J. K. Garg,

The Indian Society of Remote Sensing
Ahmedabad Chapter

NEWS LETTER

VOL. 1 No. 2
and
VOL. 2 No. 1

January 1, 1988

Dear Member,

We bring to you this issue of the newsletter-a combined second and third issue. We had to take course to this step (of combining the second and third issue) due to unavoidable circumstances. We tried our best to bring to you the second issue in October 1987, but once we slipped (considerably, we feel) we thought it better to combine the second issue with the third one. As a result, we have for you an expanded third issue packed with more articles/information/news.

Going back to the first issue, we have received encouraging responses and some useful suggestions to make this newsletter and its contents more interesting. The first thing we decided was to make the newsletter more colourful and so we thought of using colour pages. The ISRS logo also finds place in the masthead and also the print style is better. We hope that these changes have improved the image of the newsletter.

In this issue, we have for you two case studies-one on Forestry applications and another on Coastal (pertaining to the coastal problems of Gujarat). Both the case studies are typical examples of the utility of remote sensing techniques in the respective application areas. We have two departmental reports by DGM, Gujarat and GERI, Vadodara on their remote sensing activities. A new feature – **Satellite Update** - brings to you the latest information in the field of remote sensing satellites (both present and planned). The routine features on forthcoming events, books/journals etc. are also included. A report on the society/chapter activities is also included.

Some of our members have voiced their concern on not finding their names in the membership list published in the first issue. One member has expressed doubts whether only senior people's names are to be included. Believe us, the missing names were unintentional and there is no senior-junior concept. In this issue, we have an addendum to the members list where we hope all the names are included. In addition, we have for you a list of the society members from Gujarat (other than those from Ahmedabad) which you may find useful.

We wold like to once again request all of you to contribute articles/views/reports etc. which could be included in the forthcoming issues of the newsletter. In particular, we would like to include departmental reports from other organisations on their activities in remote sensing. And please do send in your views on the newsletter-its format, content, reading etc

Lastly, though late, we wish you all a happy new year !

—Editor

CHAPTER ACTIVITIES

FILM SHOWS ON REMOTE SENSING IN MINERAL EXPLORATION

The Ahmedabad Chapter of Indian Society of Remote Sensing had arranged the screening of three short films at the lecture theatre of the Physics Department of Gujarat University on September 12, 1987. The films titled "Treasures of the Earth", "Rocks and Minerals" and "Remote Sensing in Mineral Exploration' were shown with the courtesy of the Directorate of Geology and Mining and the Space Applications Centre. These films depict how the minerals and rocks had been formed in the earth, how one can identify the minerals, rocks and the methods and techniques at several stages for the exploration of minerals. This was followed by a question and answer session in which Dr. R. T. Shukla and Shri V. Tamilarasan gave explanation to the queries raised by the audience.

ANNOUNCEMENT

Seminar on Remote Sensing Activities in Gujarat

The recent advances in the application of Remote Sensing techniques for exploration, monitoring and management of natural resources, are being promptly adopted by the Gujarat Government with significant success. The Gujarat Engineering Research Institute (GERI) in Baroda has been identified as the nodal agency to coordinate these activities. GERI, in collaboration with the Indian Remote Sensing Society, Ahmedabad Chapter (ISRS AC) is organising a one day Seminar on the **Remote Sensing Activities in Gujarat** during March 1988, the details of which are given below.

Objectives :

The main objective of the Seminar is to bring together the various groups involved in remote sensing activities in the State, and to provide a forum for exchange of information on the status of the activities.

Themes :

The following themes are expected to be discussed :-

- 0 Groundwater Exploration
- 0 Land use and Land cover Mapping
- 0 Wasteland Mapping
- 0 Crop Production Forecasting
- 0 Crop Stress Detection
- 0 Crop Yield Modelling
- 0 Salinity/Water logging
- 0 Coastal Environment
- 0 Forestry
- 0 Town Planning and Urban Land Use

Exhibition

An exhibition (of maps, satellite imagery, activities of the Gujarat State Remote Sensing Organisation) is also planned on the same day.

Correspondence

All correspondence connected with the Seminar and registration may please be sent to :

Dr. B B Jambusaria
Organising Secretary
Gujarat Engineering Research Institute
Vadodra-390 007.

