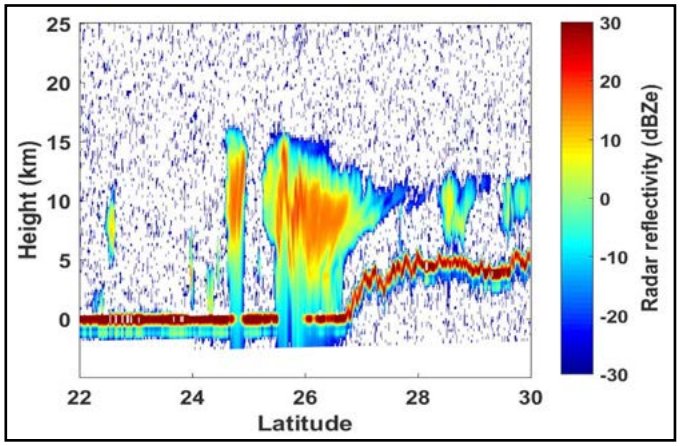
The forecast generated showed the probable lightning occurring zones. The lightning origin density count was classified into moderate, high,

and severe represented with green, yellow, and red color respectively. All the forecast were uploaded to the NERDRR (North Eastern Regional node for Disaster Risk Reduction) website and also sent to all the concerned state and district disaster management authorities. Validation of the forecast was done using ENTLN lightning location data. A spatial shift between the simulated and observed lightning location was observed on many days. The possible reason could be the time interval for lightning data assimilation. Due to limitations in computation resources, the centre is unable to run the model at the time interval that best suits such dynamic weather system.



Vertical cross section through an intense convective cell showing simulated Radar reflectivity, Vertical velocities, Graupel mixing ratio, isotherm lines, etc.

Research is also conducted at NESAC to understand the Physics of charging and discharging mechanism in a cloud by simulation of cloud microphysical and intensity parameters. Several parameters like vertical velocity, radial reflectivity, groupel mixing ratio, isotherm lines, electric field magnitude, space charge mixing ratio, etc. are simulated. The numerical model simulated parameters were analysed and it was found that they represent the expected theoretical values. It was also observed that the charging in cloud takes place in 4-10 km range. The model simulated vertical structure of the storm is also validated with vertical structure of reflectivity obtained from Cloudsat satellite data. The validations suggest that the model could simulate the cloud vertical structures with identification of regions of intense convection very strongly. The model therefore could be used for forecasting of lightning with some modifications. It has been planned to operationalise this system for early warning of lightning from the pre-monsoon seasons of 2020 for the entire NE region of India.



Cloudsat vertical reflectivity for 19 April 2017 over 90 degree East longitude

The dissemination of lightning warning to masses in short time holds the key to success in mitigating lightning hazard. Efforts have been made to directly disseminate the lightning warning to individuals who are likely to be affected, through SMS services. Capacity building and awareness on lightning is another very important aspect in the mission to reduce lightning fatality. NESAC, with support from CROPC (Climate Resilient Observing Systems Promotions Council) and IMS (India Meteorological Society) has been conducting lightning resilient campaigns and meetings.

Lighting resilient India Campaign for NER of India was conducted on 22 June, 2019 at NESAC with more than 100 participants.

State Meet for Promoting Space Technology Based Tools and Applications in Governance and Development for the state of Tripura

Dr Shyam S Kundu

The State level meet on Promoting space technology based tools and applications in governance and development for the State of Tripura was organised jointly by Tripura Space Applications Centre (TSAC), North Eastern Space Applications Centre (NESAC), and Indian Space Research Organisation (ISRO) at Pragna Bhawan, Gorkhabasti, Agartala, Tripura on December 03, 2019. A total of 184 officials attended the meet that includes participants from 52 Tripura state government departments, central government officials from Tripura and officials from NESAC, National Remote Sensing Centre (NRSC), and ISRO.

