

## 5.0 Events

### 5.1 40 Years And Beyond—IIRS-ITC Collaboration In Capacity Building

The collaboration between IIRS and International Institute for Geoinformation Science and Earth Observation (ITC) spans four decades now. During these forty years, four distinct periods or phases of collaboration can be clearly distinguished. The first marked the establishment of the Indian Photo-interpretation Institute (IPI, now known as Indian Institute of Remote Sensing, i.e. IIRS) in 1966 with Dutch Govt. collaboration. During initial period of 1966 to 1974, the emphasis was placed on creating basic facilities in training in aerial photo-interpretation. During second phase (1983 to 1990) emphasis was directed towards establishment of a new division, “Human Settlement Analysis Group-HUSAG” for study of urban and rural settlements for planning and developmental purpose. The third phase spanning from 1994 to 1999 was devoted to infrastructure upgradation and faculty improvement in the field of Geoinformatics for Natural Resources Development and Environmental Planning and Management. The fourth phase spanning from 2000 to 2004, was marked by collaboration with two more institutes of Netherlands apart from ITC, namely International Institute for Infrastructural, Hydraulic and Environmental Engineering (IHE) and Wageningen University (WU) for capacity building in disaster management. This also led to initiation of Joint Educational Programme (JEP) under which IIRS students did three months’ project work at ITC and received M.Sc. degree with joint IIRS-ITC logo.

Thus a commemorative workshop was organized on 28-29 November, 2006 at Indian Institute of Remote Sensing, Dehradun on Forty Years (1966-2006) Of Glorious Collaboration between IIRS and ITC in Capacity Building. The workshop had ten sessions. The Chief Guest Mr. G. Madhavan Nair, Chairman ISRO and Chairman NRSA Governing Body delivered his address via spacenet. In the Inaugural session, the Guest of Honour H.E. Eric F.Ch. Neihe, Ambassador, Royal Netherlands Embassy addressed the audience on the auspicious occasion and also released the souvenir brought out on this occasion. The souvenir contained historical landmarks and vintage photographs, besides messages from Chairman ISRO, Ambassador Dutch Government, Rector ITC, Ex-Director CSSTEAP, Program Director International Cooperation ISRO, present and past NRSA Directors and IIRS Deans, and also details of training, research and Ph. D. programmes under collaborative mode).

The workshop was graced by a number of national and international dignitaries viz. Mr Theo J.J. Groothuizen, Councillor S. & T., Dutch Embassy; Dr M. Molenaar, Rector ITC; Dr K. Radhakrishnan, Director NRSA; Prof Deekshatulu, Dr D.P.Rao; Ex Directors- NRSA, Dr P.Nag, Ex- Surveyor General SOI; Dr NS Virdi, Ex-Director WIHG; Dr G.S. Srivastava Ex- Dy. D.G. GSI; Prof A.Meijerink,

ITC Faculty Members ,besides approx 300 participants that included present and past IIRS Faculty; and IIRS Alumni.



The second session was devoted to “Reflections & Milestones” with Dr Meijerink ,Dr DP Rao, Dr Viridi, Dr Srivastava, Prof AK Roy and Prof BM Singh shared their experiences .“Shaping Future Indo-Dutch and IIRS-ITC

collaboration and Panel Discussion”, “Status of ITC- IIRS/NRSA Collaboration” were consecutively the third and the fourth sessions.

Poster Session included “Visit to Exhibition” and “Poster Presentations by students under JEP” respectively. IIRS & ITC faculty made presentations on “Recent Advances in E.O. applications” while three IIRS faculty made presentations related to their “IIRS-ITC sandwich Ph. D. programme”. The concluding session concentrated on future directions of Indo-Dutch and IIRS-ITC collaboration activities.

DOS and Dutch Embassy also took keen interest in organization of above mentioned workshop, apart from programme committee of IIRS and ITC. The workshop was a great success.

The positive outcome of this workshop is that IIRS and ITC have signed another significant MOU for JEP for next five years (upto 2010) under which IIRS will continue to conduct joint logo M Sc and Diploma courses in Geoinformatics and Geohazards.

## **5.2 HINDI FORTNIGHT CELEBRATIONS**

Hindi Fortnight celebrations were organized during September 14-28, 2006 at IIRS with great zeal by the staff and faculty members and also by the trainees of various courses. Various competitions have were also organized to encourage use of Hindi Language.

