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CONTACT

अंक 16 संख्या 1/ Volume 16 No.1

जून 2014/June 2014

...on a mission for transferring technology through education, research and capacity building

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Training and Capacity Building Initiatives at IIRS

Indian Institute of Remote Sensing (IIRS) is a premier institute engaged in training and capacity building for Earth Observation (EO) applications and Geo-information Science. The institute also hosts United Nations affiliated regional centre i.e. Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP). IIRS has collaborated with various international partners. Under the Joint Education Programme with International Institute for Aerospace Survey and Earth Sciences (ITC), The Netherlands, Post-Graduate Degree and Diploma Programmes are offered in Geo-informatics (GI) and Natural Hazards and Disaster Risk Management (NHRDM). IIRS conducts M.Tech. programme in eight sub-disciplines which is accredited by Andhra University. The Institute has so far trained 9416 professionals, including 906 professionals from abroad representing 92 countries mainly from the Asia, Africa and South America. A total of 330 students have graduated in the M.Sc. and M.Tech. courses being conducted by the Institute since 2002. It has also trained 801 professionals including 443 in short and 358 in long-term courses from various countries in the Asia-Pacific Region in its endeavour of providing technical support to CSSTEAP for all its RS and GIS training and education programmes. Further, 15834 graduate and post-graduate students from 217 universities spread across the country have also benefited through EDUSAT-based distance learning programmes being offered by the Institute since 2007. IIRS has launched e-learning course this year in addition to existing distance learning programs for colleges and universities. IIRS has also been certified as ISO 9001:2008 institution with the scope of "Capacity building through training and education in the field of RS and GIS for sustainable development".

The present issue of *CONTACT* newsletter showcases recent research experiments conducted by M.Tech. and M.Sc. students of IIRS as a part of their course curriculum. The exemplary research outputs generated by students under the guidance of IIRS faculty create benchmark in quality education in Geo-informatics for natural resources management. Readers are encouraged to visit Course Calendar given in this newsletter and IIRS website for the details of various courses, application forms and guidelines for admissions. Under e-learning programme, individuals can also get enrolled and learn the geospatial technologies at their ease. IIRS welcomes collaborative research activities with various user departments, research or academic institutions and long term projects by external students.

- Dr. Y.V.N. Krishna Murthy

TECHNICAL COMMUNICATIONS

Detection of Crop Water Stress and its Impacts on Productivity of Cropland Ecosystem

Detection of crop water stress is crucial for efficient irrigation water management. Satellite monitoring of vegetation water stress is very important for precision agriculture, which relies on timing of irrigation to ensure that crops will not suffer from water stress and produce maximum potential yield under limited water conditions. Satellite data has potential to provide spatial and temporal dynamics of crop growth conditions under water stress. This study was conducted in western Uttar Pradesh and parts of Haryana. Multi-temporal Landsat data was used for detecting water stress using thermal and optical based indices. Vegetation Water Stress Index (VWSI), Land Surface Wetness Index (Ws_LSWI), Water Stress Index (WSI) and SEBS for ET was used. For estimating productivity, Light Use Efficiency model (LUE model) was used. Water stress was validated with flux tower data. The crop cutting experiment was done for yield validation. Crop stress factor was incorporated into LUE model for assessing impact over productivity. The results indicated that Ws_LSWI was better over other indices showing RMSE=0.12 and $R^2=0.65$ whereas, Ws_VWSI overestimated with Mean RD=4%. SEBS derived daily ET values were overestimated for all months. Ws_LSWI based estimated LUE showed better results for February month than Ws_VWSI. Productivity derived by using water scalar (Ws_LSWI) had $R^2=0.65$ and 0.46 for Ws_VWSI. Study revealed that Ws_LSWI

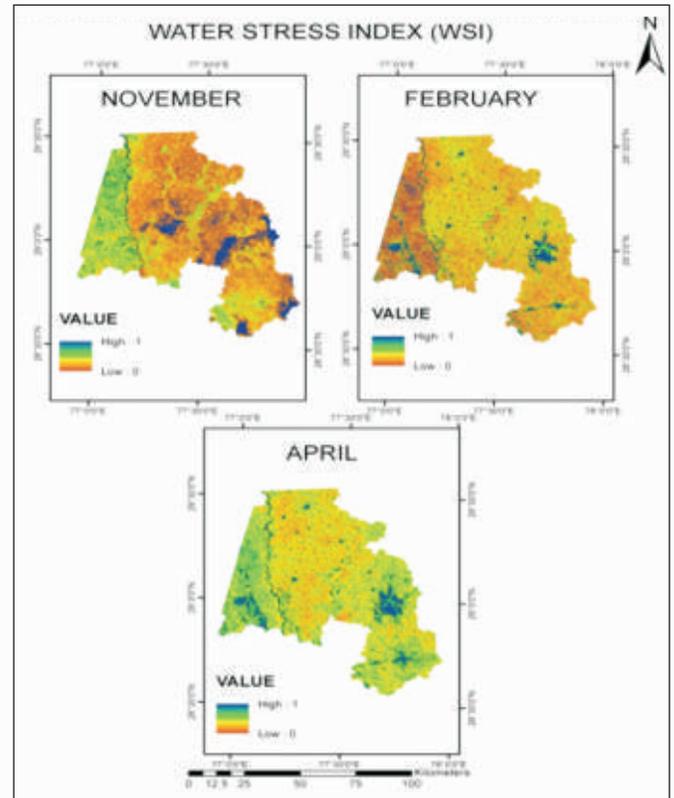


Fig. 1. Water Stress Index (WSI)

was most useful in detecting crop water stress and has proven to be a robust index.

- Nitika Dangwal, N. R. Patel and Mamta Kumari

Optimizing Parameters Obtained from Multiple Sensors for Biomass Estimation at ICESat/ GLAS Footprint Level using Different Regression Algorithms

Accurate estimation of forest biomass is crucial to determine its role in better quantification of carbon stocks and fluxes within the global carbon cycle. Sensitivity of both passive and active (RADAR) remote sensing to biomass goes down in the dense forests with high biomass. The Light Detection and Ranging (LiDAR) measures vertical forest structure directly, hence offer potential for accurate estimation of height and biomass. In the present study, Above

Ground Biomass (AGB) was estimated at ICESat/ GLAS footprint level by integrating space borne LiDAR (ICESat/GLAS) and optical (WV-2) data using two regression algorithms viz., Random Forest (RF) and Support Vector Machine (SVM). Results showed that a combination of LiDAR, spectral and texture parameters provide better biomass estimation accuracies as compared to those obtained by using single sensor parameters (Table 1). The study

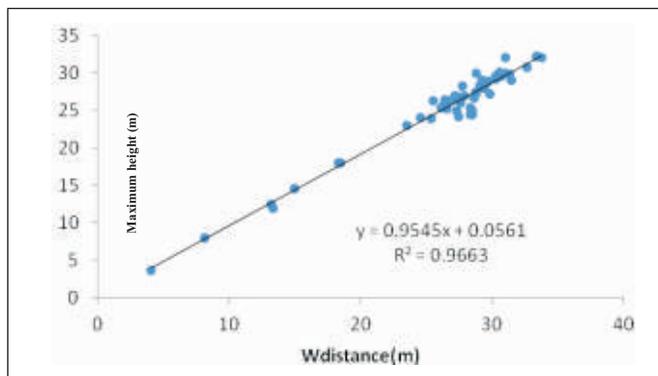


Fig. 1. Maximum height vs. distance

introduced a novel and better method of field data collection from ICESat/ GLAS footprints. The results of the study were encouraging. The forest height was predicted with an RMSE of 1.35 m (Fig. 1). Six most important parameters viz., wdistance, wextent, correlation2, NIR2max, IRGVI2max and H75, were able to explain 78.7% (adjusted) variation in the observed AGB with an RMSE of 13.9 tha^{-1} . Fifteen most important parameters were able to explain 83% (adjusted) variation in the observed AGB. SVM regression algorithm explained 88.7% of variation in

Table 1. Comparison of SVM and RF prediction accuracies

| Dataset | SVM R^2 value | RF R^2 value |
|---------------|-----------------|----------------|
| LiDAR | 0.699 | 0.687 |
| WV-2 Spectral | 0.601 | 0.594 |
| WV-2 Texture | 0.515 | 0.665 |
| Combined | 0.887 | 0.835 |

AGB with an RMSE of 13.6 tha^{-1} on the combined datasets while RF regression algorithm explained 83.5% of variation in AGB with an RMSE of 20.57 tha^{-1} . The study demonstrated that RF regression algorithm performs equally well on datasets irrespective of the correlation of underlying variables with the predicted variable whereas SVM regression was found to perform well on those datasets which were having a subset of underlying variables that are correlated with the predicted variable. The study conclusively established that sensor integration approach is much better than single sensor approach in predicting the AGB.

- Parshant Dhanda and Subrata Nandy

3D Geodata Management and Query Optimization in GeoRDBMS in Multi-User Data Access Environment

Atribution of real world phenomena in 3D GIS environment is useful for different applications. Most of the 3D GIS technologies presently focus on 3D visualization and simulations with limited interactions from users for data query and analysis, especially in multi-user data access environment. This is possible through integration and incorporation of augmented reality with GeoRDBMS for 3D geodata at server end. GeoRDBMS has an advantage in 3D GIS studies as large volume of spatial data can be managed inside GeoRDBMS environment and it can also store semantics similar to 3D file formats like CityGML. Optimization and management of 3D geodata inside GeoRDBMS is a key issue when it comes to storing large 3D datasets. The present study is an attempt to develop a platform using GeoRDBMS where user(s) can extract various information from created 3D geodata and can visualize the results on web based map visualization systems. The developed platform provides different functionalities to the user(s) to perform 3D GIS operations, such as segmentation of 3D objects, rotation of 3D objects,



Fig. 1: Outputs of 3D generator tool (left) and floor based query (right)

automatic 3D generation at LOD2 and performing location and attribute queries (Fig. 1). The developed system also provides an interface for automatic optimization of GeoRDBMS based on the performance study of spatial indexes and other parameters. A web browser based 3D visualization system with 3D operations and queries is also developed with GeoRDBMS for multi-user data access. The developed platform is tested in Noida adjoining Delhi. The outcomes of this study can be used to develop many exciting applications in the field of 3D GIS using GeoRDBMS.

- Vaibhav Kumar and Harish Karnatak

Total Electron Content and Thermal Anomalies for Earthquake Studies

Ionospheric perturbations by natural geophysical activity, such as volcanic eruptions and earthquakes, have been studied since the great Alaskan earthquake in 1964. Prior to large earthquakes, the Earth sends out transient signals, sometimes strong, more often subtle. These signals may consist of local magnetic field variations and

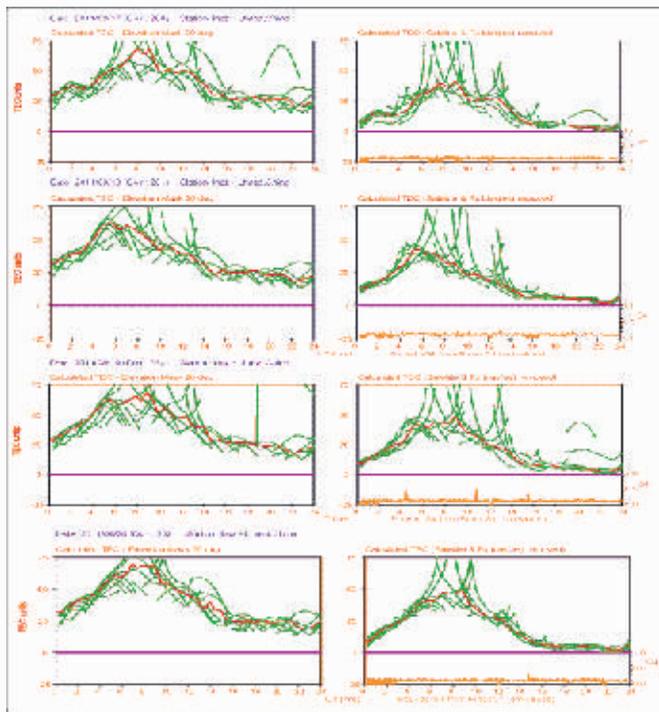


Fig. 1. Total electron content (or TEC)

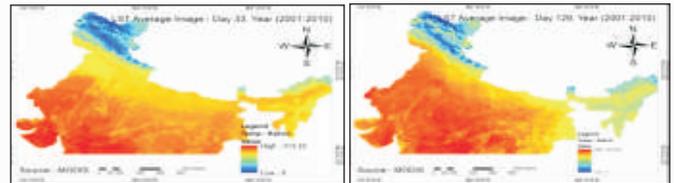


Fig. 2. LST average image

electromagnetic emissions over a wide range of frequencies that contribute to a variety of atmospheric and ionospheric phenomena. Total Electron Content (or TEC) is an important parameter of the ionosphere of the Earth. TEC is the total number of electrons present along a path between two points, with units of electrons per square meter, where 10^{16} electrons/m² = 1 TEC unit (TECU). Using the GPS data recorded at Lhasa, China during September 2011, the TEC values during the 2011 Sikkim earthquake were analyzed. Further, using the GPS data the TEC values for Lhasa were calculated for each day in September, 2011. The resulting graphs for TEC values varying in 24 hours showed a spike in TEC values ± 2 days of the seismic event (18.09.2011). Average LST image was generated by stacking images of same timeframe for last 10 years in an array, then by averaging those using python. The LST anomalies can be detected by subtracting the average image from composite LST image of same timeframe. A framework is being developed to correlate TEC and LST anomalies from which inferences can be made for significant seismic events.