The State Meet was inaugurated by Hon'ble Deputy Chief Minister of Tripura, Shri Jishnu Dev Varma by lighting the lamp

Hon'ble Deputy Chief Minister of Tripura, Shri Jishnu Dev Varma was the Chief Guest of the inaugural session. He inaugurated the state meet by lighting a lamp. This was followed by the welcome address by Shri Shailendra Singh, Special Secretary, Dept. of Science, Technology & Environment (DSTE), Govt. of Tripura. Dr. John Mathew, Senior Scientist from ISRO HQ gave an overview of the Earth Observation Satellites and Applications and explained the four verticals of Indian Space Program. Shri P. L. N Raju, Director, NESAC made a presentation on Space Technology Applications in North Eastern Region (NER) with special reference to Tripura, where he highlighted different projects carried out by NESAC in Tripura covering all major thematic areas and also showed the potential areas where such technology can be successfully used. Shri Avishek Dasgupta, Scientist, TSAC gave a brief outline of activities carried out by TSAC.

During his address, the Chief Guest stressed on the need of scientific data to enable administration to work efficiently and effectively. He stressed on utilizing space technology for collecting such scientific data that will help in making plan for optimum utilization of resources thus enabling long term and sustainable development. He appreciated ISRO's vision of four pillars of space technology applications namely Socio economic security, Sustainable development, Governance, and Disaster risk reduction. He called upon all the departments present to deliberate throughout the day and understand what each department want and then make an action plan to meet those based on scientific data.

At the end of the inaugural session, Hon'ble Deputy Chief Minister inaugurated the Space exhibition. He visited the NESAC stall and was briefed about different thematic applications of space technology by Director, NESAC. He was also briefed about the UAV (Unmanned Aerial Vehicle) remote sensing (RS) system that was set up by TSAC.

Director, NESAC explaining about NESAC activities to Hon'ble Deputy Chief Minister of Tripura Shri Jishnu Dev Varma

The inaugural function was followed by two presentations by Dr P V N Rao, Dy Director, NRSC, Hyderabad and Shri Kalyandeep K, Scientist, NRSC. Dr Rao explained in detail, about different national projects executed by NRSC that covers Tripura as well. He also highlighted about Tripura specific applications by NRSC. Shri Kalyandeep made a brief presentation cum demonstration on ISRO's Bhuvan geoportal and explained how different line departments can make use of this portal.

The state meet had four Technical Sessions on

State Meet for Promoting Space Technology Based Tools and Applications in Governance and Development for the state of Tripura

A section of participants during in the State Meet

Agriculture and Allied Sectors; Environment, Energy & Natural Resources; Infrastructure Planning & Technology Diffusion; and Governance & Societal Applications. 33 departments made presentations through these four technical sessions about their department level use of space technology and on their future plan on using space technology. 93 projects were proposed to be taken up by different departments in collaboration with TSAC, NESAC, NRSC, etc.

Shri S K Rakesh, Additional Chief Secretary to the government of Tripura was the Chief Guest in the valedictory/special session of the state meet. The session started with the welcome address by Shri Shailendra Singh, Special Secretary, DSTE wherein he briefed about the highlights of the day long state meet. All the four session's chairman / co-chairman briefed about each technical session and provided insight into the discussions and deliberations done in each session. Shri P L N Raju, Director, NESAC while giving complete summary of the state meet mentioned about different thematic areas that these proposed projects cover. He appreciated the innovative project ideas coming from some department and assured that ISRO and NESAC shall always be ready to provide all technical assistance in successful execution of the projects. He also summarized a few points that may be taken from the state meet which are added as recommendation from the state meet in next section.

Dr K Sivan, Secretary, Department of Space, Government of India and Chairman, ISRO addressed the participants through a recorded video message. In his message, he told that Indian Space Program is driven by the vision of harnessing space technology for national development. With active support from state and central government departments, ISRO has established many operational applications addressing the priorities of government and society. He assured that ISRO will work closely with the line departments in Tripura for maximizing the potential of space technology applications towards development of Tripura.

The video message from Dr K Sivan, Secretary, DoS and Chairman, ISRO

The Chief Guest of the concluding session, during his address invited all the Departments of Govt. of Tripura to come forward and use space technology to its fullest potential. He said that a full throttle science & technology can be used as a force multiplier to the state's development. He requested ISRO, NESAC, and TSAC to have a coordinated approach to make use of space technology to address various problems in the state. He told that Tripura has been an advanced state in terms of use of Science and Technology and requested all departments to interact more with TSAC and NESAC to realize the wish list that was prepared throughout the day. He desired that ISRO and NESAC continue to provide right technical advice to line departments in Tripura and help in growth of the state.