## 6.0 Staff News

### 6.1 News / Awards

- Dr. George Joseph, currently Honorary Distinguished Professor, ISRO has been appointed as Director of the CSSTEAP. He took over the charge of Director, CSSTEAP in the forenoon of December 6, 2006 from Dr. V.K. Dadhwal, Dean, IIRS, who was holding the additional charge of Director In charge, CSSTEAP.
- Dr. VK Dadhwal attended 49th session of the UN Committee on the Peaceful Uses of Outer Space (COPUOS) at Vienna (Austria) during June 12- 25, 2006 as Director In charge, CSSTEAP.
- Ms. Vandita Srivastava received the ISCA Best Poster Award in the section of Earth System Sciences in Indina Science Congress 2007 held during 3-7 January 2007 at Annamali University.
- Mr. I.C. Das, has been undergoing sandwiched Ph.D Programme at ITC , The Netherlands .
- Mr. Rabindra Nayak has been awarded doctorate degree in Physics entitled “ Coupling between the north Indian Ocean and the monsoons” from Goa University.

### 6.2 New Recruits/ Transfers/ Superannuations/Resignations

- Mr. K.S. Bisht , Sc/Engr “SD” and Mrs Sudesh Sethi , Sr. Administrative Officer retired from NRSA service on attaining the age of superannuation on September 30,2006 and December 31, 2006 respectively.
- Dr. Milap Punia Sc/Engr “SD” has resigned and joined as Assistant Professor in Jawahar Lal Nehru University, New Delhi on 16.10.06.
- Sri Anurag Gupta Sc/Engr “SD” resigned and joined Freescale Semiconductor India Pvt. Ltd, Noida on 15.11.06.
- Dr. P.K. Joshi Sc/Engr “SD” has resigned and joined as Associate Professor in TERI University, New Delhi on 26.2.2007
- Smt. Shobha Devi has joined as Attendant on 30.10.2006

## Promotions

- From 1.4.2006
  - Sri U.S. Kukreti , Technical Supervisor
  - Sri RC Sudey Tech. D
  
- From 1.7.2006
  - Dr. Sarnam Singh, Scientist/Engineer 'SG'
  - Dr. V Hari Prasad, Scientist/Engineer 'SF'
  - Sri P.V. Ramaraju, Scientist/Engineer 'SE'
  - Sri Sandeep Maithani , Scientist/Engineer 'SE'
  - Sri G. Srinivas, Scientist/Engineer 'SC'
  
- From 1.10.2006
  - Sri PS Rawat, Technical Supervisor
  - Sri GS Rana, Senior Technician B
  
- From 1.1.2007
  - Dr. VK Dadhwal, Scientist/Engineer 'H'
  - Sri Arun Kumar Sardar, Scientist/Engineer 'SD'
  - Sri K. Rama Mohan Rao, Scientist/Engineer 'SD'
  - Sri Ram Naresh Arun, Scientist/Engineer 'SC'

## 7.0 New Facilities

### 7.1 EDUSAT - Establishment of Teaching end at IIRS

EDUSAT facility at IIRS has established its own Teaching end Studio and Up-linking facility in the campus under national beam coverage of EDUSAT and link with users. Twelve universities/institutions, Madurai Kamaraj University; Pune University; Mysore University; Banasthali Vidyapith, Rajasthan; Jamia Milia Islamia, Delhi; JNU, Delhi; Tripura University; NIT, Warangal; Harisingh Gour University, Sagar; Anna university, Chennai; Kashmir University & Rajiv Gandhi University, Itanagar, are participating in the first phase for attending the 6 weeks training on Remote Sensing and GIS. Presently more than 55 universities have been set with Satellite Interactive Terminals (SITs) under CEC/UGC network and around 60 Engineering colleges under AICTE network where they can also participate in the proposed training program. This facility will be expanded gradually to cover larger number of universities /institutions.