Gram : RESEARCH

Phone : 327213-14-15, 3266876, 326891.
325283 (Direct), 323497 (Residence)

'LAKSHMI NARAYAN CALLA ENDOWMENT' LECTURE

The "Laxminarayan Calla Memorial Lecture" has been started as generous financial support was received from Shri O. P. N. Calla. It is planned to invite an eminent person to deliver a talk on subjects related to natural resources and remote sensing. This year, Prof P. R. Pisharoty was invited to deliver this memorial lecture on 'Remote Sensing of Ocean Floor Topography'. Summary of this lecture (delivered on 30 Dec. 1987 at Space Application Centre) is given below.

SEASAT was a remote sensing satellite designed to assess the value of micro wave sensors for the remote sensing of the worlds oceans. It may be recalled that our Bhaskara satellite carried a microwave sensor designed and fabricated by Prof O P N. Calla of SAC. One of the important sensors carried by SEASAT was a radio altimeter (13.5 GHz, pulse width 3 nano seconds) for measuring the sea-surface heights, with a precision of 10 cms (Root Mean Square). It took data for 70 days, 14 tracks each day.

Through appropriate filtering, data on the height of the marine geoid in the wavelength region 30 km to 300 km were obtained. Using known bathymetry data for a couple of tracks, algorithms were generated for the determination of bathymetry over the rest of the oceans, mostly unsurveyed in the conventional way with echosondes and ships.

The development of the algorithm is a highly skilled job, involving ' time series'' analysis and geophysical theories. These were briefly described by Prof.Pishroty. The final global bathymetric map was reasonably good. Based on the success of SEASAT (and the analysis of data obtained), two remote sensing satellites for the measurement of sea surface topography are being planned for launch in 1991–the Navy Remote Ocean Sensing System (N-ROSS) and Ocean Topography Experiment (TOPEX).

GUJARAT FROM SPACE :

GUJARAT FROM SPACE is the name of the publication that the ISRS Ahmedabad Chapter has been planning to bring out for quite some time. The idea of having such a publication has arisen from the fact that, although a lot of work using remote sensing techniques has been done by various departments/agencies in Gujarat, there is no single source where information on the work done can be obtained either as a reference or as a record. The information, presently, lies scattered in various reports/journals etc

The aim of the Ahmedabad Chapter is to bring out a comprehensive publication on the work done in Gujarat in all the fields of natural resources till now. The Chapter proposes to have this publication ready towards the end of 1988.

A set of five major chapters have been identified as the broad framework of the publication. Within these, there are specific topics on which details/case studies etc. can be prepared/compiled. The Executive Council has decided some of the topics for the five main chapters. This is given in the table below.

The Chapter requests from its members suggestions or guidelines so as to finalise the framework of the publication.

LIST OF SUGGESTED TOPICS

CHAPTERS	SUGGESTED TOPICS
1. Water Resources	(i) Ground water studies (ii) Ukai catchment studies
2. Agriculture & Land Use etc.	(i) Waterlogged and saline areas in command areas (ii) Desertification (iii) Soils (iv) Crops (v) Wasteland Mapping (vi) Urban Land use and Town Planning
3. Forestry	(i) Forest mapping and change detection
4. Geology	(i) Mineral Exploration
5. Marine Applications	(i) Coastal Environmental studies

CASE STUDIES

1 Monitoring of Afforestation and Deforestation on Compartment Level through Remote Sensing

Increasing industrialisation and growing human population are drastically altering the landscape. Forest land is cleared for industrial development, transportation, public utility lines and quite often for agriculture. These anthropogenic changes and the changes created by natural catastrophes such as fire, insect infestation, disease and floods must be measured/monitored periodicially to keep the forest information updated and useable for decision making.

Forest mapping and damage detection project (FMDD) is one of the experimental applications project under the Indian Remote Sensing Satellite Utilisation Programme (IRS-UP). One of the objectives of FMDD is monitoring of afforestation and deforestation.

Monitoring of vegetation change through remote sensing has received attention recently and most of the work is confined to temporal registration and digital analysis of Lanosat data.

The study was carried out on monitoring of afforestation and deforestation at compartment level in Matin and Jatga blocks of the North Bilaspur forest division of Madhya Pradesh by the visual analysis of multi-temporal Landsat data (Nov. 1972, Feb 1975 and Nov. 1985).