Shri S K Rakesh, Additional Chief Secretary to the government of Tripura addressing the participants during the valedictory session

The state meet was ended with the vote of thanks offered by Shri Animesh Das, Director, DSTE, Govt. of Tripura.

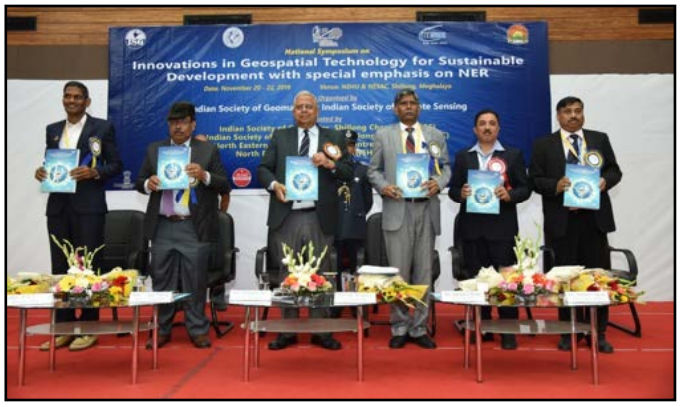
ISG-ISRS National Symposium 2019

Dr Bijoy K Handique

The National Symposium on "Innovations in Geospatial Technology for Sustainable Development with special emphasis on NER" and annual conventions of Indian Society of Geomatics (ISG) & Indian Society of Remote Sensing (ISRS) was organized jointly by Indian Society of Geomatics & Indian Society of Remote Sensing during November 20-22 in Shillong. The event was hosted by ISG Shillong Chapter (ISG-SC), ISRS Shillong Chapter (ISRS-SC), North Eastern Space Applications Centre (NESAC), and North Eastern Hill University (NEHU). The Symposium focused on recent advancements made in the satellite payloads, data processing techniques, web GIS, mobile App., geospatial technology and applications in various key areas. The symposium was attended by more than 350 delegates consisting of researchers, professionals, academia, students and geospatial industry from different part of the country.

Shri Tathagata Roy, Hon'ble Governor of Meghalaya lighting the lamp

The symposium was preceded by a 2 days pre-symposium tutorial which were conducted during November, 18-19, 2019 under the four broad themes, (i) UAV Remote Sensing – acquisition, processing and derivatives, (ii) SAR data processing and applications, (iii) Artificial Intelligence (AI) and Machine Learning (ML) for Remote Sensing data analysis, and (iv) Hyperspectral Remote Sensing.



Abstract Volume cum Souvenir of the symposium was released by Hon'ble Governor and other dignitaries on the dais.

The national symposium was formally inaugurated by Shri Tathagata Roy, Hon'ble Governor of Meghalaya. Prof. S.K. Shrivastava, Vice Chancellor, NEHU was the Guest of Honour, In his inaugural address, the Governor stressed upon the innovations of space technology and geospatial technologies as a means to address issues and challenges of the north-eastern region and to enable it for accelerated development. Referring to the Prime Minister's recent appeal on the various ministries, agencies and state governments to use space technology, he urged upon the scientists participating the symposium to give more focus to the aspects related to governance and development. The Abstract Volume cum Souvenir of the symposium was released by Hon'ble Governor

A section of the participants during the inauguration program

during the inaugural function of the symposium.

Shri Tapan Mishra, President, ISG and ISRS in his presidential address gave the details of the activities of the ISG and ISRS in the country and highlighted on various initiatives to expand the activities of the societies. Prof. S.K. Shrivastava, Vice Chancellor, NEHU, thanked Indian Society of Geomatics for choosing NEHU as the Venue of the symposium.

The seminar consisted of several plenary sessions on Geospatial Technology: Need for Innovation; Advances in Space & Atmospheric Science Research, etc, wherein lectures were delivered by many eminent speakers. Padmasree Kiran Karnik delivered the Vikram Sarabhai Memorial Lecture on "Technology for People's Good: Vikram Sarabhai's Enduring Legacy" touching upon ISRO's scientific activities for the betterment of India over the years driven by the economic viability and feasibility of their technology. Prof. Henry Lamin (Pro-Vice Chancellor, NEHU) delivered the talk on "Development of North East India: Issues and Challenges" wherein he touched upon many diverse issues pertaining to the development of North East India

Padmasree Kiran Karnik delivering the Vikram Sarabhai Memorial Lecture.