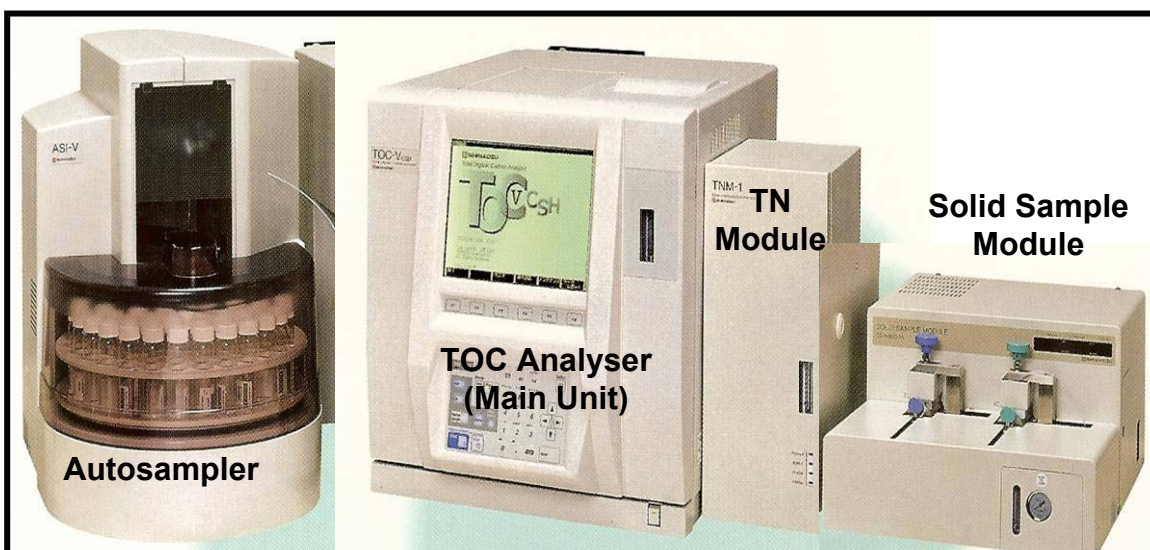


### 7.2 Instrumentation for Measuring Carbon & Nitrogen in Environmental Samples

The Institute has procured SHIMADZU-make Total Organic Carbon Analyzer (TOC-VCPH). It is equipped with Total Nitrogen Unit (TNM-1), Solid Sample Combustion Unit (SSM-5000A), Autosampler (ASI-V), Magnetic Stirrer, and Gas Sample Injection Kit. The instrument measures Total Carbon (TC), Inorganic Carbon (IC), Total Organic Carbon (TOC), Non-purgeable Organic carbon (NPOC), and Total Nitrogen (TN) in liquid and solid samples. Gas Injection Kit can be used to measure TC, CO<sub>2</sub>, and TOC concentrations in gas and aqueous samples. Combustion catalytic oxidation method is used to convert the carbon (C) and nitrogen (N) present in the samples into CO<sub>2</sub> and NO, which are then measured by high sensitivity Non-Dispersive Infrared (NDIR) and Chemiluminescence (CL) detectors, respectively. The area of CO<sub>2</sub> or NO peak signal measured by NDIR or CL detectors is converted to measure the concentration of desired parameter using a pre-prepared calibration curve. High-purity synthetic air is used as a carrier gas. The operations of the instrument are controlled by PC powered with especially designed software.

The brief specifications of the instrument are given below:

|  | Aqueous Samples |                |               | Solid Samples             |                            |
|--|-----------------|----------------|---------------|---------------------------|----------------------------|
|  | TC              | IC             | TN            | TC                        | IC                         |
| Measurement Range                      | 0 to 25000 ppm  | 0 to 30000 ppm | 0 to 4000 ppm | 0.1 to 30 mg in 1g sample | 0.1 to 20 mg in 1 g sample |
| Detection Limit                        | 50 ppb          | 50 ppb         | 0.1 ppm       | 0.1 mg in 1g sample       | 0.1 mg in 1g sample        |
| Measurement Accuracy (Reproducibility) | CV 1.5% max     | CV 1.5% max    | CV 3% max     | --                        | --                         |



TOC Analyser (Shimadzu-Make) with Peripherals

## 7.3 Instrumented Field Observations

### 7.3.1 Soil Erosion and runoff Generation

A research project titled ***“Soil Erosion Assessment at catchment scale using satellite data and GIS in Himalayan region – A case study in Sitla Rao watershed”*** was initiated in 2003 to study soil hydrological processes and process-based modeling of runoff and erosion in Himalayan landscape. Sitla Rao, a tributary of Asan River falls in Western Doon Valley in Dehradun District of Uttaranchal. Under the project, field instruments such as automatic weather station (one), self-recording raingauge (2 Nos.) and one stage level runoff (discharge) recorder were established at Langha village in Sitla Rao Watershed. The site is also being developed as study site to meet the research and training requirements of the various training and education program at the Institute. The project mainly focuses on process-based simulation modeling to assess soil erosion and runoff generation employing remote sensing data and GIS. The data generated will provide the real field based hands-on experience to the trainees working in these fields.

Dr. K. Radhakrishnan, Director, NRSA along with members of NCMC (NRSA Central Management Council) visited the research site on 24<sup>th</sup> April, 2006 during the meeting of NCMC at IIRS and were apprised with the preliminary results of the study and the data (daily rainfall and runoff) being collected since July 2003.