- Anant Nautiyal and P.K. Champati ray

Association of Aerosol Loading with the Active and Break Spells of 2009 Indian Summer Monsoon Rainfall

Intraseasonal variability of Indian Summer Monsoon Rainfall (ISMR) and its association with aerosol loading was examined using TRMM rainfall and MODIS derived Aerosol Optical Depth (AOD). Active and break spells of 2009 summer monsoon rainfall are identified using satellite derived data sets over the Central Indian (CI) region [17°N-27°N & 74°E-82°E]. Earlier studies have demonstrated that aerosols can have a strong influence on the intraseasonal variability of rainfall. From the spatial pattern of active spells, it was noticed that CI region receives high rainfall during active spell and north-east India receives substantial amount of rain even during break-spell (Fig.1).The

break-spell of 2009 was from 24 July to 9 August and it was observed that the aerosol concentration was higher than the long term mean (Fig.2). This implies that higher aerosol concentration might have an influential role in sustaining long intense break events. Figure 1 illustrates the spatial pattern of the rainfall during the active and break events along with the aerosol dispensation. During the break event of 2009, it was observed that aerosols are stacked along the Himalayan range and higher AOD values were observed over most of the Indian land region (AOD<0.8). It has been observed that during the break-spell, north-eastern Arabian sea is confined with

higher aerosol loading (Fig.1D). During the break days, rainfall is enhanced over north-east India, close to the foothills of Himalayas. In addition to the regional scale impact of aerosols originated from

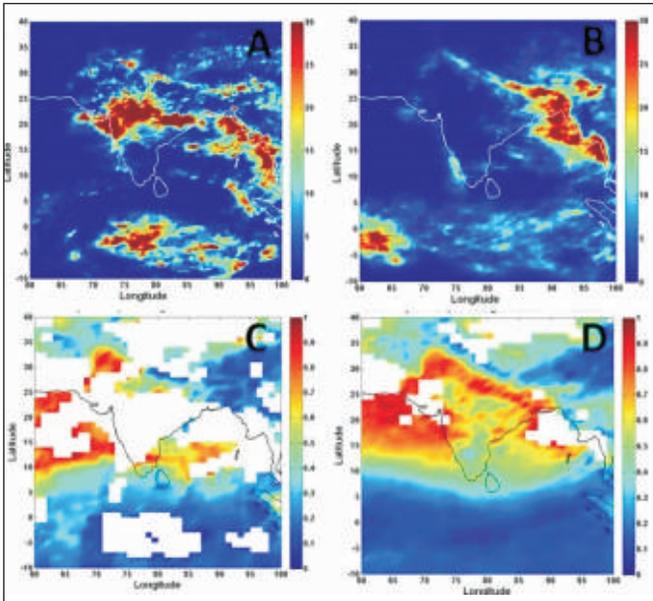


Fig. 1: Spatial pattern of (A) active spell (July 20-22, 2009). (B) Break spell (July 24-Aug. 9, 2009). (C) AOD during the active spell. (D) AOD during the break spell

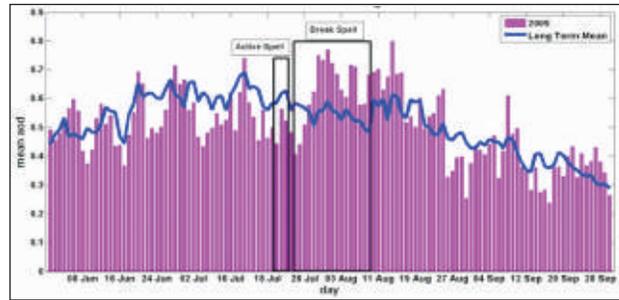


Fig. 2: Area averaged AOD over the central Indian region. Vertical bars represents AOD during 2009 ISMR. Two rectangles in the figure represents active and break spell, respectively

local sources on monsoon rainfall, it can alter the rainfall pattern over other regions through transport by large scale wind systems that prevail. Circulation during these contrasting monsoon conditions might accelerate the movement of aerosols which appeared to be confined over north-eastern Arabian Sea and moves towards the Indian subcontinent, while ending up mainly over central India. Hence, it is suggested that aerosols are significant in influencing the intraseasonal variability of ISMR.

- Litty Thomas and Charu Singh

POLInSAR Based Scattering Information and Physical Property Retrieval of Vegetation

The study was carried out with objectives: *i*) to analyze the effect of shift in polarization orientation angle on multi-frequency POLInSAR data, and *ii*) to examine the application of POLInSAR techniques for the scattering information retrieval and height estimation of forested areas. Polarization orientation angle shift on airborne SAR data has been researched leading to analyses of its effects on coherence matrix and topographic analysis. The effect is demonstrated using space-borne data acquired by ALOS PALSAR, RADARSAT-2 and TERRASAR-X platforms. Interesting results are obtained for Yamaguchi decomposed products with changes observed in helix scattering, which is contrary to the literature available. Orientation angle shift compensation is also applied, for the first time, to POLInSAR data. A preliminary analysis is presented in the present work, on the effects of orientation angle shift on POLInSAR based scattering information and also on the estimated forest stand height. POLInSAR data is utilized for estimation of forest stand height. Two techniques- Coherence Amplitude Inversion and Three

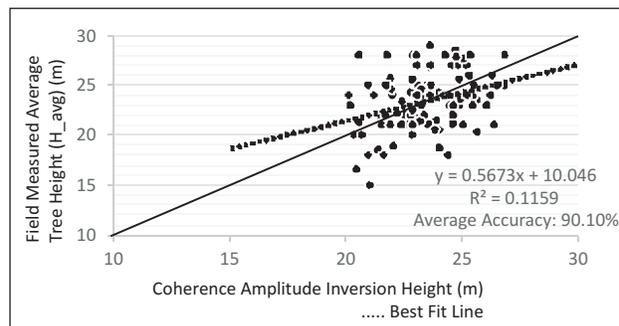


Fig. 1. Scatter plot for the height derived using the Coherence Amplitude Inversion Technique. The solid line is the line at 45° and the dotted line is the best fit line through the plots. The R² value is low at 0.1159 corresponding to a correlation of 0.34

Stage Inversion for forest height estimation are discussed, compared and validated. These techniques allow estimation of forest stand height and true ground topography. Complex coherences are calculated in all the possible polarization combinations. Ground-to-volume scattering ratio is used for accurate estimation of polarizations which represent surface and top of canopy scattering. The accuracy of the forest height estimated is assessed

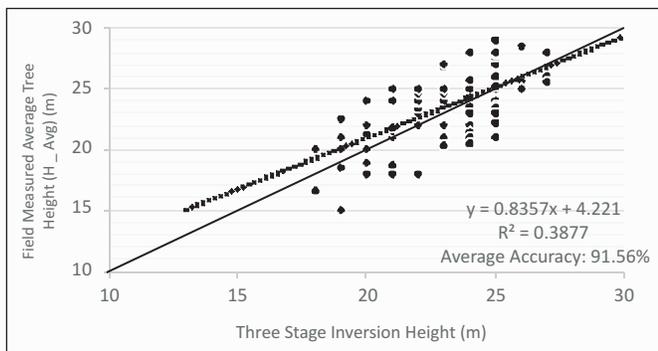


Fig. 2. Scatter Plot - Three Stage Inversion Height vs. Field Measured Average height (H-avg). The solid line is the line at 45° and the dotted line is the best fit line through the plots. The R² value is 0.3877 corresponding to a correlation of 0.623



Fig. 3. Three-dimensional representation of the height difference between effective phase scattering centers of the Barkot forest area.

using ground based measurements. For the Coherence Amplitude Inversion technique, the average accuracy calculated for POLInSAR derived forest height and field measured height was 90.10%. Whereas for the same plots, the forest height derived using the Three Stage Inversion technique was higher at 91.56%. However, the correlation between the field-measured and estimated height increases drastically using the Three Stage Inversion technique. The inability of the existing forest height estimation techniques for identification of forested areas and overestimation of

height in non-forested regions is also addressed in the present study. Based on coherence and backscatter approach, a threshold based technique for forested area identification and accurate height estimation in non-forested regions is introduced. The performance of the forest height estimation techniques and the coherence and backscatter based approach are demonstrated using fully polarimetric single baseline data acquired over the tropical forests of Barkot and Thano range, Uttarakhand, using RADARSAT-2 acquired data.

- Unmesh Khati and Shashi Kumar

Landscape Configuration and Thermal Environmental Study for Urban Planning of Central National Capital Region

Cities are like complex adaptive systems maintained by the most intense form of human-nature interaction and modifying the environmental setup. Understanding the effects of changing landscape pattern and ecology with uncontrolled anthropogenic growth gives a reasonable perspective for environmental issues like urban heat island. Urban conurbations have resulted in receding green buffer zone area around nodal centre and the ring towns tend to face a greater risk of intense heat problems. This research work is an attempt at quantifying the urban landscape spatial configuration by using spatial metrics and its collation with the thermal conditions of the selected towns in Central National Capital Region (CNCR) region. The study area comprises of Ghaziabad, Noida, Faridabad and Gurgaon, which are the major satellite towns lying in the CNCR belt around NCT-Delhi. Due to the fast rate of urbanization and receding green buffer, this region has been consistently reported for rising summer temperatures and discomfort of the urban residents. Data used for the research was derived from satellite

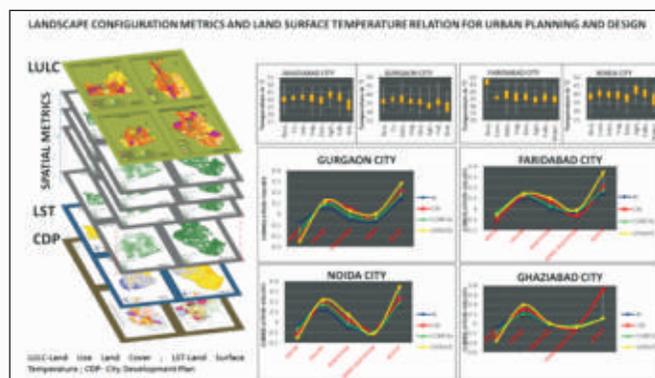


Fig. 1. Landscape Configuration Metrics and Land Surface Temperature Relation for Urban Planning and Design

images of Resourcesat LISS-IV and Landsat-8 data of May 2013 along with City Development Plans. The quantification of urban form was based on four aspects of measure- Area and Edge, Shape, Core Area, and Aggregation. Indices for each aspect measurement were Area Weighted Radius of Gyration, Mean Contiguity, Mean Core Area Index and Aggregation Index. Metric computation was done by moving window

analysis on the land cover image that gives an output as a new grid for each specified index. LST data were retrieved from two thermal bands of TIRS with the application of split window algorithm model. Pixel based correlation was employed to investigate the relationship between LST and the spatial pattern of land cover configuration represented via metrics. The correlation found in the region was gentle ranging from -0.3 for water bodies and 0.4 for built up land cover as built-up contributes towards the propagation of surface temperature. Among the four indices, the Area Weighted Radius of Gyration exhibited highest correlation with the thermal conditions followed by Mean Core Area Index, Mean Contiguity and Aggregation Index. Patch size has a greater influence on the variation in correlation values, for example, with increasing patch size of built up, the correlation values will be highly positive and reverse scenario for natural land covers. Thus, vegetation does not show significant negative

correlation as its mean patch area is 5-8 times smaller than built-up class wherein the average patch size values for vegetation are ranging from 0.10 to 0.14 and for built-up from 1.31 to 3.99. Thus, small patch of dense vegetation cover shows meagre contribution in mitigating the LST. Among the cities, Gurgaon depicts highest fragmentation and heterogeneity in configuration of patches and thus, least maximum temperature. The trend of heterogeneity decreases from Gurgaon to Faridabad, Noida and Ghaziabad and accordingly the temperature ranges are seen to be higher. This interlinking of urban climate and urban setting are found to be having applicability in urban ecological planning and design. Future policy efforts may focus on encouraging strategies to introduce higher heterogeneity in geometry of urban landscapes to reduce urban heat island.

- Amreesh Kaur Bhullar and Sadhana Jain

Statistical Downscaling of GCM Output and Generation of future Hydrological Scenario for Ganga Basin, India

General Circulation Models (GCMs) are regarded as credible tools that generate time series of the climate using transient climate simulations. However, GCMs are only available at a coarse-resolution. Most of the hydrological models require climate information at a finer spatial resolution. Downscaling has thus been considered as an important component of climate change impact assessment, to bridge the gap between the large-scale GCMs and the needs of the small scale study area. In the present research, daily statistical downscaling of CMIP5 GCM outputs has been performed using two transfer functions, namely the Least Square-Support Vector Machine (LS-SVM) and Multi-variate Kernel Regression (KR) to obtain simulations of local climate variable for four stations across the Ganga Basin. The downscaled GCM output was then used in macro-scale hydrological model, Variable Infiltration Capacity (VIC) to generate the hydrological scenario of the basin for a future time period. Establishing a downscaling model involves a statistical relationship derived between observed small scale (station level) variables and large (NCEP/NCAR Reanalysis data) scale variables, using a transfer function. GCM Projections (CMIP5 Daily simulations) have been used to derive the mathematical transfer function, in order to estimate the small-scale details of future climate as shown in Figure 1.