The inaugural and plenary sessions of the first day were concluded by a lively cultural program in the evening, depicting the rich and diverse culture of North East India. The audience was enthralled with several dance forms representing Manipur, Assam, Mizoram and Tripura.

A cultural troupe from Manipur.

There were 18 technical sessions spread into different themes like, Advances and Innovations in Image Processing Forestry, Environment & Ecosystem Management, Geospatial Technology on Governance and Societal Applications, Large Scale Mapping, Urban and Infrastructure Planning and Development, Remote Sensing for Agriculture, Soil, and Allied Areas, Current Scenario in Weather and Climate Change Studies, Geospatial Technology for Water Resource Management, Special Session of ISPRS Technical Commission V on Capacity Building, Advancements in Photogrammetry, UAV and LiDAR Applications, Geospatial Technology for Renewable Energy Resources and Geosciences Applications, Web and Location Based Services, Big Data Analytics,

Shri Tapan Mishra, President ISG and ISRS at a exhibition stall.

Data Mining and IoT, Hyperspectral Remote Sensing - Advancements and Applications,

Space Technology for Disaster Management and Mitigation, Microwave Remote Sensing - Challenges and Applications, Special Session on Jal Shakti – Sustainable Water Resources Management in India. There was a Poster session as well. Posters from different themes were displayed in the Poster presentation area, where visitors went through the posters and interacted with the authors.

The concluding session had a panel discussions that started with opening remarks by Shri P.L.N. Raju, Director, NESAC. The major suggestions that emerged during the discussions were, greater importance to be given to bamboo cultivation, use of geospatial technologies to contribute to the economic growth of farmers by performing site suitability analysis for high value aromatic crops, bridging of gap between local people and technology by involvement and feedback of people in the decision making process, increase in the focus on NE region assets, Exclusive use of geospatial technology for infrastructure development, inclusion of schools and colleges as regards geospatial knowledge development, socio-economic development of the NE region as an ecotourism hub using geospatial technology, etc.

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We are now preparing to conduct the very prestigious course on Capacity Building on the Earth Observation Applications and Research for the BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) countries during 6-17 January, 2020. Four delegates from each of the member countries excluding India shall attend the course that is fully funded by Ministry of External Affairs of Government of India. We are also celebrating the birth centenary of the father of Indian Space Program, Prof Vikram Sarabhai along with other ISRO centers. A series of program shall be conducted till 12 August, 2020 and the first in the series is planned at Agartala, Tripura during 2-4 January, 2020.

The State Meet on Promoting Space Technology Based Tools and Applications in Governance and Development for the state of Tripura was conducted on December 03, 2019 in collaboration with Tripura Space Applications Centre (TSAC). A total of 184 officials attended the meet that includes participants from 52 departments from state and central government departments and officials from ISRO/DoS. It was a very successful program that will pave the way for enhanced use of Space Science and Technology for the state of Tripura. Hon'ble Deputy Chief Minister of Tripura gave clear directives to all concerned to make best use of Geospatial Technology for planning and execution of projects in Tripura. NESAC will continue to provide technical and all other possible support in such endeavor.

We have hosted the National Symposium on Innovations in Geospatial Technology for Sustainable Development with special emphasis on NER during 20–22 November 2019. This was the biggest event hosted by NESAC so far with more than 350 registered delegates. NESAC demonstrated excellent team work to host such a big and multi faceted program successfully with a limited human resource. We are hosting another National Seminar, TROPMET-2020 of similar scale in November, 2020.

The scientific activities of the centre have also been increasing. While we have made good progress on the ongoing projects, we have completed a few of them recently like, identification of suitable areas for expansion of orange in Meghalaya, development of decision support system for early warning of selected Muga Silkworm diseases, Flood Early Warning System for Assam, etc. A few new projects, both covering application and research areas were also approved during this time, like, Geo-tagging of all sericulture assets in NE region has been approved by Central Silk Board, Ministry of Textiles; Setting up a Hydro-meteorological monitoring system for the catchment areas upstream of Kopili hydro-electric project was approved by NEEPCO (North Eastern Electric Power Corporaton Limited), Geo-tagging and monitoring of NEC funded projects, etc. NESAC will continue to put highest emphasis on taking the benefits of Space Technology for the development of NE region through venturing into new areas of space applications and research. The Satellite remote sensing and UAV remote sensing is already complementing each other and NESAC, with the use of modern technologies and tools, wishes to take this to newer heights in the coming year to address the complex problems that the NE region of India faces.