Dr. K. Radhakrishnan, Director, NRSA and other NCMC members are being apprised to Automatic Weather Station (AWS) installed at research site in Sitla Rao watershed

### **7.3.2 Corner Reflector Installation At The Sitla Rao Site For Microwave ENVISAT ASAR Passes**

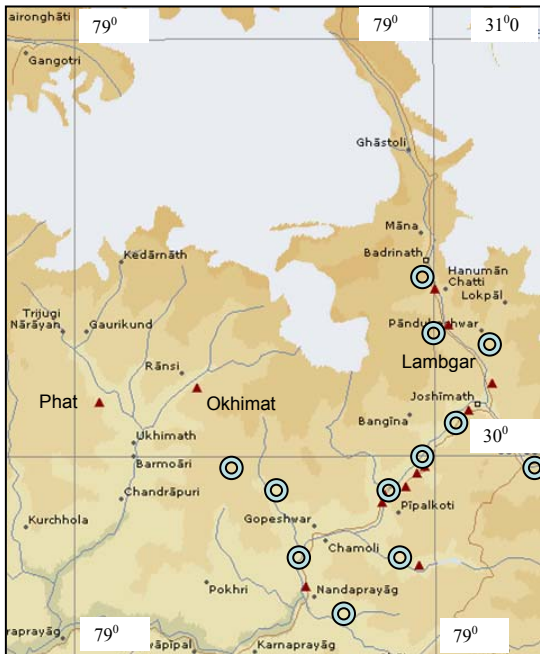
A research entitled “Role of microwave remote sensing for spatially distributed water erosion modeling in a Himalayan catchment” is being carried out at Sitla Rao watershed with ENVISAT ASAR data which requires multiple remote sensing data rectified with a high precision. Appropriate technique for the delineation of the features in ENVISAT ASAR data is use of corner reflectors for Ground Control Points (GCPs) collection. In the study area five corner reflectors were fabricated and installed in the field. The design of the corner reflector with a movable base for the smooth orientation with respect to azimuth and elevation of the corner reflector was fabricated. The requirement of the corner reflector is that two surfaces meet at a 90 degree angle that are pointed toward an incident beam. A triangular trihedral corner reflector presents three reflective surfaces arranged at 90-degree angles and requires less precision in pointing the reflector towards the radar beam. The trihedral corner reflectors were designed such that, the opening of the reflectors forms an equilateral triangle with 2.43 meter per side. The angle from the bore sight to the reflectors plates is 30 degrees. The bottom point of the reflector was set on a circular stand that allowed the reflector to be moved in the azimuthal direction as well as to be elevated to the desired elevation angle. The circular stand was fixed into the ground such that the bottom point of the corner reflector is at ground level. The exact position of the reflectors was determined using a Differential Global Positioning System (DGPS). These positions were forwarded to the European Space Agency (ESA) according to which they have supplied the azimuth angle as well as the elevation angle at each position to which the corner reflectors are oriented in order to face the ASAR beam thus enabling the corner reflector to reflect the beam back to the satellite sensor



**Corner Reflector on Ground**

### 7.3.3 Rainfall thresholds for initiation of landslides and decoupling of spatial variations in precipitation, erosion, tectonics in Garhwal Himalaya

Understanding of rainfall induced landslides and coupling of erosion, tectonics and climate is of critical importance in Garhwal Himalaya for a proper understanding of geodynamics of the region. Due to lack of basic meteorological data, very limited progress or no progress has been made so far in this regard. Rainfall induced landslides cause immense loss to human life and property in Himalaya every year. It is necessary to study two aspects that are of critical importance to landslide hazard and risk assessment: magnitude-cumulative frequency of rainfall and initiation of landslides. Relationship of rainfall and sediment yield will also enable to define the threshold of landsliding in the region. A project has been taken up by IIRS under Disaster Management System (DMS) of ISRO, that will enable to establish a relation of sediment yield with tectonics, landslides and earthquake in the region.



Network of Automated Weather Stations set up by IIRS for landslide Alkananda basin



AWS located on northeast slope at ITBP campus in Joshimath, monitoring in background snow-glacier features such as cirque and arête

### 7.3.4 Aerosol Measurement over Dehra Dun

Under the aerosol climatology and effects (ACE) project of IGBP an Multiwavelength Radiometers (MWR) at Indian Institute of Remote Sensing (IIRS) is functional and is continuously taking measurements on atmospheric aerosols in and around Dehra Dun. The instrument is under operation from October 2005. An Integrated Campaign for Aerosols, gases and radiation budget (ICARB) campaign under ISRO-GBP is conceived from mid February to end to May this year as an integrated campaign comprising of three segments, land based observations of aerosols and trace gases from observations over main land and from islands, ship board measurements over Bay of Bengal and Arabian sea and aircraft measurements of altitude profiles of aerosols and trace gases. Towards the campaign, IIRS is participating in both ocean and land activities. Over the land activities the measurement using MWR at Dehradun are in progress and data are being collected. The measured parameters from each segment will be assimilated subsequently and analyzed to meet the campaign objectives.