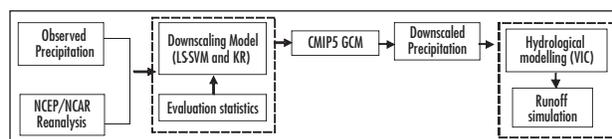


Fig. 1. GCM Projections (CMIP5 Daily simulations) used in the study

A robust methodology has been established after conducting numerous experiments on a station level data of the four stations. The calibration of the downscaling model has been based on the hyper-parameters obtained from the observed daily station data and the large scale re-analysis data. The validation of the model has been performed on the basis of the observed and the simulated climate variable as shown in Fig. 2. A detailed and rigorous evaluation and comparison of these downscaling techniques has also been undertaken. The evaluation has been performed based on a list of the best evaluation techniques for measuring the efficiency of downscaling models. Further, future hydrological regime has been generated using VIC. The calibration and validation of the hydrological model has been done using observed runoff data. The calibrated hydrological model has been run using the downscaled meteorological variables of future time period to generate the grid-wise water balance components (as shown in Fig.3) and the

simulated runoff at various specified outlets of the basin. Though, literature suggests that KR

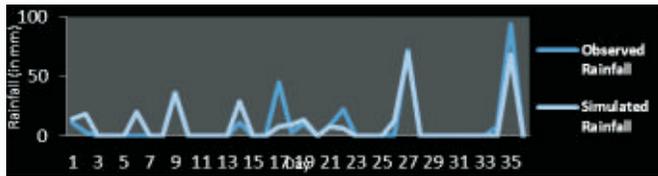


Fig. 2. Plot of observed rainfall vs. simulated rainfall using LS-SVM for Patna

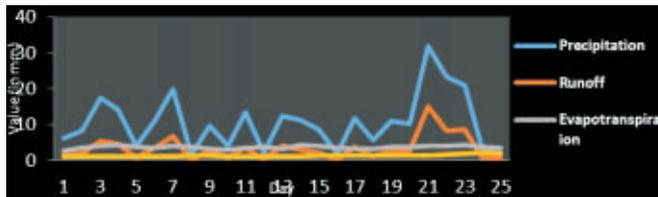


Fig. 3. Water balance components for monsoon month of August, 2040

techniques are better suited for daily simulations, the study indicates that the LS-SVM is capable of simulating peak rainfall events more effectively, whereas KR tends to average out the daily output. The sum of total daily rainfall and the Nash-Sutcliffe coefficient were determined to be the most suitable evaluation measures for downscaling techniques. The downscaled precipitation data indicates an increase in the precipitation in the month of August of 2040. The generation of hydrological regime for the future indicates a runoff of 29058 m³/s at the Farraka outlet of the Ganga basin for the month of August, 2040.

- Soumya Rajan, S. P. Aggarwal and Bhaskar R. Nikam

Web Based 3D Analysis and Visualization using HTML5 and WebGL

CityGML is a recent standard developed to describe, store and exchange virtual 3D city models. This standard not only allows understanding the spatial properties of urban objects, but also provides a common platform to integrate city level information from different sources and make them accessible to the concerned people. A plethora of software have been developed for processing and visualizing CityGML data, but its visualization on the web is still a challenging area. Although, many APIs have been developed to display 3D graphic contents on the web, they work only with certain browsers or with additional browser plug-ins installed. HTML5 and WebGL can overcome this limitation and is the main focus of this research. Applying such approach, 3D capabilities can be realized directly in the browser without any need for an additional plug-in or extension. Another benefit is that WebGL provides hardware accelerated 3D functionality on the web, resulting in significant performance improvement. This study deals with visualization and analysis of 3D objects of CityGML on a WebGL based virtual globe running on an HTML5 enabled web browser. The primary focus is to develop a framework to visualize geometry and semantics of 3D city objects on the web based virtual globe with the help of WebGL. Cesium virtual globe, which is an open source JavaScript API based on

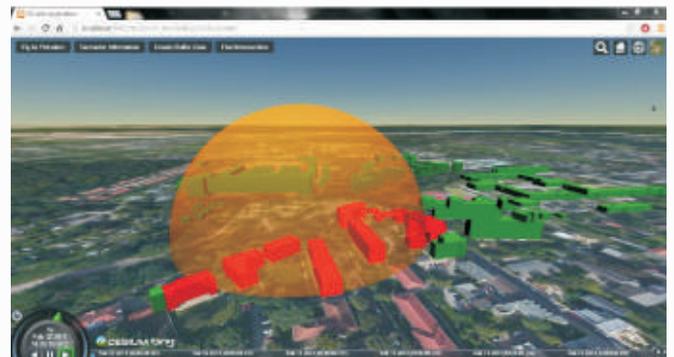


Fig. 1: A web application for 3D analysis and visualization (e.g., Google Chrome, a WebGL compatible web browser)

WebGL, has been considered in this study. The study also includes the development of on-the-fly 3D analysis, performed directly by the client. The emphasis is given to 3D buffer analysis techniques helpful in understanding and preparing for evacuation planning or other emergency scenarios in an urban area. Additionally, the functionality also includes the implementation of 3D operations, such as 3D intersection and 3D inside on top of the city model. The results of this research study show that such computationally intensive analysis functionality provides maximum power in the hands of the user without depending on the server.

- Kanishk Chaturvedi, Ashutosh K. Jha, Javier Morales and Claudio Piccinini

Trend and Variability Analysis of Groundwater in Ganga Basin as observed from Space

The Gravity Recovery and Climate Experiment (GRACE) satellite mission is the first of its kind for regional Ground Water Storage (GWS) monitoring applications. Gravity data derived from GRACE allows GWS mapping at basin-level resolutions (200,000 km² and beyond) and monthly intervals, which is extremely useful for getting the 'big picture' behind groundwater dynamics and its time evolution. This study explores GWS trend and variability over the Ganga Basin, a heavily populated and industrializing zone roughly covering the states of Uttar Pradesh (including Delhi NCR), Bihar, and West Bengal from January 2003 to December 2012. Using Monte-Carlo analysis to establish confidence intervals and to account for error propagation, GRACE observations in conjunction with Global Land Data Assimilation System (GLDAS) land surface models was used to estimate the Ganga Basin's depletion rate to be $8.9 \pm 0.3 \text{ km}^3 \text{ yr}^{-1}$ which is equivalent to a net water loss of 100 km³ over the 10-year period. In previous studies by Tiwari et al. (2009) [http://fore.research.yale.edu/files/Tiwari_Wahr_Swenson.pdf] on GWS trend analysis over the Ganga-Brahmaputra basin estimated the depletion rate to be 34 km³yr⁻¹ from April 2002 till June 2008. Based on present study, it is inferred that over Ganga Basin, the rate of depletion is lower. This is welcome news but significant effort still needs to be undertaken to curtail existing unsustainable groundwater depletion. Variability analysis is subsequently carried out over the Ganga Basin GWS time series to study level of unpredictability in year-to-year groundwater storage dynamics. Using the $\pm 2\sigma$ approach, it is observed that the study region is susceptible to yearly GWS shortfalls as large as 23 km³ due to the erratic nature of the natural and anthropogenic processes driving the groundwater system. The regional water storage and distribution mechanisms must cope with these shortfalls before they evolve into drought conditions. In-situ well data from the Central Groundwater Board (CGWB) is used for validation of GRACE results over a sub-region of Uttar Pradesh using state-of-the-art

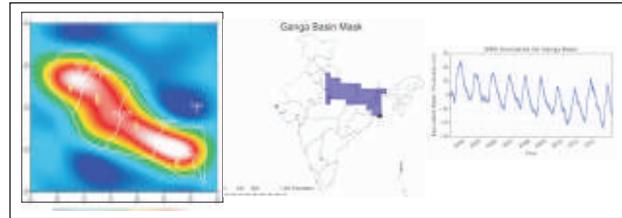


Fig. 1. (left) Areas c +d represent the Ganga-Brahmaputra basin studied by Tiwari et al. (2009) and (right) represents the study mask used for this study along with (far right) regionally averaged GWS anomalies over the Ganga Basin with shaded areas representing uncertainty

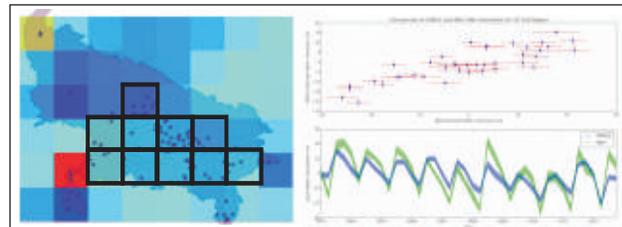


Fig. 2. (Left) The map of Uttar Pradesh with purple dots showing well locations and black squares representing the study area. (Upper Right) Plot of regionally averaged GRACE-GWS vs. CGWB-GWS with error bars, and (Bottom right) comparison of GRACE and CGWB GWS time series with shaded areas representing uncertainty

geo-statistical method known as Empirical Bayesian Kriging (EBK). EBK corrects for certain errors inherent in classical kriging and results in significant time savings when carrying out interpolation of in situ-based GWS values. The RMS error was estimated to be $8.43 \pm 0.53 \text{ cm}$ and R^2 was 0.64 ± 0.05 . The R^2 shows reasonable one-to-one relationship between the CGWB and GRACE results, however, the RMS error is on the high side. Still, the error margin is higher considering the large uncertainties inherent in well data processing. This work concludes that rapid, accurate regional GWS assessment is possible through the GRACE mission. Furthermore, Ganga Basin faces a combination of net groundwater loss and alternate policy is called for framing water management, storage, and distribution decisions.

- Guru Pradhan, P.K. Champati ray,
Rogier van der Velde and Suresh Kannaujiya

मौसम पूर्वानुमान में उपग्रहीय सुदूर संवेदन की भूमिका

मौसम पूर्वानुमान में उपग्रहीय सुदूर संवेदन की भूमिका मानव कई दशकों से पृथ्वी और उसके वायुमंडल के रहस्य को समझने के लिए प्रयासरत है, जिसमें परिवर्तनशील मौसम की जटिलता को समझना भी शामिल है। उपग्रहीय सुदूर संवेदन इस दिशा में किए गए प्रयासों का ही नतीजा है, जिससे पृथ्वी के वायुमंडल और मौसम को जानना, समझना और ततसंबंधी पूर्वानुमान लगाना संभव हो सका है। उपग्रह द्वारा समुद्री एवं भू-पृष्ठ तथा वायुमंडलीय आंकड़ों के प्रग्रहण से अब हमें पृथ्वी और उससे सम्बद्ध आंकड़ों का व्यापक दृश्य प्राप्त होता है। उपग्रहों में लगे सुदूर संवेदी उपकरणों द्वारा जैव-भूभौतिकीय तथा वायुमंडलीय प्राचल संबंधी जानकारी अब हमें वैश्विक स्तर एवं वास्तविक काल आधार पर प्राप्त होती है। मौसम पूर्वानुमान तथा चेतावनी सेवाओं में सहयोग करने के लिए अब इन उपग्रहों का उपयोग विश्वव्यापी स्तर पर मौसम के मॉनिटरिंग हेतु किया जा रहा है। मौसम पूर्वानुमान तथा चेतावनी सेवाओं में विशाल क्षेत्रीय कवरेज तथा प्रति घंटा पुनरावृत्ति चक्र के दृष्टिगत मौसमविज्ञान उपग्रहों का उपयोग अपरिहार्य हो गया है। उपग्रह से प्राप्त छवियों का उपयोग ऊष्णकटिबंधीय चक्रवात आदि जैसे विभिन्न मौसम तंत्रों का पता, उनके किसी क्षेत्र विशेष के निकट आने से कई दिन पहले पता लगाने में किया जाता है। वैश्विक स्तर पर मौसम तंत्रों के मॉनिटरिंग हेतु प्रचालित भूस्थिर उपग्रहों में गोज़/GOES (संयुक्त राज्य अमरीका), मेटिओसैट/ METEOSAT (यूरोप), इनसैट/INSAT (भारत), जी०एम०एस०/ GMS (जापान), गोम्स/GOMS (रूस) और फेन्यून/FENYUN (चीन) आदि प्रमुख हैं। इन उपग्रहों में लगे दृश्य एवं ऊष्मीय अवरक्त (इन्फ्रा-रेड) संवेदक द्वारा मेघ संरचना (मेघ का प्रकार, ऊंचाई तथा मेघ के ऊपरी सतह का तापमान) तथा वायुमंडल तथा समुद्रों की अवस्था (वायुमंडलीय जल वाष्प, समुद्र पृष्ठ का तापमान) की जानकारी प्राप्त होती है। कुछ ध्रुव-कक्षीय मौसमविज्ञान उपग्रहों (नोआ/NOAA श्रेणी, टी.आर.एम.एम./TRMM तथा क्विकसैट/QUICKSAT) से ऊर्ध्व तथा क्षैतिज वृष्टि दर तथा समुद्री पृष्ठ पर पवन गति आदि की जानकारी प्राप्त होती है। क्विकस्कैट/QUICKSCAT उपग्रह में समुद्र तरंगों द्वारा पश्च प्रकीर्ण सूक्ष्मतरंग संकेतों को मापने हेतु सूक्ष्मतरंग रेडार लगाया गया है ताकि समुद्र पृष्ठ पर चलने वाली पवन की गति एवं दिशा का समस्त मौसम एवं मेघ दशाओं में निगमन किया जा सके। यह महासागरों के ऊपर उष्णकटिबंधीय चक्रवातों का पता लगाने, उनके स्थान निर्धारण एवं लक्ष्यानुरणण में विशेष रूप से सहायक है। हाल ही में, केयू (Ku) बैंड पर प्रचालित अवक्षेपण रेडार ने उष्णकटिबंधीय और उप-उष्णकटिबंधीय वर्षा मापन के सटीक वैज्ञानिक डेटा सेट प्राप्त करने में अपन असीम सामर्थ्य स्थापित/स्पष्ट किया है। मौसमविज्ञान उपग्रह द्वारा ऐसे उपयोगी प्राचलों के मापन का