Forest blank areas in different compartments of Matin and Jatga blocks in the years 1972, 1975 and 1985 are demarcated. Afforestation and deforestation maps are prepared on 1:63, 360 scale.

It was found that the total forest blank area was more in the Matin block in all the three years. It was 701.0, 596 4 and 733.9 ha. area in the years 1972, 1975 and 1985 respectively. In Jatga block, the forest blank area was 90.8, 249.6 and 75.5 ha. for the respective years. When the aggregate for the two years is considered, maximum blank area, of 791.9 ha. was recorded in 1972. By 1975, the blank area had increased by 54.2 ha. (846.05 ha. total). But by the year 1985, 809. 4 ha remained blank. Over all net vegetation loss between 1972 and 1985 was 17.6 ha. which is 0.2% of the total forested area (8.941 ha.).

It is found that during 1972-1975 in Jatga block, 14 compartments have undergone deforestation (total area 163.4 ha. out of 3150 ha. total forested area) and only two compartments showed afforestation (area 4.8 ha.). In Matin block, for the same period, number of compartments showing afforestation and deforestation are 9 and 12 respectively. In this time frame in Matin block 230.6 ha. area was reclaimed and 125.7 ha. area was lost. Between 1975 & 1985 Matin block recorded more deforestation and Jatga block underwent afforestation Total deforested area in Matin block during this period was 198.6 ha. and total afforested area in Jatga block in the same period was 186 0 ha. Out of the 16 compartments of Jatga block, during 1975-1985, only one compartment (No. 96) recorded deforestation.

The reason for studying both short peroid (1972-1975) and long period (1975-1985) was to determine whether recorded changes from 1972 to 1985 were similar to the sum of the recorded changes from 1972 to 1975 and from 1975 to 1985 But due to different degress of afforestation and deforestation measures from time to time, an exact agreement could not be expected. For example, a compartment recorded deforestation in the fitst period (1972-1975) and afforestation in the second period (1975-1985) still showed deforestation in the overall long period because the original loss was much greater than the latter gain (compartment number 95 of Jatga block). The vice-versa was also observed.

From the vegetation changes recorded, it is possible to deduce the causes with some degree of reliabiiity. For example, in the

present study maximum blank areas was recorded in the year 1975. This may be due to hectic activity of the the preparatory work of Hasdeo Bango project work during this period. Thereafter, vegetation might have been restored and perhaps this may be the reason for recording less blank area in 1985 than in 1975.

For further details on above case study contact Shri R. N. Jadhav, RSA, SAC, Ahmedabad.

2. COSTAL ENVIRONMENT

The costal environment is very dynamic and governs industrial, engineering, commercial and recreational activities conducted in this environment. Remote sensing data, because of its repetitive and synoptic nature, is useful in the study of various parameters of the coastal environment like coastal currents, chlorophyll, wetlands, shoreline changes, landforms, tidal boundary, offshore bars and underwater features, suspended sedin ents, ocean dumping, waste outfalls, oil pollutions etc.

Various studies related to many of the above cited parameters were conducted at the Space Applications Centre. These studies wera carried out using Landsat and/or Salyut-7 data of the coasts of Gujarat and Orissa. Studies have been also taken up on the Karnataka and Kerala coast under IRS-UP.

Coastal currents and fronts were mapped using Landsat MSS band 6 data, supplemented with band 7 data in the Gulf of Khambhat. It was observed that they are strongly influenced by tides.

Wetland mapping was carried out in the Gulf of Khambhat, Gulf of Kachchh and in the Mahanadi delta using visual as well as digital techniques. It was observed that mangroves are dwindling on the Gujarat coast and the Orissa coast. This is very alarming as they provide :

(i) nutrients to the sea water,

(ii) habitat for shrimps and crabs etc., and

(iii) protection from sea erosion.

Coral reef area in the Gulf of Kachchh have also reduced considerably owing to high turbidity in water.

Shoreline changes were mapped (1972-84) mainly in the Mahi, the Narmada and the Tapi estuaries. Complex erosional and depositional changes were noticed in the Mahi estuary. These erosional changes are threatening the existance of the cooling pond at the Dhuvaran Thermal Power Station. The possible reason for these changes is the construction of dams on the Mahi and its tributary. In Narmada estuary, depositional changes are more pronounced than erosional changes.