Multiwavelength Radiometers (MWR)



Aethalometer

## 8.0 DISTINGUISHED VISITORS

- ❖ The Valedictory Function of SPECIAL COURSE FOR ALGERIAN NATIONALS was held on April 25, 2006 in IIRS Auditorium. **Dr. K Radhakrishnan**, Director, NRSA presided over the function as Chief Guest and also handed over the certificates to the participants.
- ❖ **Dr. BN Suresh**, Chairman, Science and Technology Sub Committee of UNCOPUOS and Director, VSSC visited IIRS on November 20, 2006.
- ❖ **Prof. Sjaak Beerens** of ITC, the Netherlands visited IIRS during May 22-23, 2006. Apart from discussions with Dean, IIRS for future fruitful and mutually enriching cooperation, Dr. Beerens interacted with IIRS faculty.
- ❖ **Dr. He Changchui**, Asst. Director General, FAO and Regional Representative for Asia-Pacific along with Dr. Masakazu Kashio, Forest Resources Officer, FAO, Bangkok visited IIRS on 18th April'06 and discussed on utility of RS and GIS for large area forest inventory. The two appreciated the initiative the IIRS has taken on carbon cycling studies in India. They also expressed their happiness over LCCS course and the LCCS workshop organized by IIRS on behalf of FAO, Rome.
- ❖ **Dr. K.D. Singh**, FAO-LCCS India Coordinator visited IIRS for discussions on preparation for ensuing LCCS-FRA 2010 Workshop, 4-8 Dec. 2006 at IIRS.
- ❖ **Dr. K. Haridasan**, Joint Director, FRLHT, Bangalore visited IIRS on 17.11.06 for first hand information on IIRS activities.
- ❖ **Dr. S.B. Duerr**, Programme Director, DFG, Bonn, Germany and Dr. Gernot Gad of DFG, India Office at New Delhi visited IIRS/FED for discussions on the possibilities of funding by DFG for Indo-German projects in India.
- ❖ **Dr. P Nag**, Director, NATMO, Kolkata visited IIRS on November 29, 2006.
- ❖ 4-member delegation from Venezuela led by **H.E. Milena Santana Ramirez**; Ambassador of the Bolivarian Republic of Venezuela to India visited IIRS on 15th December 2006. The delegation had discussions on various issues of mutual interest with the Dean, IIRS followed by presentations and discussions with the various IIRS Divisional Heads. The delegation visited various facilities in the campus.
- ❖ The committee to formulate a HRD and Training Policy for IIRS constituted by Chairman, IIRS/Secretary, DOS comprising of Dr.

- R.G. Nadadur**, Joint Secretary, DOS as Chairman with eight other senior officials from ISRO/DOS visited CSSTEAP/IIRS on 17th January 2007
- ❖ **Shri P.Mukherjee**, Jt. Secretary (Finance), DOS, Bangalore visited IIRS on 28th December 2006 and had discussions with Dean, IIRS on various issues.
  - ❖ **Prof. Margerata** Ihse from Stockholm, Sweden visited FED on 8th March for first hand information on FED activities.
  - ❖ **Prof. Herald Kaechele** from Leibniz- Centre for Agricultural Landscape Research, Germany visited FED on first hand information on our activities.
  - ❖ A four member high level Iranian delegation namely **Mr. Mohammed Hassan Nami** , **Mr. Hamid Al. Mirian**, **Mr. Touraj Alinia** and **Mr. Mohmound Mohebbi** visited IIRS on March 8, 2007 and had discussions with Dean, IIRS about IIRS Training Programs. Divisional Heads also participated in the presentations.
  - ❖ **LT General RR Goswami**, **Brig. M Mohan** and **Brig. S Choudhuri** of College of Military Engineering, Pune visited IIRS on March 17, 2007 to discuss capacity building in Geoinformatics.