प्रयोग संख्यात्मक मौसम प्रागुक्ति एवं पूर्वानुमान हेतु जटिल पृथ्वी तंत्र जलवायु प्रतिरूप (डबल्यूआरएफ़//WRF, एमएम5/ MM5 आदि) के प्रचालन में किया जाता है। मौसम पूर्वानुमान में मौसमविज्ञान उपग्रहों के प्रत्यक्ष अनुप्रयोग के अतिरिक्त, भू-प्रेक्षण उपग्रहों ने हाल ही में मौसम पूर्वानुमान में समुन्नति के लिए महत्वपूर्ण भू-पृष्ठ प्राचलों की प्राप्ति में असीम सामर्थ्य प्राप्त किया है। भूपृष्ठ अभिलक्षणों की महत्ता जैसे भू-आवरण के अंश, मृदा, भूभाग, समय-परिवर्ती प्राचलों जैसे मृदा नमी, पर्णक्षेत्र सूचकांक तथा पृष्ठीय रूक्षता आदि की पृष्ठीय ऊर्जा आय-व्यय तथा मेसोस्केल प्रतिरूपों में परिसीमा प्रतिबंध निर्धारण में महत्वपूर्ण भूमिका होती है। जलवायु परिवर्तन तथा अल्पकालीन मौसम पूर्वानुमान में भूपृष्ठ प्रक्रमणों एवं वायुमंडल के बीच अन्त्योन्यक्रियाओं को अब व्यापक रूप में मान्यता प्राप्त है।

पहले ज्यादातर मेसोस्केल संख्यात्मक मौसम पूर्वानुमान प्रतिरूपों में निर्दिष्ट भू-आवरण अभिलक्षणों को मासिक जलवायु डेटा से प्राप्त किया जाता था। ऐसे डेटाबेस भू-विषमांगता में अक्सर वृहद मात्रा में अंतरिक्ष-काल वैभिन्य का सही निर्धारण नहीं कर पाते थे जिसके कारण अनुकार प्रतिरूप में त्रुटियाँ होती थीं। विश्व भर में किये गए कई अध्ययन यह बताते हैं कि वास्तविक काल या इससे इतर समय के भू-आवरण डेटा के प्रयोग से भूपृष्ठ तापमान के पूर्वानुमान में रचनात्मक सुधार आया है। पिछले कुछ वर्षों में विविध प्रकाशीय तथा सूक्ष्मतरंग संवेदकों द्वारा भूप्रेक्षण द्वारा मानचित्रण एवं इनवेंट्री प्रबंधन तथा भू-आवरण परिवर्तनों के उच्च स्थानिक एवं कालगत विभेदन के मॉनिटरिंग में क्षमता वृद्धि हुई है। NWP प्रतिरूपों के लिए आई०आर०एस०-ओ०सी०एम०, एम०ओ०डी०आई०एस०, स्पॉट-वेजिटेशन/SPOT VEGETATION और NOAA जैसे स्थूल विभेदन संवेदकों द्वारा वानस्पतिक अंश तथा एल०ए०आइ० का अभिकलन प्रसामान्यीकृत भेद वानस्पतिक सूचकांक आधारित गणना द्वारा संभव है। इसरो-भूमंडल-जैवमंडल कार्यक्रम के अंतर्गत प्रक्षेत्रीय जलवायु प्रतिरूपण अध्ययन से यह स्पष्ट है कि सुदूर संवेदी उपग्रह से प्राप्त पृष्ठीय मृदा नमी तथा वानस्पतिक अंश की जानकारी/आंकड़ों से भारतीय मॉनसून प्रागुक्ति/पूर्वानुमान की सटीकता में रचनात्मक सुधार हुआ है। वैश्विक प्रतिरूपण अध्ययनों ने जहां यह स्पष्ट किया है कि निकट वास्तविक काल वानस्पतिक अंश के आंकड़ों से 2m तापमान तथा ओसांक तापमान पूर्वानुमान में सुधार आया है वहीं उक्त अध्ययनों ने विशिष्टतया यह भी दर्शाया है कि प्रचालनरत मौसम पूर्वानुमान प्रतिरूपों में इस तरह की जानकारी आवश्यक रूप से सम्मिलित की जानी चाहिए।

- एन.आर. पटेल

COURSE REPORTS

M.Sc. in Geo-Information Science and Earth Observation with Specialization in Geoinformatics

11th M.Sc. course (2012-14) in Geo-Information Science and Earth Observation (specialization in Geoinformatics) offered within the framework of IIRS-ITC Joint Education Programme was completed on 21st March 2014. Among the ten students who joined the course, seven graduated on this day. The course aims at developing a critical understanding of appropriate techniques and tools for the acquisition, processing, transformation, analysis, modeling, storage and presentation of spatial data, developing research skills to design and undertake research and development projects in various fields of geoinformatics. The course is modular in structure and is divided in 23 modules, each module of 3-weeks duration. The first 11 modules were taught at IIRS, followed by 4 modules at ITC of the University of Twente, The Netherlands. In the last 8 modules, each student carried out research on a chosen topic. The M.Sc. research was carried out under the joint supervision of IIRS and ITC faculty on different topics, viz. Polarimetric SAR Interferometry, Advanced Image Processing, 3D GIS and Modifiable Spatio-temporal Unit Problem (MSTUP). The students successfully defended their research work before the Thesis



Assessment Board (TAB) consisting of Prof. Alfred Stein of ITC as the Chair, ITC Theme Leader, External Examiner and Supervisors from IIRS and ITC. We extend our heartiest greetings to all the students for successfully completing the course. We sincerely thank the faculty and staff of IIRS and ITC and the invited faculty from various organizations viz., ADRIN, Secunderabad; BIT, Ranchi; DST, New Delhi; GSDL, Delhi; IIT, Roorkee; Survey of India, for their contributions in making the course successful.

- S. K. Srivastav

M.Sc. in Geo-information Science and Earth Observation with Specialization in NHRDM

10th M.Sc. course in Earth Observation and Geo-information Science or in short Geoinformatics with specialization in Natural Hazards and Disaster Risk Management (NHRDM) commenced on 24th September 2012 and concluded on 21st March 2014. It is organized as a part of Joint Education Programme between IIRS and Faculty of Geo-Information Science and Earth Observation (formerly known as ITC), Twente University (TU), The Netherlands. The course is modular in structure with 15 course work modules and 8 project modules (each module is of 3 weeks duration) spread over 18 months. The course started with 9 M.Sc. students and 6 PG Diploma students in 2012. The initial three modules are the core modules on Principles of Remote Sensing, Principles of GIS and Principles of databases and were delivered by Photogrammetry and Remote Sensing Department (PRSD) and Geoinformatics Department



(GID). After completion of 4 technology modules, 2 common application modules have followed under Module 5 (Natural Hazards and Disaster Management) and Module 6 (Image Interpretation and Analysis for Natural Hazards Assessment). These were followed by specialization module 7 i.e., Application

of Geo-informatics to Natural Hazards Mapping and Monitoring with three specializations: Environmental, Hydro-Meteorological, and Geological Hazards followed by Module 8 (Advances in Remote Sensing for Natural Hazards study) and Module 9 (Advances in GIS for Natural Hazards study). The module 10 was on 'GI for Natural Hazard Modeling', which was followed by Module 11 on Research Skill Development and during which students also developed the initial proposal for M.Sc. Thesis. The students have worked on various

topics for research work such as Seismic vulnerability analysis, GRACE gravity data analysis for groundwater depletion, DInSAR for mining subsidence, Flood modeling and vulnerability analysis, GLOF modeling, Elephant habitat analysis, and Sal infestation both related to environmental degradation. The course has concluded on 21st March 2014 and the successful candidates were awarded the certificate.

P.K. Champati ray

Special Course on Monitoring of IWMP Watershed using Geospatial Data and Bhuvan

A special training course on “Monitoring of IWMP Watershed using Geospatial Data and Bhuvan Services” was organized from 30th December 2013 to 4th January 2014 (06 days). The course was sponsored by Department of Land Resources (DoLR), Ministry of Rural Development, Govt. of India. The course was designed by DoLR and National Remote Sensing Centre (NRSC) for the participants of State Level Nodal Agency (SLNA) of Integrated Watershed Management Programme (IWMP). A total of 27 participants from four states namely, Uttarakhand (06), HP (04), J&K (05), UP (10) and DoLR, New Delhi (02) attended the course. During the training programme, 12 lectures, 7 practical sessions and one day field visit was conducted in Sitlarao Watershed; 50 km away from Dehradun to familiarize the participants on satellite data and land features such as land use/land cover and erosion features. Dr. Y.V.N. Krishna Murthy, Director, IIRS delivered an inspiring lecture on “Geospatial Technologies for Watershed Management”. Dr. K.S. Vijay Kumar, participant from DoLR also shared experience of SUJALA project with the participants.



Participants were exposed to open source GIS software and its use with the satellite data and other thematic maps available on BHUVAN. The feedback analysis revealed that the course was well organized and it has achieved its objectives. Mrs. Neena Grewal, Additional CEO, SLNA, Uttarakhand delivered the valedictory lecture on concluding day of the course.

- Suresh Kumar

Short Course on Remote Sensing with special emphasis on Digital Image Processing

Ministry of External Affairs, Govt. of India under its flagship programme Indian Technical and Economic Cooperation (ITEC) and its sister programme, Special Commonwealth Assistance of Africa Plan (SCAAP) has capacity building as one of its major activity. These training programmes have contributed to capacity building and human resource development in many parts of the world. Under the aegis of ITEC and SCAAP funded by Ministry of External Affairs, Govt. of India, IIRS organizes two training programmes each year i.e., Short course on Geoinformatics conducted during September-November and Short Course on



Remote Sensing with special emphasis on Digital Image Processing during January-February. The Short Course on Remote Sensing with special emphasis on Digital Image Processing is being conducted since 2001. This year, 14th short course was conducted during 6 January to 28 February 2014. The course was attended by 24 candidates from 14 countries with five participants from Vietnam, two participants each from Ethiopia, Fiji, Mauritius, Myanmar, Sri Lanka and Syria and one each from Bangladesh, Bhutan, Egypt, Kyrgyzstan, Lithuania, Mozambique and Peru. So far about 417 participants from 78 countries representing all continents have been trained under ITEC sponsored courses at IIRS. In this batch, there is also representation from Lithuania for the first time. The Short Course on Remote Sensing and Image Interpretation (C-RS) has five participants, four self-

financed and one IIRS faculty. This course is of 8 weeks duration and is designed in such a way that it offers a blend of latest technologies as well as classical techniques. Various topics are covered in lectures and followed by practical/demonstrations and field visits. The course participants were taken to Mussoorie and Poanta, for Ground truth/field excursions and an educational and sightseeing tour to Delhi and Agra. After the course, formal feedback was taken from the course participants. Majority of course participants felt that the programme objective has been achieved and they were highly satisfied with the course. During the last two weeks of the course, the trainees carried out a two-week project work on the chosen topics.