Capacity building training programs under AMRUT sub-scheme on formulation of GIS based master plans

On the request of the office of Mission Director, AMRUT (Atal Mission for Rejuvenation and Urban Transformation) Assam, NESAC, in association with Town & Country Planning Organisation, Ministry of Housing and Urban Affairs, Govt. of India, organized a one-week training programme on "Formulation of GIS Based Master Plans for Middle Level officers" from 29 October to 02 November, 2019. Participants from the different Urban Local Bodies of Assam participated in the training. The training included the theoretical concepts, case studies, hands-on, field work and project work. The participants were also exposed to the new technology like UAV, mobile app for vetting, etc. During the field visit, the participants were demonstrated on how mobile app can be used for vetting of urban land use, base and mapping utilities, etc. The participants appreciated the quality of teaching by the faculty of NESAC, the use of open source software for data extraction and analysis, good facilities and overall the experience that they have gained that they will implement in their work.

Two weeks training course on UAV remote sensing

The fourth round of two weeks training course on "Unmanned Aerial Vehicle (UAV) Remote Sensing (RS) – Possible applications & future advances" was conducted by NESAC during Sep 16 - 27, 2019. The training course was attended by a total of 36 participants including students, research scholars and teachers from different Colleges and Universities and officials from various government and private sectors from different parts of the country. The course covered understanding of the UAVs and its components, flight planning for data acquisitions for various remote sensing applications, 3D printing & its application in UAV, etc. It also covered different data processing techniques such as generation of Orthomosaic, digital surface model (DSM), digital terrain model (DTM), contour maps, volumetric analysis, etc. for high-resolution UAV data processing using various software. The course had 14 hours of lectures, 26 hours of practical work for the participants, one industry interface session and one day of field visit to capture UAV data with GCPs. The valedictory function was graced by Shri Atanu Saha, Director Science & Technology, North Eastern Council as the Chief Guest and Shri Manish Kumar Agarwal, Airport Director, Umroi Airport as the Guest of Honour.

Hands-on training on geo-tagging of sericulture assets

One day hands-on training on Geo-tagging of Sericulture assets using SILKS mobile app and dashboard visualization system was organised at NESAC for the officers of Sericulture department, government of Meghalaya on 11 September, 2019. Detail background and overview of the programme was explained by Dr. B. K. Handique, Coordinator of the project. Shri Avinash Chouhan, Scientist, NESAC demonstrated the SILKS mobile app and dashboard visualization system. Hands on training on geo-tagging of assets using mobile app

was given to all participants in the residential complex, NESAC with the help of GAGAN dongle.

Two days training on applications of GIS in disaster risk management organized at NESAC

On the request of National Disaster Management Authority (NDMA), Ministry of Home Affairs, Government of India, NESAC organized a two days training course on 'Applications of Geographic Information System in Disaster Risk Management' at NESAC during 17 – 18 October, 2019. The program was inaugurated by the Shri T Dkhar, IAS, Commissioner and Secretary, Social Welfare Department. A total of twenty eight officers from various state and central government organizations participated in the training program. The training covered lectures on different aspects of the role that space technology can play for disaster management. In addition, the training covered sessions on hands-on, field visits, and practical sessions on the various live dashboards, geoportals, software, etc.

Short course on RS & GIS applications in Forestry and Ecology

A short course on RS and Geographic Information System (GIS) applications in Forestry and Ecology was conducted at NESAC during 21 - 25 October, 2019. A total of 21 participants joined the training from various parts of North East India and West Bengal. The themes covered during the course were basics of remote sensing and GIS, image interpretation, enhancement techniques, vegetation indices, concepts of GPS & map projection, wildlife habitat evaluation, species distribution modeling, concepts of microwave remote sensing, UAV remote sensing, hyper-spectral remote sensing, etc. The course focused more on practical sessions demonstrating image geo-referencing, satellite image interpretation, layer stacking, familiarization with QGIS software, forest mapping, etc. Various thematic topics and practical exercises were conducted by NESAC scientists and researchers.