## 9.0 Publications

### 9.1 Refereed journals

1. Champati ray P.K., Dimri S., Lakhera R.C. and Sati S., (2006). Landslide Monitoring and Fuzzy Integration Based Method for Hazard Assessment in Active Seismic Zone of Himalaya, *International Journal on "Landslides"*, DOI 10.1007/S10346-006-0068-6. Springer-Verlag GmbH.
2. Chatterjee, R.S., (2006). Coal fire mapping from satellite thermal IR data – a case example in Jharia Coalfield, Jharkhand, India, *ISPRS Journal of Photogrammetry and Remote Sensing*, **VOL. 60(2)**: 113-128
3. Chatterjee, R.S., Fruneau, B., Rudant, J.P., Roy, P.S., Frison, P.L., Lakhera, R.C., Dadhwal, V.K. and Saha, R., (2006) Subsidence of Kolkata (Calcutta) City, India during the 1990s as observed from space by Differential Synthetic Aperture Radar Interferometry (D-InSAR) Technique, *Remote Sensing of Environment* **VOL. 102**: 176-185
4. Chatterjee, R.S., Wahiduzzaman, Md., Shah, A., Raju, E.V.R., Lakhera, R.C., and Dadhwal, V.K., (2007) Dynamics of coal fire in Jharia Coalfield, Jharkhand, India during the 1990s as observed from Space, *Current Science*, **VOL. 92(1)** : 61-68
5. Ganguly, D., Mukhopadhyay, A., Pandey, R., and Mitra, D., (2006) Geomorphic Study of Sundarban Deltaic Estuary, *Indian Society of Remote Sensing*, **VOL. 34**: 431 – 435
6. Gupta, S., Singh, S., Agrawal, S and Roy, P.S., (2006). Degradation of tropical evergreen forests in Mokokchung, Nagaland, India. *International Journal of ecology and environmental sciences* **VOL. 32**.
7. Hanmagond, P.T, Mitra, D., (2007), Dynamics of the Karwar Coast, India, with special reference to study of Tectonics and Coastal Evolution using Remote Sensing Data *Journal of Coastal Research*, **Special issue 50**: 34-42
8. Jain, S and Jain, R.K., (2006). A Remote Sensing Approach to Establish Relationship among Different Land Covers at Micro Level. *International Journal of Remote Sensing*, **VOL. 27**: 2667-2682.
9. Jayappa, K.S., Mitra, D. and Mishra, A.K., (2006), Coastal geomorphological and land use and landcover study of Sagar Island, Bay of Bengal (India) using remotely sensed data, *International Journal of Remote Sensing*, **VOL 27**: 3671 – 3682.

10. Joshi ,P., Roy ,P.S., Singh,S., Agrawal,S and Yadav ,D, (2006). Vegetation cover mapping in India using multi- temporal 3 IRS Wide Field Sensor (WiFS) data. *Remote sensing environment* ,**VOL.103**: 190-202.
11. Jowhar, T. N. and Srivastava, V,( 2006). “*Propagation of Uncertainties in Geothermobarometry*”, *Indian Journal of Geochemistry*, **Special Volume No. 21**.
12. Karnatak,H.C, Bhatia K. and Saran,S., (2006), AHP MCDM in Biodiversity Conservation,. *Geospatial Today* **VOL 5**:14-22.
13. Krishan,G., Kumar,S., Saha, S.K. and Sardar, A.K., (2006) Role of Crop residues in Organic Farming, *Annals of Forestry*, **VOL.14 (2)**: 355-359
14. Mahajan, A.K., R, Sporry, Champati ray, P.K., Ranjan, R., Slob., S.,van Westen, (2006) Methodology for site response studies using Multi-channel Analysis of Surface Wave (MASW) technique in Dehradun city, *Current Science*, **VOL. 92**: 945-955.
15. Mantri, V, A. and Mishra, A.K., (2006), On monitoring mangrove vegetation of Sagar Island by remote sensing, *Nat. Acad. Sci. Lett.*, **VOL.29** : 45-48.
16. Mayaux, P., H. Eva, J. Gallego, A. Strahler, M. Herold, A. Shefali, S. Naumov, E. De Miranda, C. Di Bella, C. Ordoyne and I. Kopin, (2006). Validation of the Global Land Cover 2000 Map. *IEEE transactions in Geosciences and remote sensing* **VOL 44**: No. 7
17. Patel, N. R. (2006). Investigating Relations Between Satellite Derived Land Surface Parameters and Meteorological Variables. *Geocarto International*, **VOL. 21(3)**: 48-54.
18. Patel, N. R., B. Bhattacharjee, A. J. Mohammed, Tanu Priya and Saha, S.K. (2006). Remote sensing of regional yield assessment of wheat in Haryana, India. *International Journal of Remote Sensing*, **VOL. 27(19)**: 4071-4090
19. Patel, N. R., Mohammed A. J. and Rakesh, D. (2006). Modeling of Regional wheat yields in western UP Using Multi-temporal Terra/MODIS satellite data. *Geocarto International*, **VOL 21(1)**:43-50.
20. Patel, N. R., Rakesh, D. and Mohammed, A. J. (2006) Mapping of Regional evapo-transpiration in Wheat. *Hydrological Sciences Journal*, **VOL. 51(2)**:325-335
21. Raju, P.L.N., Dadhwal, V.K. and Jeganathan, C., (2007), “GIS Education and Training at Indian Institute of Remote Sensing”, *GIS Development Asia Pacific*, **VOL. 11**, Issue 3.