- Minakshi Kumar

Short Course on Remote Sensing-An Overview for Decision Makers

The “Remote Sensing-An Overview for Decision Makers” is a four-day training programme which is specially designed for senior decision makers from government and private sector. The training programme is organized with the objective to provide broad overview of the recent trends in geospatial technologies and its applications in various developmental projects related to natural resources management, disaster management support, infrastructural projects and environmental monitoring. This year, the course was organized during 17-20 June 2014 and it received overwhelming response as thirty-two participants from various organizations attended it. The course participants were from ISRO Satellite Centre, Bangalore (2); Vikram Sarabhai Space Centre (ISRO), Trivandrum (3); Centre for Marine Living Resources & Ecology (MoES), Kochi (1); Geological Survey of India, Lucknow (1); National Institute of Abiotic Stress Management (ICAR), Baramati (1); State Institute of Town Planning, Bhopal (1); High Altitude Regional Centre (ZSI), Solan (1); Dept. of Forest and Environment, Jharkhand (1); Latehar Forest Division, Jharkhand (1); National Environmental Engineering Research Institute (CSIR), Mumbai and Nagpur (2); Central Tuber Crops Research Institute (ICAR), Trivandrum (1); Dadra and Nagar Haveli Planning and Development Authority, Silvassa (1); Disaster Management Institute, Bhopal (1); Vishakhapatnam Urban Development Authority (2); Mahalanobis National Crop Forecast Centre (MoA), New Delhi (1); Department of Irrigation, Punjab (1); Uttarakhand Forest Department (1); Town and Country Planning Organisation, New Delhi (1); Survey of India, Dehradun and Lucknow (6); Directorate of Geology and Mining, Chhattisgarh (2) and



Narmada Water Resources and Water Supply Department, Govt. of Gujarat (1). The lectures were delivered on wide aspects of Remote Sensing, GIS and GPS Principles and Applications; Overview of Bhuvan and open source data/ software, Close-range Photogrammetry and Applications; Map the Neighbourhood in Uttarakhand and Recent Trends in Remote Sensing Applications. Two guest lectures were delivered during the training programme: SATCOM and Satellite Navigation Applications by Dr. V.S. Palsule, Director, DECU, Ahmedabad and Operational Remote Sensing for Natural Resources Management by Dr. V. Venkateshwar Rao, Group Head, Water Resources Group, NRSC, Hyderabad. A field visit to Mussoorie was also organized to demonstrate the ground truth collection exercise. The course concluded on 20th June 2014 with a valedictory function wherein all participants gave very positive feedback which was followed by certificate distribution and address by Dr. Y.V.N. Krishna Murthy, Director, IIRS.

- Pramod Kumar

Post-Graduate Diploma in Remote Sensing and GIS

The Post-Graduate Diploma Courses in Remote Sensing and GIS started on 19th August 2013. A total of 30 participants joined the course. Out of which 3 candidates opted for Agriculture and Soils, 4 for Forestry, 6 for Geosciences and Geohazards, 4 for Human Settlement Analysis, 4 for Marine and Atmospheric Science, 8 for Satellite Image Analysis and Photogrammetry and 1 for water resource management. Out of nine participants that joined Satellite Image Analysis and Photogrammetry, 5 participants were sponsored by Venezuelan Government, one was sponsored by Algerian Government and three were self-sponsored candidates. The course comprises of a well-defined modular structure distributed over a period of 10 months. First module which is a common module, covered technological aspects in Remote Sensing, Photogrammetry, Digital Image Processing, GIS, Mathematical Concepts and Programming. On completion of Module I, the participants joined their respective departments where they were given exposure on diverse applications in respective disciplines. Second module covered Advanced Techniques in Satellite Image Analysis and Digital Photogrammetry under the Satellite Image Analysis and Photogrammetry sub-discipline. The major



subjects covered were emerging sensors for earth observation, Mathematical concepts of Photogrammetry, Advanced Digital Image processing and Programming for photogrammetric and image processing applications. The third module consisted of a dissertation project to be carried out by the participants. General feedback from the trainees is very encouraging. 90% of the trainees rated the overall course as very good to excellent. However, they emphasized on increasing the duration of the project work. The course concluded on 20th June 2014.

- Poonam S. Tiwari

NNRMS-ISRO Sponsored Certificate Course for University Faculty

21st NNRMS course of 8 weeks duration was conducted during 5th May-27th June 2014. The course is sponsored by National Natural Resource Management System Standing Committee on Training and Education (SC-T), ISRO/DOS, Government of India. Earlier the course was conducted in two thematic disciplines namely, (i) Urban and Regional Studies and (ii) Forestry & Ecology and now it is being conducted in eight thematic disciplines. This year, total 61 participants from 17 states joined in the course. The course is designed modular in structure comprising of four modules, each of 2 weeks duration. The first two modules cover various aspects of Geospatial technology dealing with (i) Photogrammetry &



Remote Sensing and (ii) Basics of GIS and remaining two modules focus on thematic disciplines conducted by eight departments. During the course, a total of 60 lectures, 66 hours practical and 3 field days visit were conducted during the first 3 modules in 6 weeks duration. After completing 1st and 2nd modules, trainees joined the respective departments to pursue thematic disciplines designed as 3rd and 4th modules of 04 weeks duration. Before joining the thematic modules, Director, IIRS delivered a special lecture on “Geospatial technologies in Natural Resource Management” that provided a vast exposure and potential of the technologies in various fields of Natural Resource Management to the participants. In the fourth module, each participant conceptualized pilot project of their interest and to execute and built their confidence in using Geospatial technologies in their thematic area of

interest. NNRMS course participants also got opportunity to interact with Dr. D.V.A. Raghav Murthy, Director, EOS, ISRO HQ. He also delivered a guest lecture on “Earth Observation Systems: Present and Future mission programmes of the country” for the benefit of the participants. It has given them overview of the Remote Sensing Satellite programmes of the country. At the end of the course, the participants also got a unique opportunity to participate in Academia Industry Meet held on 21st June 2014 that has given them vast exposure to understand the industry needs and challenges for capacity building. The feedback was taken from participants to evaluate the success of the course as well as their critical comments for further improvement in the course curricula.

- Suresh Kumar

Special Course on Advances in RS & GIS Technology and Applications for Participants from Industry

A specialized training programme at IIRS was organized during 16-21st June 2014 especially for the first time for participants from industry. In total, 18 participants from 9 industries participated in the training programme: Pan India (1), ADCC (2), Intergraph (1), Reliance General Insurance (2), GIS technologies (5), BAE Systems (1), Design Pvt. Ltd. (1), LRM Consultant (3), and InGen Technologies Pvt. Ltd. (2). The course had 17 lectures and 8 interactive sessions on various topics such as Advances in remote Sensing and GIS, SAR Polarimetry, SAR Interferometry, Location Based Services, 3-D Photogrammetry, LiDAR, Web-GIS, GNSS, and Business opportunities in natural resource management, disaster management, urban, water resource and energy sector. At the end, there was a deliberation with Dr. Y.V.N. Krishnamurthy, Director, IIRS on various commercial applications and opportunities that exists under 12th 5-year plan of Gol. On the last day of the programme, all course participants attended Round Table Meeting on Emerging Business Opportunities for



Geospatial Industry: An Academia-industry interface organized by IIRS in collaboration with FICCI, Indian Society of Remote Sensing (ISRS)-Dehradun Chapter and Indian Meteorological Society (IMS)-Dehradun Chapter. The course was concluded by distribution of certificates by Dr. Y.V.N. Krishna Murthy, Director, IIRS and Dr. S.K. Saha, Dean, IIRS.

- P.K. Champati ray

WORKSHOPS/ SYMPOSIA/ MEETS

IIRS User Interaction Meet-2014

IIRS organized Second User Interaction Meet (IUIIM-2014) during 20-21 February 2014 to apprise stakeholders on the advances in space applications, remote sensing and GIS technology advancements vis-à-vis role of IIRS in research and capacity building; understand and explore new opportunities with user organizations in government, non-government and private sectors dealing with infrastructure planning, rural and urban development, environmental conservation, natural resource and disaster management, interface with remote sensing and GIS industry on newer avenues, explore the placement opportunities of IIRS students, and interact with representatives from universities on Distance Learning Programmes (DLP) of IIRS for future improvement in course content and delivery mechanism. The event provided a platform to share the achievements and experiences of faculty and students of IIRS and inform the current and potential user community about the existing capabilities in areas of customized training, education and research. First day focused on the RS and GIS Technology and applications Trends in EO, capacity building and IIRS programmes, while second-day emphasized on the user organizations' presentation and DLP. An exhibition was also organized during the IUIIM-2014 for the benefit of the academia, user and industry, highlighting the training opportunities, research initiatives of IIRS faculty, research outputs of students, on-going national projects at SAC and NRSC, Space technology



applications, products, services and the infrastructure available at IIRS for various remote sensing and GIS-related research, education and training, etc. Recommendations such as higher interface with the industry, larger outreach of IIRS DLP programme and renaming of IUIIM as "Advances in RS and GIS: Industry-Academia Interface" were made at the end of the Meet.

- S.P.S. Kushwaha and Puneet Swaroop

Regional Workshop on Master Plan Preparation Using Bhuvan-NUIS

A Regional Workshop for the Capacity Building of Stakeholders for 'Master Plan Preparation Using Bhuvan-NUIS' was held at IIRS, Dehradun on 15th April 2014. Dr. Sudhir Krishna, Secretary, Ministry of Urban Development, Govt. of India graced the occasion as Chief Guest and addressed the participants. Shri D.S. Garbyal, Secretary, Urban Development and Dr. R. Meenakshi Sundaram, Vice-chairman, Mussoorie Dehradun Development Authority, Govt. of Uttarakhand were the special invitees during the workshop. Dr. Anmol Kumar, Director-General, Forest Survey of India also addressed the participants as Guest of Honour. The welcome address was delivered by Dr. S. K. Saha, Dean



(Academics) and Group Director (ER&SSG), IIRS, Dehradun. The workshop was attended by 75 participants representing Centre/ State Town Planning Departments, Urban Development Authorities, Urban Local Bodies, Regional Planning & Development

Authorities, Central Public Works Department, IIRS, NRSC and State Remote Sensing Centres. Dr. Sudhir Krishna during his inaugural address stated the fact that level of urbanization has increased from 20% in 1970 to 31% in 2011. He stressed that conventionally, the master plan preparation is a time-consuming exercise which normally takes 3-5 years and subsequently, goes through the process of notification and call for objections. During this process, the ground realities changes rapidly and thus, the technology has got its role to expedite the process of plan formulation. He informed that the NUIS project was launched during 10th plan period and subsequently, the mapping has been completed for 152 towns in the country. He also mentioned the UDPFI and URDPFI guidelines and the scope for revisions. The first technical session on 'NUIS-Bhuvan: Master Plan Preparation' was jointly chaired by Shri D.S. Garbhal, and Dr. R. Meenakshi Sundaram, Govt. of Uttarakhand and co-chaired by Dr. S.K. Saha,

IIRS. During the session, Dr. P. G. Diwakar during his presentation on 'Master Plan Preparation using Bhuvan-NUIS' presented the outlines of datasets prepared for 152 towns in India under NUIS project, strength of remote sensing in plan formulations, tools for master plan formulation and also the future plans under NUIS Phase-II. The second technical session on Bhuvan - NUIS Geospatial Database Creation was chaired by Dr. P. G. Diwakar and co-chaired by Shri Ishtiaq Ahmed, Chief Town Planner, Agra Development Authority, UP. During this session, live demonstration on Bhuvan-NUIS was given to the participants by a group of scientists from IIRS, Dehradun and NRSC, Hyderabad. During the concluding session, the participants discussed the tools and technology demonstrated and its utility to master plan preparation.

- Pramod Kumar

3rd Meeting of WGCapD of CEOS

As per the commitment of ISRO to Committee on Earth Observation Satellites (CEOS), the 3rd meeting of Working Group on Capacity Building and Data Democracy (WGCapD) was organized at IIRS Dehradun during 23-25 April 2014. The major objective of this meeting was to assess the current status and progress of working group in capacity building and data democracy which includes E-learning course for developing countries (Africa), DEM (SRTM2) project for African countries and disaster risk management activities. Total 25 participants from 11 agencies which includes USGS, NOAA, CEOS, SWF, DLR, SANSA, INPE, GEO, NASA, CRECTEALC, WMO and ISRO attended the meeting. Mr. Patrick O'Brien, NOAA, USA, Ms. Kim E. Kieth, CEOS, USA, Ms. Laura D. Lopez, SWF, USA, Dr. Dieter J. Hausamann, DLR, Germany, Mr. Naledzani A. Mudau, SANSA, South Africa, and Ms. Phila, SANSA, South Africa attended the meeting in person while others have attended virtually through GoToMeeting tool. Dr. Eric Wood, USGS, USA chaired the meeting. There was a separate session on ISRO initiatives for capacity building and data democracy. Officials from SAC, NRSC, IIRS and IIST participated and presented the following capabilities in capacity building and data democracy- EO program of ISRO (Dr. DVA Raghva Murthy), CartoDEM and other Geophysical products from Indian Satellites (Dr. D. Dhar), Bhuvan Services & Products (Dr. Vinod Bothale), DMSP programme of ISRO (Dr. V. Bhanu Murthy), Capacity building and E-learning programme - (Dr. Y.V.N. Krishna Murthy). After two and



half day deliberations on status and future plan of WGCapD it was suggested to continue the current effort viz., SRTM2 DEM, E-learning Programme, disaster support, etc. Based on the capabilities of ISRO, it was requested that ISRO should lead E-learning Programme and IIRS/ISRO should take the charge of Vice-Chair for 2015-2017.