Course on Drone data acquisition, processing and analysis using open source tools

A short course on drone data acquisition, processing and analysis using open source tools was successfully organized by NESAC during 4 – 8 November, 2019. The course was focused on how available tools and libraries could be used for processing of drone derived imagery and generate valuable high resolution data products such as Orthomosaics, Digital Surface/Terrain Models, 3D textured models, etc. which can then be used for various planning and R & D purposes. Further, advanced lectures on computer vision techniques for 3D scene reconstructions and use of machine learning and deep learning for UAV data analysis were also delivered during the course. Extensive hands-on tutorials were prepared and used by the participants to equip themselves with the major tools and libraries for drone data processing. The weeklong course was attended by 32 participants coming from various government departments, institutes and public/private sectors.

NDAM sponsored training on Disaster Risk Management

NESAC conducted National Disaster Management Authority (NDMA) sponsored 5 day training course on "Applications of Geographical Information System (GIS) in disaster risk management" at NESAC outreach campus during 9-13 December,

2019. Total 18 officials from both Central and State government organizations like, Dept. of Telecommunication, State Disaster Management Authority, District Disaster Management Authority, India Meteorological Department, Colleges, etc. from Eastern and North Eastern parts of India, participated in this training.

Total 18 theory classes were taken on diverse topics including Basics of Remote Sensing, Geographical Information System, Global Navigation Satellite System and their applications to various hazards, namely, flood, forest fire, landslide, earthquake, thunderstorm, cyclone, lightening, etc apart from weather forecasting, web-GIS, satellite communication and UAV technology.

Short course on applications of RS & GIS in Water Resources

NESAC has conducted a one week short course on "Applications of Remote Sensing & GIS" in Water Resources' during 25-29 November, 2019. This course mainly focused on understanding of remote sensing (RS) and GIS techniques to study the recent advances in water resources. The course consisted of the series of lectures and practicals on RS, GIS and water resources. The course was designed with a view to provide participants an understanding of the scientific concepts associated with RS and its applications to various water resources problems. A total of 15 participants from different parts of NE region attended the training program.

Short course on applications of RS & GIS in Agriculture and allied areas

A one week short course on "Applications of remote sensing & GIS in Agriculture and allied areas" was conducted at NESAC during 25 – 29 November, 2019. This course focused primarily on providing basic working knowledge in the field of geospatial domain for professionals related to agriculture and allied areas. The course consisted of the series of lectures and hands-on exercises which emphasizing the overall understanding of basic concepts, applications and the utilization of geospatial technology for crop acreage and production estimation, cropping system analysis and crop damage assessment, Land and Soil Resources Assessment Site suitability analysis for expansion of crop, applications of geospatial technology in allied agriculture activities like animal husbandry, sericulture, etc. The trainees were also introduced to the recent developments in the areas of mobile applications and services and UAV remote sensing. A total of 19 participants for different parts of NER attended the training program. In addition to lectures by Scientists of NESAC, Dr. P. P. Nageswara Rao, Former Director, NESAC and Dr. J. S. Parihar, Former Director, NESAC and former Deputy Director, SAC, Ahmedabad delivered talks as invited speakers.

NESAC celebrated Hindi fortnight

Hindi fortnight was organized at NESAC from September 2 - 16, 2019. During this time, several activities were organized such as display of banner, plantation of trees, various competitions, etc. A Hindi workshop was also organized on the topic "Elementary knowledge of Hindi and Hindi translation" at NESAC on 3 September, 2019 which was delivered by Shri K. C. Basfor, Manager (O.L.), SBI, Guwahati, in which employees from the all sections participated. Various Hindi competitions were organized, in which NESAC staff participated with full zeal. Competitions like Hindi newspaper reading, translation of administrative terminology, extempore speech, dictation writing and group debate competition, etc. were organized. Certificates for which were distributed to the winners on 16 September, 2019.

Earthquake evacuation mock drill conducted at NESAC

A joint mock drill was conducted at NESAC on 17 September, 2019 on Earthquake evacuation for the staff of NESAC. Personnel from NESAC CISF Unit, Ri-Bhoi District disaster management authority, local police from Umiam police station, Meghalaya fire & emergency services personnel from Umiam station, personnel of Meghalaya home guard stationed at NESAC, NESAC safety team & Administration along with staff of NESAC participated in the mock drill exercise.