Coastal landforms have been also mapped using False Colour Composites made using Landsat MSS bands 4, 5, and 7 on 1,250,000 scale. Strandlines were demarcated on the Saurashtra coast based on white bands of milliolite rocks. The sudden truncation of paleoriver channels are clearly visible on the imagery. High tide flats, intertidal slopes, subtidal zone, paleomudflats etc. were delineated in the Gulf of Khambhat area.

Suspended sediments were mapped for the Gulf of Khambhat using density slicing techniques. These maps show that concentration of suspended sendiments is largely dependent on the tidal and seasonal conditions. It is concluded that Landsat MSS data allows broad coastal wetland as well as landform mapping, and provides interesting information on estuarine circulation and water quality.

For further details, please contact Dr. S. R. Nayak, RSA, SAC, Ahmedabad.

Dr. George Joseph, CONGRATULATIONS !

Dr. George Joseph, one of our esteemed member, was awarded the National Academy of Sciences, India award in the field of Instrumentation for the year 1986 This was in recognition of his work in the development of a number of sensors for remote sensing satellites. The award is sponsored by The Scientific Instrument Company (SICO). Dr. George Joseph is currently the Deputy Director (Remote Sensing) at the Space Applications Centre, Ahmedabad. We take this opprtunity (though late) to congratulate Dr. George Joseph !

REPORTS FROM ORGANISATIONS/DEPARTMENTS

. Report on Remote Sensing Activities in Directorate of Geology and Mining Gujarat

The Directorate of Geology and Mining (DGM) Gujarat has been using remote sensing techniques for quite some time - both in its day to day mapping activities as also in research and collaborative projects. The DGM has a collection of aerial photographs (for almost the whole of Gujarat) and also Landsat images (of parts of Gujarat). The Directorate has facilities for interpreting these data sets-mainly visual aids and also a group of trained officers in photogeology and remote sensing. The highlights of the remote sensing activities are described below.

In 1986-87, the DGM took up a campaign for photogeological and photo-geomorphological mapping of parts of Ahmedabad and Sabarkantha districts–mainly around Dehgam and Modasa. Aerial photographs for an area of 1050 sq kms on 1:50,000 scale were interpreted using stereoscopes and othes aids. Various structural feature (faults, folds, hog-backs, etc) and gemorphological features (rills, gullies, piedmont zone etc) could be easily mapped from the photographs. As the drainage pattern is controlled by these structural and morphological features, the drainage was taken as an aid to identify the various features. Bauxite and Trap exposures and the Aravalli super group rocks could be delineated, while much of the area is alluvium. The Bauxite exposures were then checked in the field and was observed that they were restricted to the river banks of Mazam and Watrak rivers. It was found that the Bauxite deposits of Kapadwanj and Powali villages are of potential for exploration. Detailed surveys are recommended for this area.

As part of collaborative work with Space Applications Centre (SAC), DGM was involved in two major areas :-

(a) Using ground based reflectance data as a tool for geological mapping from aerial multispectral scanner data. Ground based reflectance data in about 25-30 regeions of the visible and near IR spectrum were collected in the field (in Ambamata) using a portable spectroradiometer (deve loped by ISRO Satellite Centre, Bangalore) and these were then filtered to represent various sensor bands. These band values were then analysed using linear discriminant techniques. The concept was to develop a discriminant function (which uses these band values as also their possible ratios) which could best identify the different rock types in the area. The function was tested and results were found to be very encouraging. However its actual utility for mapping using acrial sensor data is yet to be done.

(b) Implementing a Mineral Exploration Information System (MEIS) as a case study for the Natural Resources Information System (NRIS). The Geographic Information System (GIS) package–MAPS Analysis package–was used for this case study. Geochemical data (copper, lead and zinc counts) rock type data and elevation data were digitised (manually) into grids for a small area in Amba Mata. Manipulation techniques were chalked out and the potential mineralised area delineated.

For details on the above please contect: Director, Directorate of Geology and Mining, New Mental Hospital Building Ahmedabad–380 016.