- S.P. Aggarwal

ISRO-CNES Science meet on Geodynamics of Himalaya

Himalayan region has emerged as one of the most seismically active regions of the world due to continuous northward movement of Indian plate at a rate of some 41-50 mm/year that has resulted in many fault systems and devastating earthquakes. Numerous studies have reported high crustal deformation, upliftment, incision, occurrences of landslides that have made it one of the most unstable and dynamic regions of the world. Therefore, it is imperative to design and develop complementary space based observation techniques to capture dynamic topography and land cover using optical, radar (ScanSAR Interferometry), GNSS as well as LiDAR techniques. In addition to this, space gravity and magnetism can add to the overall understanding of the Earth's lithosphere structure and evolution. Towards this, ISRO and CNES, French space agency deliberated on various relevant topics during a workshop on 5-6 February 2013, and it was decided to take up Solid Earth Geophysics and Geodynamics as a possible area of cooperation and collaboration between ISRO and CNES. As a follow up, it was proposed to organize a workshop on 'Geodynamics of Himalaya' in early 2014 vide minutes of ISRO-CNES meeting held on 19th July 2013. Accordingly, a science meet was planned and organised on 'Geodynamics of Himalaya' during 12-13 June 2014 at IIRS, Dehradun focussing on five themes: 1. Space measurements - a unique dataset to understand the Himalayan changes; 2. Himalayan tectonics; 3. Magnetic field- from global to regional scales; 4. Gravity field - from global to regional scales; and 5. Future missions. Twenty-two papers were presented on above research topics during the meet. CNES team led by Mrs. Manda Mioara and 4 others (Dr. Giovanni Occhipinti, Dr. Frederic Masson,



Dr. Raphael Grandin, and Dr. Isabelle Panet) made presentation on 6 topics and ISRO scientists from SAC, NRSC, LEOS, SPL (VSSC) and IIRS made 9 presentations and rest all presentations were made by senior scientists from Wadia Institute of Himalayan Geology, Ministry of Earth Sciences, Indian Institute of Geomagnetism and National Geophysical Research Institute. This programme was inaugurated by Dr. D.V.A. Raghava Murthy, Director, EOS, ISRO HQ, who also made a presentation on present and future missions of ISRO and it was attended by approximately 45 persons including concerned scientists of IIRS. At the end of the deliberations, it emerged that the science meet was considered as a good starting point for better appreciation of dynamics of Himalaya, identify gap areas, explore possible collaborative studies and take note of various studies presently underway to understand the Geodynamics in the region by different centres of ISRO, CNES and prominent Indian and French research organizations. Accordingly, short term and long term goals will be worked out to overall meet the objective of collaboration.

- P.K. Champati ray

Emerging Business Opportunities for Geospatial Industry: an Academia-Industry Interface

IIIRS in collaboration with FICCI, Indian Society of Remote Sensing (ISRS)-Dehradun Chapter and Indian Meteorological Society (IMS)-Dehradun Chapter organised Round Table Meeting on 21st June 2014 on Emerging Business Opportunities for Geospatial Industry: An Academia-industry interface. Thirty-seven participants from industry and around forty-five faculty members from universities and IIRS participated in the deliberations. The meet was conducted as a follow up to a specialized training programme at IIRS organized during 16-21st June 2014 especially for the first time for participants from industry. In total 18 participants from 9 industries participated in the training programme.



Dr. V.S. Palsule, Director, DECU (ISRO) in his opening remark gave an outline of opportunities in communication sector for possible commercialization, which was followed by deliberations with panellist from industry and academia represented by Mr. Shekhar Murthy, IIC

Technologies Ltd.; Mr. Manideep Saha, Intergraph; Major General Tavinder Paul, Navayuga Infotech Ltd.; Ms. Fatima Alam, Google India Pvt. Ltd.; Mr. Maneesh Prasad, Infotech Magazine India; Mr. Sumeet Gupta and Mr. Gaurav Gaur, FICCI; Dr. K. K. Raina, VC- DIT, and Dr. Y.V.N. Krishna Murthy, Director, IIRS. During the deliberations, it was highlighted how industry and academia can mutually benefit from symbiotic relationships. The industry-academia interface as envisaged encompasses the following important areas for cooperation: i) Establish and nurture Industry-Academia-Research interface, ii) Capacity building to

meet research as well as industry needs, iii) Joint and sponsored research and development on key thrust areas of application, iv) Broad-base outreach of geoinformatics technology to expand the market horizon and v) Maintain freedom of research and secrecy of industry for promotion of innovation. The event was concluded by distributing of certificates by Dr. Y.V. N. Krishnamurthy, Director, IIRS and Dr. S.K. Saha, Dean, IIRS to participants from industry who attended the specialized training programme.

- P.K. Champati ray

CAMPUS NEWS

IIRS Awarded ISO 9001:2008 Certification

IIRS has been awarded the ISO 9001:2008 certificate on 12th May 2014 from Bureau Veritas Certification (BVC) and the scope of certification is “Capacity building through training and education in the field of remote sensing and GIS for sustainable development”. Awarding of ISO 9001:2008 certificate was a tiered approach which includes conduction of internal audit, Management Review Meeting (MRM) and finally external audit in stage I and stage II (Certification audit). Internal audit was conducted by the certified lead auditors from IIRS for all the departments and sections. In the external audit, auditors came from the certification body and thorough audit towards Quality Management System (QMS) was taken care. Stage I audit was of 2 man days and Stage II audit was 4.5 man days. All the

minor non-conformities (NCs) generated during the stage I and Stage II were closed before due date and closing reports were accepted by the BVC. All other opportunities of improvement as suggested by the auditors for Quality Manual has been taken care and due incorporation/deletion has been made.



- D. Mitra and B.D. Bharath

E-learning Based Certificate Courses

Remote Sensing and Geoinformation Science have become key technology tools for the collection, storage and analysis of spatially referenced data for resource planning and decision making. Today, it is the backbone to many decision making systems and location-based services emerging in the New Information Economy. During the last decade, utilization of Internet technology by different user groups in the society has emerged as a technological revolution which has directly affected the life of human beings. IIRS is conducting many on-campus short and long term capacity building programmes ranging from three days to two years. IIRS has initiated its interactive distance education based capacity building training under IIRS outreach programme in the year 2007. Through this programme, over 15,000+ students and researchers from approximately 200+ universities/ institutes across

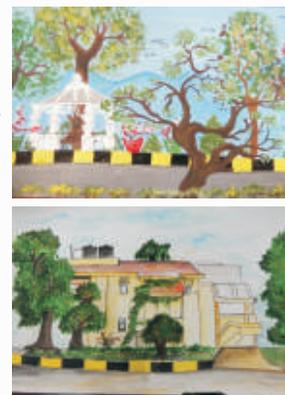
the country have been trained in the field of geospatial technology. Further, to enhance the outreach of geospatial science and technology, IIRS has now announced e-learning based certificate course on: 1) Comprehensive certificate course on Remote Sensing and Geo-information Science- Four-months duration and 2) One Month Certificate courses on: a) Fundamentals of Remote Sensing, b) Fundamentals of Photogrammetry and Cartography, c) Fundamentals of Geographical Information System and Global Navigation System and d) Fundamentals of Digital Image Processing. Registration for IIRS e-learning course have started from 15th August 2014. The interested participants can apply online through website- <http://elearning.iirs.gov.in>.

- P.L.N. Raju and Harish Chandra Karnatak

Earth Day Celebrated at IIRS Campus

MS-DC and ISRS-DC jointly celebrated “Earth Day” at IIRS on 22nd April 2014 to create awareness for environmental protection. The events began with a painting competition in the forenoon on theme-*Natural landscape of IIRS campus* for school children. In total, fourteen students from seven schools participated in the programme. Mr. Prasant Thakur from KV-ONGC, Ms. Muskaan Gupta from St. Joseph's Academy, Ms. Prachi Dhiman from RGNV won 1st, 2nd and 3rd prizes, respectively. Consolation prizes went to Ms. Priyanka Chamoli from RGNV and Ms. Pooja Mittal from St. Joseph's Academy. The event was judged by Mrs. Usha Krishnamurthy, Mrs. Anshumala Ojha and Mrs. Shefali Agrawal. In the afternoon, a debate was organized on the topic- *Green Cities: Hypothetical or Practical in Indian Perspective* for the students of IIRS/ CSSTEAP and faculty/ staff of IIRS. Dr. B.S. Sokhi and Dr. Sarnam Singh

judged the event. Mr. Prasun Kumar Gupta conducted a quiz on environmental Issues. Following the quiz, a popular talk on “Large Carnivore Conservation in India: Prospects and Challenges” was delivered by Dr. Yadendra Dev Jhala, noted wildlife biologist from Wildlife Institute of India, Dehradun. The programme ended with distribution of prizes to winners of different events by the Director, IIRS.



1st (up) and 2nd (down) prize winning paintings

- D. Mitra and Hitendra Padalia

Time Management Workshop

A one day workshop on Time Management under the faculty improvement programme was conducted by Shri Dhiren Tharnari on 10th February 2014. Shri Dhiren Tharnari is a founder of '36 Hours A Day'. Dr. Y.V.N. Krishna Murthy, Director, IIRS & Director, CSSTEAP inaugurated the workshop. Dr. S.P.S Kushwaha, Group Director (PPEG) gave a brief introduction about the workshop. The first session was focused on Goal Setting. Mr. Tharnari described difference between Desire and Dreams Goal and he also laid emphasis on S.M.A.R.T Goal i.e., Specific, Measurable, Attainable, Relevant and Time-bound. The session was conducted with interactive exercises, game activities, movie clips and presentation. The post-lunch session focused on Time Management. It was emphasized that time management is needed for Life Balance. The participants were asked to make a log of their daily routine and categorise the time they spend in different activities. This log should be utilized to make a weekly analysis of the time



which could have been utilized in creative activities. The time management matrix should be used for analysis. The speaker emphasized on the use of technology viz. to-do-list and online planners for time management. Document management, manpower management and prioritisation was also covered briefly.

- Minakshi Kumar

National Safety Week Awareness Campaign

The National Safety Day/Week Campaign is celebrated in India every year to commemorate the establishment of this event, 4th of March as well as to enhance the safety awareness among people. The theme for 43rd National Safety Day/ Week Campaign-2014 is “Manage Stress at Workplace and Control Hazards”. The National Safety Week Awareness programme was organized at IIRS campus. Shri N.P.Singh (Inspector, Fire Safety, CISF), ONGC, Dehradun and an Expert on Fire Safety was invited to IIRS campus as chief guest and he delivered the guest Lecture on “Safety Hazards in Institutional Premises and Precautions”. After the guest lecture, a quiz was held which was followed by



the safety pledge by IIRS employees.

- IIRS Safety Committee

Saranggi Concert by Ustad Kamal Sabri

Ustad Kamal Sabri, a seventh generation of distinguished family of traditional musicians performed in IIRS campus on 31st January 2014. Ustad Kamal Sabri was trained by his father, the legendary Ustad Sabri Khan, in the style of the Senia Gharana (school) of Rampur, Moradabad from the tender age of 5 years. Ustad Kamal Sabri has participated in several festivals over the years in India and abroad. He continues to explore the vast realm of the international music world, yet retaining the purity of the Indian Classical Music thorough the strains of his Sarangi. The programme was organized under the aegis of SPIC MACAY, the society for the promotion of Indian classical Music and Culture amongst youth. For

the past 34 years, SPIC MACAY has exposed thousands of students to various forms of Indian Classical music, dance, folk art, craft and folk theatre, in schools, colleges and professional institutions through concerts, lecture demonstrations by legendary performers, baithaks, workshops and scholarship programs.



