



4th Course on
‘Remote Sensing and Digital Image Processing’
 under the aegis of ITEC/ SCAAP Program of MEA,
 Government of India
 (30.10.2014 – 28.11.2014)

COURSE REPORT

Introduction:

As part of the initiative by the Ministry of External Affairs, Government of India, under the Indian Technical and Economic Cooperation (ITEC) and Special Commonwealth Assistance for Africa Programme (SCAAP) the GSI Training Institute has been conducting training programs in the fields of GIS, Remote Sensing and Digital Image processing for the candidates from different countries. The fourth such training course on Remote Sensing and Digital Image Processing was conducted at GSI Training Institute, Hyderabad during 30.10.2014 – 28.11.2014. The course was inaugurated on 30th October 2014 by Shri L. Harendranath, Dy. Director General, GSITI, Hyderabad. 11 candidates from 6 different countries namely Ghana, Myanmar, Indonesia, South Africa, Tanzania and Vietnam participated in the month long training program. Among the participants, two were from Ghana Geological Survey Dept., one from Ministry of Forest, Indonesia, one from RS Dept. Mandalay University, Myanmar, five from KZN Dept of Transport, South Africa, one from Land Housing and Human settlement, Tanzania and one from the Vietnam Institute of Geosciences’ and Mineral Resources, Vietnam.

Course Content:

Considering the varied academic and professional background of the participants the curriculum was designed to introduce the participants to the basic concepts of remote sensing and its use as a tool to achieve mapping needs in their respective domains. A brief introduction to geomorphological mapping and its bearing on lithological and structural discrimination was given to the participants. The concept and principles of Remote Sensing in optical and thermal ranges, sensors, platforms, satellite orbits, multispectral scanning, colour composites, image interpretation techniques were covered through lecture and exercise. Visual interpretation techniques for hard copy imageries as well as digital images were covered along with introduction to basic geomorphology and its application in image interpretation.

Lecture, demo and hands-on exercise were carried out on various aspects of digital image processing. Lectures and demo in principles of remote sensing, sensors, platforms, satellite orbits, colour composites, digital data formats, data acquisition, image preprocessing, radiometric and

geometric correction of raw data, image enhancement techniques (radiometric, spectral and spatial enhancements including filtering in frequency domain), multispectral classification, accuracy assessment, image mosaicing and map composition were introduced in this course. The concept of unsupervised and supervised classification and generation of thematic layers were attempted and extractions of features were also done. The participants were exposed to fundamentals of digital photogrammetry for generation of DEM from stereo pair of images and preparation of derivative maps from DEM were done during the course. Basic aspects of digital photogrammetry were covered and the participants successfully generated digital elevation models from stereo-pairs of both aerial photographs and satellite imageries. Basic concept of ortho-image generation was also covered.

Digital image processing of remote sensing data was done primarily on ERDAS Imagine 2014 software. Participants were also exposed other software like ILWIS (Integrated Water and Land Information System,) and 3DEM. The participants prepared different derivative maps from DEM and carried out drainage basin analysis.

The participants had one day visit to the Indian National Center for Ocean Information Service (INCOIS), at Hyderabad where they were introduced to the Tsunami warning and alert system and brief appraisal on the application of satellite data like NOAA AVHRR, MODIS , OCEANSAT P6 for ocean studies like potential fish zone demarcation, ocean colour monitor, coast zone management, coral studies was also given.

In the last part, the participants carried out project work wherein the participants down-loaded satellite data products including Digital Elevation Model of their area of interest from public domain. These data products were subjected to several enhancement techniques (quantitatively) for better interpretability. Finally various thematic maps were prepared by individual participants using map composition module of Erdas Imagine.