2. Remote Sensing Activities at Gujarat Engineering Research Institue (GERI)

The GERI has become the focal agency for all remote sensing activities in Gujarat. The Government of Gujarat has decided to set up a **Gujarat State Remote Sensing Organisation (GSRSO)** at GERI. As part of setting up this organisation, Director GERI has had

a series of meetings with many other departments under the Government of Gujarat, mainly to take stock of remote sensing activities/ projects being done by each of them. Ultimately, all of these would be brought under the umbrella of GSRSO. Further, the GERI has gone ahead with plans of setting up the GSRSO and has procured the following instruments for visually analysing remotely sensed data (from satellite and aircraft) :

(a) Large Format Optical Enlarger

(b) Optical reflecting projector

(c) Diazo printer

(d) Mirror stereoscope

(e) Sketch master

(f) Light tables

Apart from this, different types of data products colour composites (prints on 1:250,000 and 1:50,000 and diapositives on 1:1 M scale), band 7 product (paper print on 1:250 000) for the entire state of Gujarat have been procured from NRSA and archived.

Apart from its focal point role in setting up GSRSO, the GERI has also been actively involved in some important projects, mainly in collaboration with Department of Space (DOS). These are described below :

(a) Monitoring of Costal Environment-a project under the IRS Utilisation Programme is undertaken in joint collaboration with Space Applications Centre, Ahmedabad. The coastal process and the environment in the Mahl and Narmada estuaries are being studied in this project. The overall aim of the project is to develop a methodology for monitoring the coastal environment using remotely sensed data.

Aerial survey has also been conducted over Mahi estuary in November 1985 and is yet to be done over Narmada estuary. The aerial photographs of the Mahi estuary have been analysed and the geomorphic map of the area has been prepared. Landsat data has been analysed for the two estuaries and shoreline changes (upto 1986) in the two estuaries have been demarcated Reports on the shoreline changes in Mahi and Narmada estuary have been brought out.

(b) Wasteland Mapping Project
This work has been entrusted to GERI by Department of Space and the National Wasteland Development Board (NWDB) and is to be done in collaboration with Space Applications Cantre, Ahmedabad. The aim of this project is to map the wasteland areas of Gujarat on a top priority basis. While the maps for Panchmahal, Surendranagar and Bhavnagar districts have been completed, the Space Applications Centre is now taking up the mapping of Mehsana, Kheda and Ahmedabad districts.

For details on any of the activities of GERI, please contact Director, Gujarat Engineering Research Institute, Race Course, Vadodara-390 007.

IRS LAUNCH

The Indian Remote Sensing Satellite, IRS 1A is in its final stage of launch preparation and was recently transported to the USSR from where it is to be launched sometime in March 1988. The Chapter wishes for a succesful launch of the satellite and is looking forward to a greater success to the Indian remote sensing programme through the utilisation of data from IRS-IA.

SATELLITE UPDATE

1. SPOT DATA ACQUISITION IN INDIA

SPOT data is now being acquired at the Shadnagar earth station by National Remote Sensing Agency (NRSA), Hyderabad. This is as part of an agreement between NRSA & SPOT Image which allows for the direct acquisition of data from the satellite at the earth station and its later conversion into data products for distribution to the user community in India. Valid for two and a half years, this agreement was undertaken in May 1987 after which the SPOT data is being regularly acquired.

Data products in the form of Black-and-White prints and transparencies, colour prints and transparencies, digital data in CCTs from both the panchromatic (with 10 m resolution) and multi-spectral (20 m resolution) sensors are now available on payment basis from NRSA.

Users interested in getting SPOT data may contact NDC, National Remote Sensing Agency, Balanagar, Hyderabad-500 037.

2. SPOT IMAGE

SPOT Image Corporation has announced the follow-on to the present SPOT satellite. While SPOT-2 (the immediate successor to the present SPOT) will have no changes, the SPOT-3 and SPOT-4 are planned with modified sensors. Two important modifications, which are noteworthy for the user community are :

(a) The inclusion of a middle infrared (1.58-1.75 micrometer) band in the HRV sensor.

(b) Onboard registration of 10 m and 20 m (i.e. panchromatic and multispectral) from the HRV sensors

The first modification will mean that the users will be able to look at aspects like plant moisture etc. using the 20 m resolution data a level better than the present capability from TM at 30 m resolution. The second modification will mean that it will then be possible to look at the panchromatic and multispectral data in conjuction, as the two data sets would be automatically registered onboard, thus reducing the processing efforts on the ground.