- Bhaskar R. Nikam

भारतीय सुदूर संवेदन संस्थान में राजभाषा कार्यान्वयन संबंधी

भारत सरकार की राजभाषा नीति के कार्यान्वयन को सुनिश्चित करने, राजभाषा हिन्दी के व्यापक प्रचार-प्रसार, प्रशासन के साथ वैज्ञानिक/तकनीकी क्षेत्रों में इसे और अधिक बढ़ावा देने तथा राजभाषा हिन्दी में कार्य करने के दौरान कार्मिकों के समक्ष आने वाली परेशानियों को प्रशिक्षण के माध्यम दूर करने हेतु संस्थान में विविध कार्यक्रमों का आयोजन नियमित रूप से किया जाता है, ताकि कार्मिक अपना अधिकाधिक सरकारी कार्य हिन्दी में ही करें। जनवरी से जून 2014 की छमाही के दौरान संस्थान में राजभाषा संबंधी गतिविधियों का विवरण निम्नवत है:-

(क) कम्प्यूटरों को यूनिकोड एनकोडिंग अनुपालक बनाया जाना: राजभाषा अधिनियम, 1963 तथा उसके अंतर्गत जारी किए गए राजभाषा (संघ के शासकीय प्रयोजनों के लिए प्रयोग) नियम, 1976 के उपबंधों के सही कार्यान्वयन के लिए कम्प्यूटरों और कम्प्यूटर सॉफ्टवेयरों में हिन्दी में काम करने की आवश्यकता के दृष्टिगत संस्थान के कम्प्यूटरों को यूनिकोड एनकोडिंग अनुपालक बनाया गया ताकि कार्मिकों को हिन्दी में काम करने में आसानी हो।

(ख) प्रयोक्ता संवाद सभा: दिनांक 20 से 21 फरवरी 2014 के दौरान संस्थान में प्रयोक्ता संवाद सभा का आयोजन किया गया, जिसमें दिनांक 21 फरवरी 2014 को विशेष हिन्दी सत्र भी रखा गया। इस सत्र में निम्नलिखित विषयों पर संस्थान के वैज्ञानिकों के अतिरिक्त आपदा प्रशमन एवं प्रबंधन केंद्र, देहरादून, राष्ट्रीय जल विज्ञान संस्थान, रुड़की, वाडिया हिमालय भू-विज्ञान संस्थान, देहरादून, राष्ट्रीय आपदा मोचन बल, वानिकी एवं पारिस्थितिकी समूह, राष्ट्रीय सुदूर संवेदन केंद्र, हैदराबाद के लब्ध-प्रतिष्ठ वैज्ञानिकों ने भी अपने लेखों का प्रस्तुतीकरण हिन्दी में किया।

(ग) हिन्दी कार्यशाला-सह-प्रशिक्षण कार्यक्रम: दिनांक 22 मार्च 14 को एक दिवसीय हिन्दी कार्यशाला-सह-प्रशिक्षण कार्यक्रम का आयोजन किया गया। इस हिन्दी कार्यशाला-सह-प्रशिक्षण कार्यक्रम के प्रथम सत्र में श्री ब्रज नाथ मिश्र, सहायक निदेशक (राजभाषा), कर्मचारी भविष्य निधि संगठन (क्षे.का.), देहरादून ने संस्थान के कार्मिकों को राजभाषा नीति पर व्याख्यान एवं सरकारी कामकाज में राजभाषा के प्रयोग पर प्रशिक्षण दिया। इस कार्यक्रम के दूसरे सत्र में श्री गुरु प्रसाद जोशी, प्रशिक्षण अधिकारी (हिन्दी), केंद्रीय अकादमी राज्य वन सेवा, देहरादून ने संस्थान के कार्मिकों एवं डेटा एंट्री ओपरेटरों को "कंप्यूटर पर हिन्दी/यूनिकोड में कार्य" करने पर व्याख्यान एवं प्रशिक्षण दिया।

(घ) हिन्दी टंकण परीक्षा/प्रतियोगिता: कंप्यूटर पर हिन्दी/यूनिकोड में कार्य करने पर व्याख्यान एवं प्रशिक्षण के उपरांत दिनांक 28 मार्च 2014 को प्रशिक्षित कार्मिकों के लिए हिन्दी टंकण परीक्षा/प्रतियोगिता का आयोजन किया गया। इस परीक्षा/प्रतियोगिता में बैठने/भाग लेने वाले समस्त सहभागियों ने हिन्दी टंकण में सराहनीय प्रदर्शन किया।



भारतीय सुदूर संवेदन संस्थान के कार्मिकों को श्री गुरु प्रसाद जोशी, प्रशिक्षण अधिकारी (हिन्दी), केंद्रीय अकादमी राज्य वन सेवा, देहरादून द्वारा वर्तनी के मानकीकरण पर व्याख्यान एवं प्रशिक्षण

(ङ) हिन्दी तकनीकी संगोष्ठी: दिनांक 28 मार्च 2014 को एक दिवसीय हिन्दी तकनीकी संगोष्ठी का आयोजन किया गया। संगोष्ठी का विषय 'हिमालयी क्षेत्रों में प्राकृतिक संसाधन प्रबंधन' था। इस कार्यक्रम में संस्थान के समस्त वैज्ञानिकों/तकनीकी/प्रशासनिक कर्मचारियों ने भाग लिया।

(च) राजभाषा नियम 1976 (यथा संशोधित 1987, 2007 और 2011) के नियम 10(4) के अंतर्गत अधिसूचना। इस संस्थान के 84.92 प्रतिशत कार्मिकों द्वारा हिन्दी का कार्यसाधक ज्ञान प्राप्त कर लेने के उपरांत, भारत सरकार, अंतरिक्ष विभाग ने दिनांक 23 मई 2014 को भारतीय सुदूर संवेदन संस्थान को राजभाषा नियम 1976 (यथा संशोधित 1987, 2007 और 2011) के नियम 10(4) के अंतर्गत अधिसूचित कर दिया।

(छ) हिन्दी कार्यशाला-सह-प्रशिक्षण कार्यक्रम। दिनांक 23-24 जून 2014 को दो दिवसीय हिन्दी कार्यशाला-सह-प्रशिक्षण कार्यक्रम का आयोजन किया गया। इस कार्यक्रम के प्रथम दिवस/सत्र में श्री गुरु प्रसाद जोशी, प्रशिक्षण अधिकारी (हिन्दी), केंद्रीय अकादमी राज्य वन सेवा, देहरादून ने संस्थान के कार्मिकों को वर्तनी के मानकीकरण पर व्याख्यान एवं प्रशिक्षण दिया। इस कार्यक्रम के दूसरे दिवस/सत्र में श्री दिनेश चंद्र थपलियाल, उप महाप्रबंधक (राजभाषा), ओ.एन.जी.सी., देहरादून ने संस्थान के कार्मिकों को सूचना प्रौद्योगिकी के अनुप्रयोगों में राजभाषा के प्रयोग पर व्याख्यान एवं प्रशिक्षण दिया। उपरोक्त कार्यक्रम अत्यंत ज्ञानवर्धक एवं लाभकारी सिद्ध हुए। इन कार्यक्रमों से लाभ लेते हुए कार्मिकों का हिन्दी में कार्य करने की ओर उन्मुख होना ऐसे आयोजनों की सफलता की पुष्टि करता है। यद्यपि, राजभाषा कार्यान्वयन का कार्य एक सतत प्रक्रिया है, तथापि उपरोक्त प्रयासों से इस बात की पुष्टि होती है कि भारतीय सुदूर संवेदन संस्थान में यह कार्य सही दिशा-दशा में बढ़ते हुए लक्ष्य प्राप्ति की ओर अग्रसर है।

- राजीव कुमार त्रिपाठी

भारत के 65वें गणतंत्र दिवस समारोह का आयोजन

भारत का 65वां गणतंत्र दिवस समारोह दिनांक 26 जनवरी 2014 को भारतीय सुदूर संवेदन संस्थान में पूरी गर्मजोशी और स्वदेशानुरागपूरित भावना से मनाया गया। राष्ट्रीय पर्व के इस समारोह में करीब 400 लोगों ने सक्रिय रूप से भाग लिया, जिसमें संस्थान के कार्मिक व उनके परिवार के सदस्य, विद्यार्थी तथा अधिकारी प्रशिक्षणार्थी भी शामिल थे। उक्त समारोह में संस्थान तथा अंतरिक्ष विज्ञान एवं प्रौद्योगिकी शिक्षा केंद्र (एशिया व प्रशांत क्षेत्र) के विदेशी प्रशिक्षार्थियों ने भी बड़-चढ़ का भाग लिया। डॉ. वाई.वी.एन. कृष्ण मूर्ति, निदेशक, भारतीय सुदूर संवेदन संस्थान व निदेशक, अंतरिक्ष विज्ञान एवं प्रौद्योगिकी शिक्षा केंद्र (एशिया व प्रशांत क्षेत्र) ने राष्ट्रीय ध्वज फहराया तथा इसके उपरांत समारोह में उपस्थित समस्त लोगों ने समूहिक रूप से राष्ट्रगान गाया। राष्ट्रगान के पश्चात निदेशक महोदय ने उपस्थित जनों को संबोधित अपने अभिभाषण में राष्ट्रीय विकास की दिशा में इसरो व संस्थान के प्रयासों व उपलब्धियों की मुक्तकंठ से सराहना की। भारतीय थलसेना बैंड द्वारा की गई परेड इस समारोह का विशेष आकर्षण थी, जिसकी लोगों ने अत्यधिक प्रशंसा की। इस अवसर पर खेलों के आयोजन के साथ चलचित्र का भी प्रदर्शन किया गया। इस समारोह का आरंभ वस्तुतः गणतंत्र दिवस से एक पखवाड़ा पहले विद्यार्थियों, अधिकारी प्रशिक्षणार्थियों, कार्मिकों एवं उनके बच्चों के लिए विभिन्न खेलों आयोजन के साथ हुआ था तथा निदेशक महोदय द्वारा विजेताओं एवं सहभागी बच्चों को पुरस्कार वितरण के साथ इस समारोह का समापन हुआ।



- गणतंत्र दिवस आयोजन समिति

DISTINGUISHED VISITORS



Dr. R. R. Navalgund, Vikram Sarabhai Distinguished Professor at ISRO, Bangalore visited IIRS on 20th February 2014 and inaugurated the IUIM workshop



Dr. V. Jayaraman, Prof. Satish Dhawan Professor, ISRO, Bangalore visited IIRS on 23rd March 2014 during the valedictory function of CSSTEAP training programme



Dr. Sudhir Krishna (IAS), Secretary, Ministry of Urban Development visited IIRS during 12-15th April 2014. He inaugurated the workshop on Master Plan Preparation using Bhuvan-NUIS. He was also apprised about various research and capacity building programmes of IIRS



Dr. V.K. Jain, Vice-Chancellor, Doon University visited IIRS campus during the valedictory programme of ITEC programme on 27th Feb. 2014



Dr. P.P. Bhojvaid, Director, FRI visited IIRS campus during IUIM-2014 on 20th February 2014



Dr. Kuldeep K Raina, Vice Chancellor, DIT University, Dehradun visited IIRS campus during academia-industry meet on 21st June 2014

APPOINTMENTS



Ms. Asfa Siddiqui, joined IIRS on 2nd January, 2014 as Scientist/Engineer-SC in Urban and Regional Studies Department. She did her Bachelors in Architecture from Govt. College of Architecture, Lucknow in 2011 and Masters in Urban Planning from School of Planning and Architecture, New Delhi in 2013. She has also worked in NIT Calicut prior to joining ISRO.



Ms. Kavitha N. joined IIRS on 21st April 2014 as Scientific Assistant in Geoinformatics Department. She has done M.Sc. (Computer Science) from University of Madras, Chennai.



Shri Justin George K. joined IIRS on 9th January 2014 as Scientist/Engineer-SC in Agriculture and Soils Department. He has done M.Sc. (Soil Science and Agricultural Chemistry) from IARI, New Delhi.



Shri Sajid Ansari has joined IIRS on 19th June 2014 as Technician-B (Instrumentation) in Urban and Regional Studies Department. He is a graduate from Vinoba Bhave University, Hazaribagh.

CONTACT extends a warm welcome to the new faculty and staff to IIRS family

SUPERANNUATION

Sri Kali Ram, Security Guard 'A' superannuated on 31st January 2014. CONTACT wishes Sri Kali Ram and his family members a happy, healthy and peaceful life ahead.



Dear Readers,

This issue of CONTACT newsletter contains some of the students' research projects carried out under the guidance of IIRS faculty. Kindly send your suggestions and feedback at newsletter@iirs.gov.in