Dr. K. Radhakrishnan, Former Chairman, ISRO visited NESAC

Dr K Radhakrishnan, former Chairman of ISRO visited NESAC on 15 October, 2019 while he came to Rajib Gandhi Indian Institute of Management (IIM), Shillong to deliver the Dr A P J Abdul Kalam Memorial lecture there. He inaugurated and flagged off the Space of Wheel 2019, that has been developed for use in Vikram Sarabhai centenary celebration program. He also interacted with all Scientists, Research Scientists, and Research Scholars at NESAC.

Swachhata Hi Seva (SHS) celebrated at NESAC

Swachhata Hi Seva (SHS) campaign with a Motto 'Plastic waste free India', was organized by NESAC from 3 – 27 October 2019. The program was inaugurated by a Swachhta Pledge which was administered by Shri P L N Raju, Director NESAC followed by a cleanliness drive at NESAC campus.

During this period, various activities took place like cleanliness drive outside NESAC office, NESAC residential complex, NESAC outreach facility & hostel block, nearby villages, Umiam market, etc. In order to create awareness on cleanliness, hygiene & sanitation and creating awareness regarding segregation of plastic waste, flyers, stickers, and pamphlets were distributed to nearby areas. Awareness talks on segregation of waste to all residents and nearby villages as well as arrangement of blue and green bins for waste segregation was also given to the residents and nearby villages. Sloganeering on sustaining toilet usage and taking up waste management work in the area and sensitize local community to stop wasting of water resources was also done for nearby villages.

NESAC participated in Assam state level "National Children Science Congress"

NESAC participated at the 27th State level "National Children's Science Congress (NCSC)" held at Domdooma, Assam from 1 - 4 November, 2019. A state of the art space museum build in a bus developed by ISRO as a part of the Dr. Vikram A. Sarabhai centenary celebration program was also displayed in the NCSC. The mobile space exhibition bus was on display for the first time in the North Eastern part of India. The "Space Museum on Wheels" has models of launch vehicle (SLV, ASLV, PSLV, GSLV), satellites (polar and geostationary), Vikash engines, cryo stage, RLV-TD-NAVV, ISRO extra planetary missions, etc. The bus was also exhibited in CSIR-NEIST, Jorhat and Sivasagar College, Sivasagar. Around 2500 participants from various groups of people like students, teachers, and general public visited the bus and experienced Indian space technology. A team of NESAC led by Dr. Arup Borgohain, Scientist demonstrated the features of the exhibition to the participants.

Student Visits

Visit of students from Regional Institute of Science & Technology, Meghalaya to NESAC on 5 November, 2019

Students from Arya Vidyapeeth, Guwahati visited NESAC on 6 September, 2019

Visit of Madhya Pradesh Police Officers to NESAC as part of training program at North Eastern Police Academy (NEPA), Meghalaya on 23 October, 2019

Students from Ayush Public School, Shillong

NESAC Training Calendar for 2020

SN	Title of the course	Tentative dates
1.	Short term course on fundamentals of RS and GIS for BIMSTEC countries	6-17 January, 2020
2.	RS & GIS applications in Geosciences	10-14 February, 2020
3.	AMRUT training	17-28 February, 2020
4.	RS & GIS applications in Atmospheric science	2-6 March, 2020
5.	RS & GIS applications in disaster management (NDMA Sponsored)	6-7 February, 2020 2-6 March, 2020
6.	Application of UAV in Disaster Management (NDMA Sponsored)	16-20 March, 2020
7.	UAV RS - Possible applications and future advances	27 April – 8 May, 2020
8.	Yuva Vigyani Karyakram (YUVIKA) - 2020	11-22 May, 2020
9.	Basic course in RS and GIS	1-19 June, 2020
10.	UAV data Processing using FOSS	12-16 October, 2020
11.	RS & GIS applications in Forestry & Ecology	2-6 November, 2020
12.	RS & GIS applications in Agriculture and Soil	23-27 November, 2020
13.	RS & GIS applications in Water Resources	23-27 November, 2020

Achievement

Dr Dibyajyoti Chutia, Scientist/Engineer – SF from NESAC was awarded with the National Geomatic Award - Technology by Indian Society of Geomatics for his contribution in the field of geoinformatics. He received the award from Hon'ble Governor of Meghalaya during the ISG-ISRS National Symposium held at Shillong during 20-22 November, 2019.

Congratulations Dr Dibyajyoti Chutia

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