There are also plans to add a new sensor module called **VEGETATION** having five spectral bands (red, green, blue, near IR and middle IR), 1 km and 4 km rasolution, 220 km swath and high radiometric resolution of 10 bit coding (which means the total dynamic range would be of 1024 levels). Compare this against the 128 levels of IRS, 256 levels of TM and the present SPOT. This sensor is supposed to be mainly optimised for monitoring vegetation as well as oceans.

3. NAVY REMOTE OCEAN SENSING SYSTEM (N-ROSS)

The US Navy's N-ROSS is back in the reckoning after a 'shelving' for about 2 years. Originally planned as a replacement for SEASAT the N-ROSS was slated for a 1991 launch with the objective to provide global oceanographic data under all weather conditions. This was tobe achieved through a package of four sensors a Radar Altimeter (useful for studying wave heights, bathymetry etc.), a scatterometer (mainly for winds), a special sensor microwave imager and a low frequency microwave radiometer.

LOOK OUT FOR THE NEXT ISSUE

The Editorial Committee recently talked to Dr. Baldev Sahai who is the President of our society. The hour long discussion was on a wide range of topics. We bring to you a record of this interview in the next issue.

USEFUL REFERENCES

A list of books which could serve as useful references is given below :-

1. Remote Sensing :- Principles and Interpretation, Second Edition, By F F Sabins, Published by W H Freeman, New York, Price : US Doller 47 95.

2. Hydrologic Applications of Space Technology, 1986, IAHS, Publications No. 160. Edited by Al Johnson, Published by Int Asso. Hydrological Science (Wellingford), Price Doller 45 00.

3. Spectral signatures of objects in Remote Sensing, 1986, ESA Publication, SP 247, By T D Guyenne, Published by Noordwijk, The Netherlands, Price 200 FF.

4. Classification of Remote Sensing Images, By I L Thomas, V M Benning and N P Ching, Published by Adam Hilger Bristol, Boston, Price : Doller 25.00.

5. Digital Image Processing in Remote Sensing 1987, Edited by J P Muller, Published by Taylor & Francis, London, PriceDoller 54 00

6. Remote Sensing Yearbook 1987, Edited by A P Cracknell and L W B Hayes Published by Taylor and Francis Inc. 242 Cherry Street, Philadephia, P A, 19106 1906, Price Doller 126.00.

7. Principles and Applications of Photogeology, 1986, By S N Pandey, Published by John Wiley.

8. Geomorphology from Space, 1986. NASA Special Publication No. 486. Edited by N M Short and R W Blair.

9. Remote Sensing Applications for Consumptive use (Evapotranspiration) Edited by A I Johnson and A Rango, 1986. AWRA Monograph series No 6, American Water Resources Association, 5410 Grosvenor Lane, Suite 220, Betherda, Maryland 2084

10 Oceanic Remote Sensing, 1987. Edited by F V Bunkin, NY NOVA Science Publication

11. Remote Sensing Applications in Meteorology and Climatology. Edited by R A Vanghan, Published by D Reidel, Dordrecht

Training Course on Satellite Oceanography

A two-week training course on satellite oceanography was organised at the Space Applications Centre, Ahmedabad during September 7-18, 1987 under the joint sponsorship of the Department of Space and the Department of Ocean Development. The main objective of the training course was to expose the participants to the state of the art in satellite oceanography giving due emphasis on the application potential of this new technology.

The training course was attended by about 20 participants from 16 different organisations from different parts of the country which included a number of Central and State Government R&D institutions, Defence R&D Laboratories and Universities. About 20 lectures were delivered during the training course which dealt with different techniques of satellite remote sensing using optical, infra-red and microwave sensors for studying problems related to physical and biological oceanography. In addition, a few tutorial exercises onthe VAX-11/780 computer were also conducted to demonstrate the use of satellite data for deriving oceanographic parameters.

FORTHCOMING EVENTS

March 1988

9-11 Microwave Radiometry and Remote Sensing Applications at Fivenze, Italy, Contact : Dr. P Pampaloni, CNR-IROE via Pancitatichi, 64 50127 Florence, Italy.

28-30 4th International Conference on Pattern Recognition. Contact : Dr. J kittler, University of Surrey, Gildford GU25XH, England

April 1988

4-8 Recent Advances in Sensors, Radiometry and Data Processing for Remote Sensing : orlanda, USA, SPIE Technical Symposium, Contact : SPIE, Box 10, Bellingham Washington 98227-0010, USA

May 1988

16-19 6th Thematic Conference on Remote Sensing for Exploration Geology at Houston, USA. Contact : ERIM, P O Box 8618, Ann Arbor, Michigan 48107, USA.