Editorial Team

Editor: Pramod Kumar

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TRAINING CALENDAR 2015

Last updated on 20.11.2014

| Sl. No | Course Code | Course Name | Entrance Requirements | No. of Seats | Starting Date | Passing Out Date | Course Fee for Individual Candidate | | | Apply by Date |
|---|-------------|---|---|--------------|---------------|------------------|-------------------------------------|--|---------------------------------|---------------|
| | | | | | | | Govt. Spons. ₹ | Open ₹ | Foreign US \$ | |
| POST-GRADUATE DIPLOMA COURSES IN REMOTE SENSING AND GIS WITH SPECIALIZATION IN | | | | | | | | | | |
| 1. | D-AS | Sustainable Agriculture | M.Sc. in Agri./Vet. Sci./Env. Sci./Agril. Engg./Master deg in Geog. (with Sci. at H.Sc. level) /B.Sc. Agri. (4 years) / B.E. / B.Tech. in Agril. Engg. /Agric. Inform./Agril. Officers with 2 years exp. | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 2. | D-FE | Forest Resources & Ecosystem Analysis | M.Sc. Forestry / Ecology / Botany / Wildlife Sci. / Biosci. / Zool./Env. Sci. / Life Sci. / Master in Geog. (with Sci. at H.Sc. level)/B.Sc. Forestry (4 years) / Forest Officers with 2 years exp.) | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 3. | D-GG | Geosciences | M.Sc./M.Sc.(Tech.) / M.Tech. in Geol. / Appl. Geol. / Geophy. / Earth Sci. / Geoexplor. / Petrol. Engg. or equivalent / Geo-Engg. / Mining Engg. / Env. Sci. / Master in Geog. ((with Sci. at H.Sc.level) / B.Tech. / B.E. in Civil Engg., Geosci., Petrol. Engg., Mining Engg., Mineral Process. | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 4. | D-MS | Marine & Atmospheric Sciences | M.Sc. in Marine Sci. /Earth Sci. / Physics / Oceanog. / Atm. Sci. / Env. Sci. / Master in Geog. (with Sci. at H.Sc. level). | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 5. | D-UR | Urban & Regional Studies | Master in Plng. / Arch. / Civil / Agri. / Comp. Engg./IT/ Geo-inform / Env.Sc./Geog. (with Sci. at H.Sc. level)/B. Plan./ B.Arch/B.E./B.Tech. in Civil/Agri./Comp. Engg. /IT/ Town Planners with 2 years exp. | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 6. | D-WR | Water Resources | B.E. / B.Tech. / M.E. / M.Tech. (Civil Engg.) / Agril. Engg. / M.Sc. in Geol. / Env. Sci./Geog., Candidates should have Math as one subject up to 10+2 level. | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 7. | D-PR | Photogrammetry & Remote Sensing | B.E. / B.Tech. in Civil / Electronics / Electrical/ECE/Comp. Sci. / Comp. Engg. / IT/ Geomatics / Geoinform./Remote Sensing or equivalent or M.Sc. / M.Tech. in Physics / Appl. Physics / Math. / Stat. / Appl. Math./Geog. / Geoinform. / Geomatics / Remote Sensing orequivalent with B.Sc. in Sci. Candidates should have Math as one subject up to 10+2 level. | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| 8. | D-NHDRM | Natural Hazards & Disaster Risk Management | M.Sc. in Math. / Chem. / Bot. / Zool./ Geol. / Earth Sci. / Env. Sci. / Marine Sci. / Atm. Sci. / Agri. / Master in Geog. (with B.Sc. at Grad. level) OR B. Arch / B. Plann. / M. Plann. / Master in Geog. (with Science at H.Sc.level) / OR B.E. / B.Tech. in Civil Engg. / Agril. Engg. / Env. Engg./ Geosci./Geoexplor. / Geo-Engg. / Earthquake Engg. / IT / CS / ECE OR B.Sc. (4-year Forestry / Agri., course) OR Master in Disaster Mgmt. /Forest / Agri. Officers (with B.Sc. deg.) / MCA (with B.Sc. in Sci.). | 6 | 17.08.2015 | 17.06.2016 | Nil | 60,000 | 6,000 | 29.05.2015 |
| M.TECH. COURSE IN RS & GIS | | | | | | | | | | |
| 9. | M-RG | M.Tech. in RS&GIS with specialization in: (i) Sustainable Agriculture, (ii) Forest Resources & Ecosystem Analysis, (iii) Geosciences, (iv) Marine & Atmospheric Sciences, (v) Urban & Regional Studies, (vi) Water Resources, (vii) Satellite Image Analysis & Photogrammetry & (viii) Geoinformatics | For specializations from Sl. No. 1 to 7 corresponding qualifications as mentioned for Post-Graduate Diploma courses under Sl. Nos. 1 to 7 are applicable. M.Sc. (Geog.) is eligible. Entrance Requirement for Geoinformatics Specialization: M.Sc./M.Tech. in Physics/ Appl. Physics/ Electron./ Math./ Appl. Math./ Stat./ IT/ Comp. Sci./ Geo-Engg./ Urban and Reg. Plann. OR M.Sc. in Remote Sensing/ Geoinform. or its equivalent, OR Master in Geog. (having B.Sc. in Science subjects) OR B.E./ B.Tech./ B.Sc.(Engg.) Graduate (with four year deg. course) in Civil Engg./ Electron. & Comm./ Comp. Sci./ Comp. Engg./IT/Agril. Engg./ Remote Sensing/ Geoinform./ Geosci. Engg./Petrol. Engg./ Mining Engg./ Agri. Inform./ Forest Inform. or its equivalent OR B.Arch./ B.Plann./ M.Arch./ M.Plann., OR MCA (having B.Sc. in Science subjects), M.Sc. Geog. OR equivalent. | 30 | 17.08.2015 | 14.08.201 | Nil | 1,44, 000+ 20,000 (Andhra Univ. Regn. Fee) | 20,000 (Andhra Univ. Regn. Fee) | 29.05.2015 |
| <p>Note:</p> <ul style="list-style-type: none"> Candidates should have secured a minimum of 55% marks in the qualifying examination. M. Tech. is accredited by Andhra University, Visakhapatnam. From 2nd module onwards the students will have to select one of these disciplines: (i) Sustainable Agriculture, (ii) Forest Resources & Ecosystem Analysis, (iii) Geosciences & Geohazards, (iv) Marine and Atmospheric Sciences, (v) Urban & Regional Planning, (vi) Water Resources (vii) Satellite Image Analysis & Photogrammetry, and (viii) Geoinformatics. The admission for M.Tech./M.Sc. courses is based on entrance test (held annually at Dehradun, Nagpur, Banaglore, Jodhpur, and Kolkata), interview and academic record. Govt.-sponsored candidates are exempted from written test. They have to appear only for interview. Admission to P.G. Diploma course is based on merit considering the academic record and subject relevance. Govt.-sponsored candidates are given preference. Selection to long-term courses i.e. P.G. Diploma, M.Sc, M. Tech. will involve counseling from 2015 onwards. Discipline, once opted, can't be changed during the course. The age limit for admission to above courses (Sl. No. 1-8) is 50 years. | | | | | | | | | | |
| IIRS-ITC JOINT EDUCATION PROGRAMME | | | | | | | | | | |
| 10. | D-GI | Post-Graduate Diploma in Geoinformation Science & Earth Observation with specialization in Geoinformatics | M.Sc./M.Tech. in Physics/ Appl. Physics/Electron./Math./Appl. Math./Stat./IT/Comp. Sci./Geology/Geophysics/Geo-Engg./ Agriculture/Forestry/Urban and Reg. Plann. or any Natural/ Env. Sci., OR Master in Geog. (having B.Sc. in Science subjects) OR B.E./ B.Tech./ B.Sc.(Engg.) Graduate (with four year deg., course) in Civil Engg./Electron. & Comm./Comp. Sci./Comp. Engg./IT/Agril. Engg./Geosci. Engg./Petrol. Engg./ Mining Engg./ Agri. Inform./ Agriculture/ Forest Inform./ Forestry or equivalent, OR B.Arch. / B.Plann./M.Arch./ M.Plann., OR MCA (having B.Sc. in Science subjects), OR equivalent. | 10 | 21.09.2015 | 15.07.2016 | EURO 450 | 65,000 + EURO 450 | EURO 3000 + EURO 450 | 29.05.2015 |

| Sl. No | Course Code | Course Name | Entrance Requirements | No. of Seats | Starting Date | Passing Out Date | Course Fee for Individual Candidate | | | Apply by Date |
|---|-------------|---|--|--------------|---------------|------------------|--|---|---------------------------|---------------|
| | | | | | | | Govt. Spons. ₹ | Open ₹ | Foreign US \$ | |
| 11. | M-GI | M.Sc. in Geoinformation Science & Earth Observation with specialization in Geoinformatics | Entrance requirements as mentioned under Sl. No. 10. | 10 | 21.09.2015 | 17.03.2017 | Nil Fee to IIRS | 1,20,000 payable to IIRS | EURO 5000 payable to IIRS | 29.05.2015 |
| | | | | | | | ITC Fee Euro 4050 (tuition fee) PLUS Euro 4230 approx. (living allowance & other cost for 4.5 month stay in The Netherlands) payable to ITC. | | | |
| | | | | | | | Others To and fro air travel to visit ITC (to be borne by student). | | | |
| Note: (i) For M.Sc. course, candidate should have secured a minimum of 60% marks in the qualifying examination. (ii) The M.Sc. degree is awarded by the University of Twente, The Netherlands under Joint IIRS-ITC Education Program. (iii) The Post-Graduate Diploma in Geoinformatics (D-GI) is awarded jointly by IIRS and ITC/University of Twente. (iv) The admission for M.Sc. Course is based on entrance test (held annually at Dehradun, Nagpur, Bengaluru, Jodhpur, and Kolkata), interview and academic record; the government-sponsored candidates are exempted from appearing in the entrance test. The admission for PG Diploma Course is based on merit considering the academic record and experience. The government-sponsored candidates are given preference. | | | | | | | | | | |
| REMOTE SENSING APPLICATIONS: THEME-SPECIFIC ORIENTATION COURSE | | | | | | | | | | |
| 12. | O-DM | Remote Sensing -An Overview for Decision Makers | Decision makers in organizations (with 10 years experience in service). | 10 | 15.06.2015 | 18.06.2015 | 10,000 (includes boarding+ lodging charges) | 10,000 (includes boarding+ lodging charges) | -- | 15.05.2014 |
| INTERNATIONAL PROGRAMMES (Only for Foreign Nationals from ITEC/SCAAP Partner Countries) | | | | | | | | | | |
| 13. | S-RS | Short Course on Remote Sensing with special emphasis on Digital Image Processing (ITEC-Sponsored) | P.G. Deg. / Graduate in Physics, Chem., Math., Bot., Forestry, Zool, Wildlife Sci., Env. Sci., Life Sci., Agri. Sci. subjects, Geog. (with B.Sc. at Grad. level) or any other Sci. / any discipline of Engg. with sufficient knowledge of Math. / Stat. at high school level / middle level resource managers and professionals from Govt., NGOs, Universities with 2-year work experience. Age limit: up to 45 years. | 20 | 05.01.2015 | 27.02.2015 | 20,000 | 20,000 (12,000-Fee+8,000 - Regn.) | \$ 2000 | 27.11.2014 |
| 14. | S-GI | Short Course on Geoinformatics (ITEC-Sponsored) | P.G. Deg. / Graduate in Physics, Chem., Math., Bot., Forestry, Zoology, Wildlife Sci., Env. Sci., Agri. Sci. subjects, Geog. (with B.Sc. at Grad. level) or in any other Sci. / Engg. discipline with sufficient knowledge of Math. / Stat. at high school level / middle level resource managers and professionals from Govt., NGOs, Universities with 2-year work exp. Age limit: up to 45 years. | 20 | 21.09.2015 | 13.11.2015 | 20,000 | 20,000 (12,000-Fee+8,000 - Regn.) | \$ 2000 | 21.08.2015 |
| CERTIFICATE COURSE | | | | | | | | | | |
| 15. | C-RS | Short Course on Remote Sensing and Image Interpretation | Engg. Graduate. / P.G. in Sci. and Geog. (with B.Sc. in Sci.) | 5 | 05.01.2015 | 27.02.2015 | Nil | 20,000 (12,000-Fee+8,000 - Regn.) | - | 27.11.2014 |
| NNRMS-ISRO SPONSORED CERTIFICATE COURSES: FOR UNIVERSITY FACULTY ONLY (With Two Years Teaching Experience at P.G. Level) | | | | | | | | | | |
| 16. | N-GI | GIS Technology and Advances | P.G. Deg. in Sci. / Engg. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 17. | N-WR | RS & GIS in Water Resources | P.G. Deg. in Civil / Agril. Engg. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 18. | N-FE | RS & GIS in Forestry/ Ecology / Wildlife / Env. Sciences | P.G. Deg. in Bot. / Ecol. / For. / Env. Sci. / Zool. / Wildlife Sci. / Life Sci. / Biosci. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 19. | N-UR | RS & GIS in Urban & Regional Studies | P.G. Deg. in Plann. / Civil Engg. / Arch. / Geog. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 20. | N-CM | RS & GIS in Cartography and Mapping | P.G. Deg. in Sci./Geog. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 21. | N-GG | RS & GIS in Geosciences | P.G. Deg. in Geol./Appl. Geol./ Geophy./ Geog. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 22. | N-GA | RS & GIS in Soils & Land Use Planning | P.G. Deg. in Agri./Geog./ Env. Sci./Agric. Engg./Vet. Sci. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |
| 23. | N-CO | RS & GIS in Coastal & Ocean Sciences | P.G. Deg. in Marine Sci./Geol./Oceanog./Appl. Geol./Env. Sci. | 8 | 05.05.2015 | 26.06.2015 | Nil | 12000 | 1200 | 13.02.2015 |

Important information:

- If the date of course commencement falls on a holiday, course will start from next working day.
- Sponsoring organizations are required to meet all expenses viz., traveling allowance, daily allowance, contingent expenses, medical expenses etc., for their candidates except course fee. However, courses at Sl. Nos. 13, 14 & 15 are paid courses for all including Govt. organizations. In case of NNRMS-sponsored course, the candidates admitted are paid TA/DA by IIRS as per ISRO/DOS rules applicable for this course.
- The Govt. organizations (Central/State Government bodies/Autonomous Institutions and State and Central Govt.-funded Universities) can sponsor only permanent employee. Private universities & self-sponsored candidates have to pay full course fee in advance.
- Security deposit: Self-financed candidates have to deposit security deposit one month prior to the commencement of the course @ Rs. 4000/- in respect of Certificate Courses @ Rs. 6000/- in respect of P.G. Diploma Courses, and @ Rs. 10000/- in respect of M.Sc./M.Tech. courses failing which seats would be offered to the wait-listed candidates.
- Boarding and lodging charge at IIRS Hostel are Rs. 2500 p.m. (approx.). Local candidates will be considered for hostel accommodation only if available.
- Number of seats are subject to change in all courses.

For further details, contact: Director, IIRS/Group Director, Program Planning & Evaluation Group, Indian Institute of Remote Sensing, ISRO, 4 Kalidas Road, Dehradun-248001, U.K., India. Tel: +91-135-2744583, 2524105, 2524106, 2524107, Fax: +91-135-2741987, 2748041; E-mail: admissions@iirs.gov.in; please visit our website- www.iirs.gov.in for details about IIRS and application form download.