Course Schedule

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DATE	SESSION	TOPICS	FACULTY
30.10..2014	FN AN	Registration & Inauguration Principles of Remote sensing Geomorphic processes, landforms and their significance in image interpretation	MNM SD
31.10..2014	FN AN	Sensor and platforms. Image Resolution Colour image representation Principles of image interpretation	VPG SD JPM JPM
01.11..2014		Interpretation criteria for lithology Interpretation criteria for Structure Interpretation of landforms and litho units using hardcopy satellite imagery	VPG JPM PGRS
02.11.2014		Sunday	
03.11.2014	FN AN	Spatial data models. Introduction to Digital image processing, Digital Image formats Demo and hands on practice on ERDAS Imagine-2013, Image loading, Image sub setting	MNM SD PGRS
04.11.2014		Holiday	
05.11.2014	FN AN	Concepts of Datum, Coordinate System and Map projection Lecture and demo on image Geometric correction & Image Mosaicing Toposheet to image and image to image geometric correction & Image Mosaicing Using ERDAS Imagine-2014	MNM JPM PGRS
06.11.2014		Holiday	
07.11.2014	FN AN	Image Statistics Lecture and demo on radiometric enhancements Hands on practice on radiometric enhancement	JPM VP PGRS
08.11.2014	FN AN	Lecture and demo on spatial enhancements Spatial enhancement/ Filtering techniques	JPM PGRS
09.11.2014		Sunday	
10.11.2014	FN AN	Lecture on Spectral Enhancements Demo and practical exercise on Spectral enhancement	SD PGRS
11.11.2014	FN AN	Lecture and demo on multispectral image classification Exercise on Image classification	JPM PGRS
12.11.2014	FN AN	Introduction to image processing in ILWIS Exercise on image processing in ILWIS	SD
13.11.2014	FN AN	DEM and DEM derivative maps Practical Exercises on generation of DEM derivative maps in ILWIS	SD PGRS
14.11..2014	FN AN	Raster analysis in ILWIS Automated drainage extraction and drainage analysis in ILWIS	SD PGRS
15.11.2014	FN AN	Introduction to Digital Photogrammetry and Digital Image Orientation Hands on exercise – Using Satellite stereo data	DKC PGRS
16.11..2014		Sunday	
17.11.2014	FN AN	Aerial and Space Triangulation and Bundle Block Adjustment. Practical Exercises using stereo satellite imagery	DKC PGRS

18.11.2014	FN AN	Lecture on Digital elevation model and its application, Generation of ortho-image Practical exercises on DEM generation, ortho-image generation and feature extraction	DKC PGRS
19.11.2014	FN AN	Demo on feature extraction and map composition in ERDAS Imagine Practical exercises on feature extraction and map composition	JPM PGRS
20.11.2014	FN AN	Principles of Thermal Remote sensing Exercise on thermal Remote sensing: Urban heat island mapping, underground coal fire mapping	NRSC NRSC
21.11.2014	FN/ AN	Visit to INCOIS	
22.11.2014	FN AN	Application of RS and GIS in Disaster preparedness, assessment and mitigation measures Briefing about Project work and commencement Project work	SD JPM PGRS
23.11.2014		Sunday	
24.11.2014		Project work	PGRS
25.11.2014		Project work	PGRS
26.11.2014		Project work	PGRS
27.11.2014		Finalisation of project work and submission of report	PGRS
28.11.2014		Presentation by the participants	PGRS

Faculty	
SD	Dr. Sanjay Das, Director, PGRS Division, GSITI, Hyderabad
MNM	M.N. Mishra, Director, CGMT Division, GSITI, Hyderabad
VPG	V.P. Gaur, Superintending Geologist, PGRS Division, GSITI, Hyderabad
JPM	J.P. Mohakul, Superintending Geologist, PGRS Division, GSITI, Hyderabad
Guest Faculty	
DKC	Sri D.K.Choudhury, Director, SR, GSI, Hyderabad

Participants

1	Ms. Diep Cong Thi	Vietnam
2	Mrs. Siri Nassor Mrisho	Tanzania
3	Mrs. Hla Myitzu	Myanmar
4	Mr. Abdul Malik Solahdin	Indonesia
5	Mr. Jonas Bediako Ofori	Ghana
6	Mr. Robert Twum	Ghana
7	Mr. Lindokuhle Success Sithole	South Africa
8	Ms. Marguerite Catherine Vosloo	South Africa
9	Ms. Silindile Khanyisile Patronella Dlamini	South Africa
10	Mr. Thamlin Moodley	South Africa
11	Ms. Thembisile Morreen Jili	South Africa