July 1988

1-10 16th International Congress on Photogrammetry and Remote Sensing, ISPRS. Contact : Prof. S Murai, Institute of Industrial Science, University of Tokyo, ISPRS, 722 Roppongi, Minatoku, Tokyo, Japan.

September 1988

13-16 Moving Towards the 21st Century. IGARSS 1988 International Geoscience and Remote Sensing Symposium at Edinburgh, UK, Contast : Dr J A T Young, Department of Geography, University of Edinburgh EH 8 9XP. Scotland.

ADDENDUM TO THE LIST OF MEMBERS

ISRS – AHMEDABAD CHAPTER

HONORARY MEMBER

1. Prof. P R Pisharoty, Physical Research Laboratory, Ahmedabad-380 009.

LIFE MEMBERS

A. Space Applications Centre, Ahmedabad-380 053.

1. Dr. George Joseph
2. Dr. K K Gupta

ANNUAL MEMBERS

A. Space Applications Centre, Ahmedebad-380 053.

1. Shri I M Bahuguna
2. Shri T T Medhavy
3. Shri D G K Murty
4. Dr. A Sarkar
5. Shri S V C Sastry
6. Shri S P Vyas

B. Central Ground Water Board, Ahmedabad-380 009.

7. Shri Arijit Dey
8. Shri P R Gupte
9. Shri L K Mathur

C. Directorate of Geology and Mining, Ahmedabad-380 016.

10. Shri Harsad M Shah

D. Public Health Mechanical Lab, Ahmedabad-380 016.

11. Shri Dipak Patel

SUSTAINING MEMBERS

1. All India Soil and Land Use Survey, Regional Sub Centre, Ahmedabad-380009.
2. The Directorate of Geology and Mining, Ahmedabad-380 016.
3. Space Applications Centre, Ahmedabad-380 053.
4. The Supdt. Engineer, Narmada Projects, Gandhinagar-382 010
5. Director, School of Planning, Ahmedabad-380 009.
6. Central Designs Organisation, Gandhinagar-382 010

PATRON MEMBER

The Director of Research, Gujarat Agricultural University, Ahmedabad-380 009.

OTHER MEMBERS FROM GUJARAT

LIFE MEMBERS

1. Dr. P P Patel, Dept. of Geology, MS University, Baroda-390 002.
2. (Mrs.) K A Bhagawat, Dept. of Botany, MS University, Baroda-390 002.
3. Dr. (Ms) Suman Pandya, The Dhansura Mahila Arts and Commerce College, Dhansura-383 310
4. Dr. B B Jambusaria, Gujarat Engineering Research Institute, Baroda-390 007.
5. Shri A C Patel, Gujarat Engineering Research Institute, Baroda-390 007.
6. Shri S A Laghate. Water Resources Development Corporation, Rajkot-360001
7. Shri S L Shanbhag, Gujarat Water Resources Development Corporation, Rajkot-1.
8. Shri P M Pofali, Irrigation Department, Rajkot-360 001.
9. Shri J B Trivedi, Irrigation Department, Rajkot-360 001.

ANNUAL MEMBERS

10. Prof. A N Mehta, B A College of Agriculture, Anand-388 110.
11. Shri Venkatesh Hosahalli, B A College of Agriculture, Anand-388 110.
12. Shri Hakimuddin, B A College of Agriculture, Anand-388 110.
13. Shri P N Shah, Gujarat Engineering Research Institute, Baroda-390 007.
14. Shri V B Patel, Gujarat Engineering Research Institute, Baroda-390 007.
15. Shri D G Mankad, Irrigation Department, Baroda-390 001.
16. Shri P D Dhru, Irrigation Department, Godhra.
17. Shri Nayan Shah, Gujarat Water Supply and Sewarage Board, Nadiad.

SUSTAINING MEMBERS

1. National Bureau of Soil Survey and Land Use Planning, Western Region, Baroda.
2. National Dairy Development Board. Anand-388 001

BOOK-POST

To,

undelivered
ease return to :
r. S. R. Nayak
ecretary, ISRS-AC.
mote Sensing Area,
pace Applications Centre,
HMEDABAD-380 053.

We Welcome your Suggestions & Comments

— **Editor** —