22. Roy, P.S., Joshi ,P.K., Singh ,S., Agarwal ,S., Yadav ,D. and Jegannathan ,C., (2006). Biome mapping in India using vegetation type map derived using temporal satellite data and environmental parameters. *Ecological Modelling*, **VOL. 197**:148-158.
23. Saran, S, Bharti ,A., Sterk ,G. and Raju ,P.L.N, (2007) “Comparing & optimizing land use classification in a Himalayan area using parametric and non parametric approaches” *Indian Society of Geoinformatics*, **VOL 1**:30-38
24. Saran, S., Padalia, H., Tupe, R.P., Harish, C. K. and Raju ,P.L.N., (2006), “Assessing Performance of Granulometric Method for Individual Tree Counting (ITC)”, *I.J.Geonformatics*, **VOL 2**: 21 – 30.
25. Sharifikia, M., Dubey, C. S., Sharma, B. K., Chaudhry M., Champati ray, P.K., (2006). Mapping of Fault Rupture of the 28 May 2004 Iran Earthquake (Mw = 6.2) Using Satellite Image, *Journal of ISRS*, **VOL 34**: 423-430
26. Shrestha, G.B., and Champati ray, P.K., 2007. Remote Sensing in Geology: An Overview, *Bulletin of Nepal Geological Society*, **VOL. 24**.
27. Singh, I. J., Mizaurahaman, M., and Kushwaha, S. P.S (2006). Assessment of effect of settlements on growing stock in Tahno range of Dehradun Forest Division using RS and GIS. *J. Ind. Soc. Remote Sensing*. **VOL. 34(2)**: 209-217
28. Stibig H-J, Roy P.S., Agrawal S., Upik R, Joshi P, Beuchle, R., Hildanus , Mubareka, S. , and Fritz S., 2007. A land cover map for South and Southeast Asia derived from SPOT VEGETATION data. *Journal of Biogeography*, **VOL. 34**: 625-637
29. Thakur, V.C., Perumal, R.J.G., Champati ray, P.K., Bhat, M.I., Mallik, M.A., 2006. 8<sup>th</sup> October, Muzaffarabad Earthquake and Seismic Hazard Assessment of Kashmir Gap in Northwest Himalaya, *Journal of Geological Society of India*, **VOL. 68**: 187-200.
30. Velmurugan, A., Swarnam, T.P. and Ravisankar, N. (2006). Assessment of tsunami impact in south Andaman using RS and GIS, *Journal of the Indian Society of Remote Sensing*, **VOL. 34(2)**:193-202.

## 9. 2 Symposiums/Workshops/Seminars Proceedings:

31. A.K.Mishra , Rahul K. Pandey and A. Mukhopadhyya, 2006, Application of Analytical Algorithm to Classify Near Shore Substrate Types and Coral Reef Environment, ISPRS-TC-IV, International Symposium on “Geospatial Data bases for sustainable Development”, Sept 27-30, 2006, Goa, India, 794-799.