Inauguration of the course- Participants with the Faculty of GSITI



Participants introducing themselves



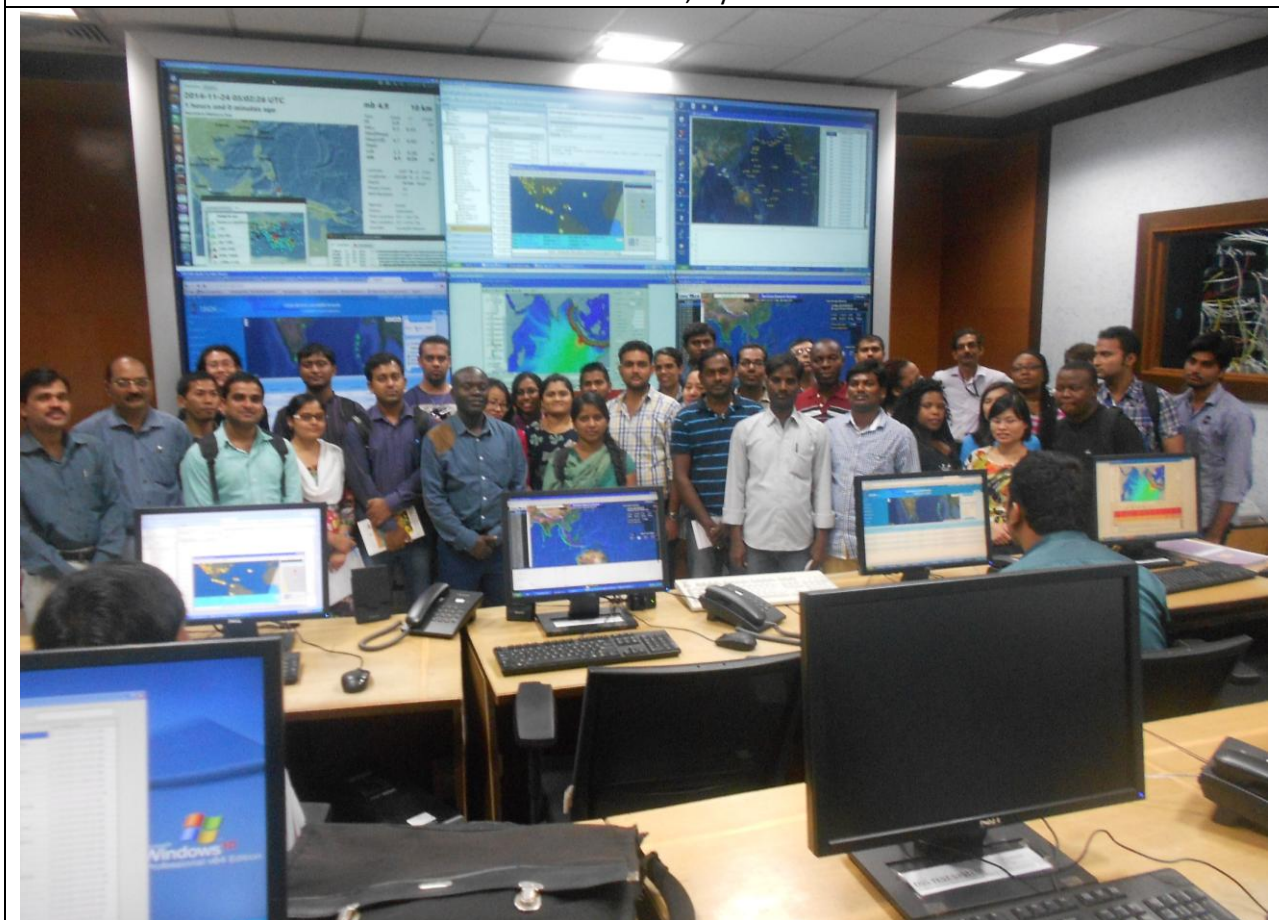
Trainees at during their independent Project workDigital Image Processing Lab, GSITI, Hyderabad



Trainees attending lectures in the lecture hall at GSITI, Hyderabad



Trainees in INCOIS, Hyderabad



Trainees in the ITsunami Monitoring Lab. at INCOIS, Hyderabad