32. A.K.Mishra, V.K.Dadhwal and C.B.S.Dutt, 2006, Retrieval of Marine Aerosol Optical Depth (AOD) using IRS-P4 (OCM) Sensor and preliminary comparison with SeaWiFS and MODIS retrieved AOD, ISRO Geosphere Biosphere Programme (IGBP), First Post-Campaign Meeting of the WG-II of ISRO-GBP, 82-85.
33. Bhakar, R., Srivastav, S.K. and Jetten, V. (2007). Remote sensing approach for point data regionalisation: an example of extrapolation of soil-hydrologic parameters in an Irrigated Tract of Thar Desert. *Abstract*, National Conf. on Remote Sensing, Lucknow, March 10-11 March, 2007.
34. Champati ray P.K., Lakhera R.C., Singh, V.K., 2007. Spatial modeling of Seismicity Induced landslides, presented at 2<sup>nd</sup> Regional Training for Landslide Risk Mitigation, organised by Asian Disaster Preparedness Centre (ADPC), Bangkok and Norwegian Geotechnical Institute, Oslo. at Phuket, Thailand, 29 Jan -02 Feb, 2007.
35. Champati ray P.K., R.S. Chatterjee, Lakhera R.C., 2007. Potential and Limitations of InSAR Techniques for Landslides Monitoring in Garhwal Himalaya, In proceedings of Conference of JEP towards Microwave Remote Sensing Data Utilization (JEP-MW), SAC, Ahmedabad, 785-792
36. Champati ray, P.K., Gairola, S., and Singh, V.K., 2006. The tragedy of earthquake and landslides in Garhwal Himalaya using remote sensing and GIS (in Hindi), Ashmika, June 2006, WIHG, Dehradun, 22-25.
37. Champati ray, P.K., Mahajan, A.K., Ranjan, R, van Westen, C. J., Dasmohapatra, D., Lakhera,R.C. 2006. Recent tectonics and seismic microzonation of Dehradun city, India, presented at ISPRS International Symposium on "Geospatial Databases for Sustainable Development", Goa, India, Sept. 27-30, 2006
38. Champati ray, P.K., Sarkar, S., Kanungo, D.P., Singh, S., Bhusan, K., Chatterjee, R.S., Srivastav, S.K., and Lakhera, R.C. (2007). Parameter characterization and landslide hazard assessment in Northeast India. *Abstract*, National Conf. on Remote Sensing, Lucknow, March 10-11 March, 2007
39. Dutta, R., Patel, NR and Stein A. (2006). Can MODIS Derived NDVI provides biophysical status of Tea Bush ? GIS Develoment, weekly 17<sup>th</sup> July.
40. Gejo Anna Geevarghese, A.K.Mishra, Alok Saxena, S.P.S Kushwaha, 2006, Mapping coral reef habitat of South Andaman: A comparative analysis of different multi spectral data sets, ISPRS-TC-IV, International Symposium on

“Geospatial Data bases for sustainable Development”, Sept 27-30, 2006, Goa, India, 817-823.

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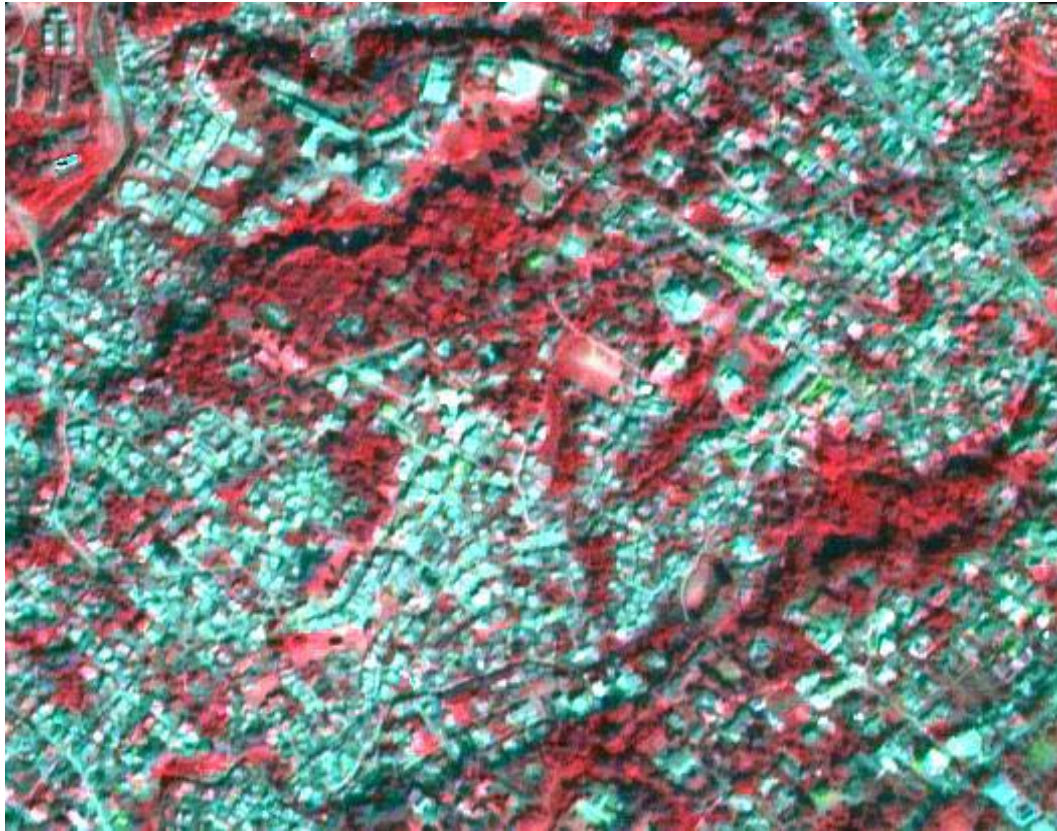
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