ISRS

SIGNATURES

NEWSLETTER OF THE INDIAN SOCIETY OF REMOTE SENSING –AHMEDABAD CHAPTER

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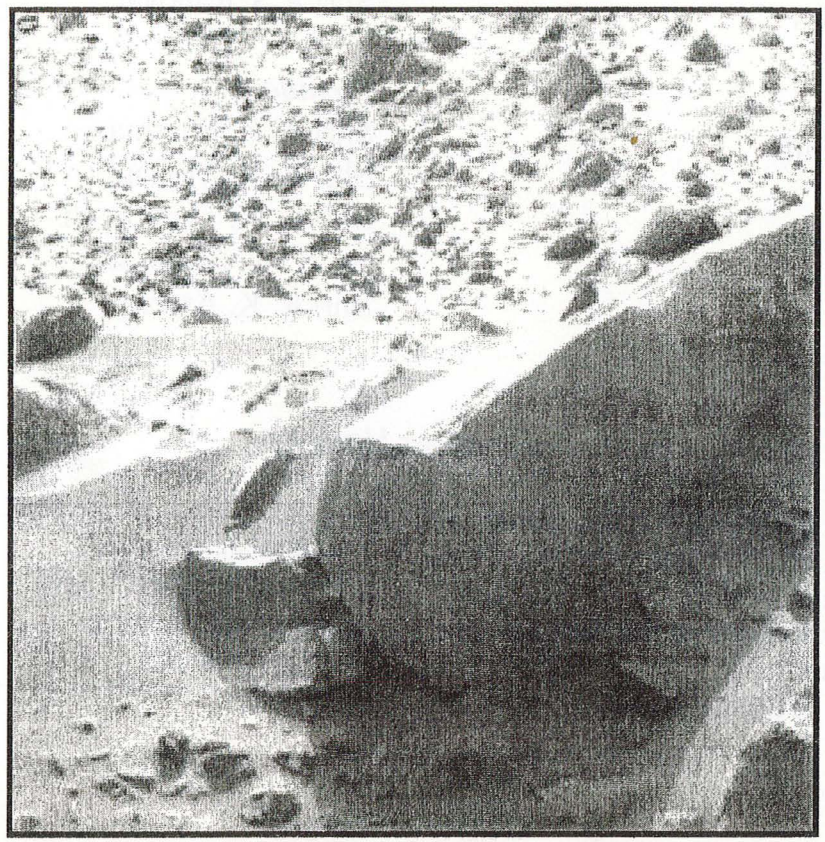

A ROCK ON MARS AS SEEN BY MARS EXPLORATION ROVER SPIRIT'S PANORAMIC CAMERA

IN THIS ISSUE

Indian Society of Remote Sensing-Ahmedabad Chapter

Executive Council (2002-2004)

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Chapter Update

The Ahmedabad chapter of Indian society of Remote Sensing has got additional strength in terms of new membership during 2003-2004. Five life members and one annual members have been enrolled during 2003-04. The table below shows the details of the membership.

Life members	376
Annual members	01
Sustaining members	04
Patron members	07

Editorial Board

Front cover

This image, acquired by the Mars Exploration Rover Spirit's panoramic camera on the 53rd martian day, or sol, of the rover's mission, struck science and engineering teams as not only scientifically interesting but remarkably beautiful. The large, shadowed rock in the foreground is nicknamed "Sandia" for a mountain range in New Mexico. An imposing rock, "Sandia" is about 33 centimeters high (1 foot) and about 1.7 meters (5.5 feet) long

(Source: http://marsrovers.jpl.nasa.gov)

Site Suitability Analysis for Biodiesel plants: A methodology

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VASC/RESIPA
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Introduction

Coupled with concern over diminishing fossil fuels soaring import bills & rising demand, and the continued rise in volume of vehicles on roads, there is a need to go for alternate fuels to propel the vehicles of the future. Biodiesel is one such alternate fuel. The biodiesel can be extracted from certain species of tree that are common in many parts of India, such as the Jatropha *carcus* (Rataan-jyot), Pongamia pinnaat (Karanja) and Mahua. These sturdy tree species grow easily, even in dry conditions and would be ideally suited for an estimated 70-130 million hectares of wasteland. Now the problem is to identify suitable land from these large wasteland areas for growing these plants. Further, the areas should fulfill the other requirements like its connectivity to the milling and processing centers as well as availability of the labour around to collect the seeds. This can be solved by using remote sensing and GIS technologies.

Objectives

The main objectives around which the methodology is crafted are:

1. Identification of sites suitable for plantation of biodiesel trees.
2. Zone identification for seed produce procurement / collection and oil expelling centers.
3. To devise a monitoring scheme for assurance of supply in required quality & amount for each region.

This will provide the concerned organisation(s) with sufficient information to:

- Make an assessment of the areas suitable for plantation activity based on the recent datasets for landuse, land-capability and socioeconomic status of the area.
- Make an assessment of the sites suitable for setting up the seed collection and processing units based on the proximity analysis to the transportation network and location of plantation area.

The Scheme

As Biodiesel is being produced from vegetation products, feasibility in terms of planting trees capable of producing raw material at commercial scale largely depends on the availability of land (mostly wasteland), demand and requirement, environmental fragility and priority, and socioeconomic condition of the region. Therefore, taking into consideration all these factors prevailing in Indian conditions could be studied using remote sensing and GIS (Geographic Information System) techniques. Due to its synoptic view capability, remote sensing tends to be the best technique available for land observation and due to its spatial data mining capability GIS turns to be the best technique available for prioritising areas for plantation of biodiesel trees.

The Project Team

The following subject matter expertise will be required and an empanelment can be made out of the experts available in each field:

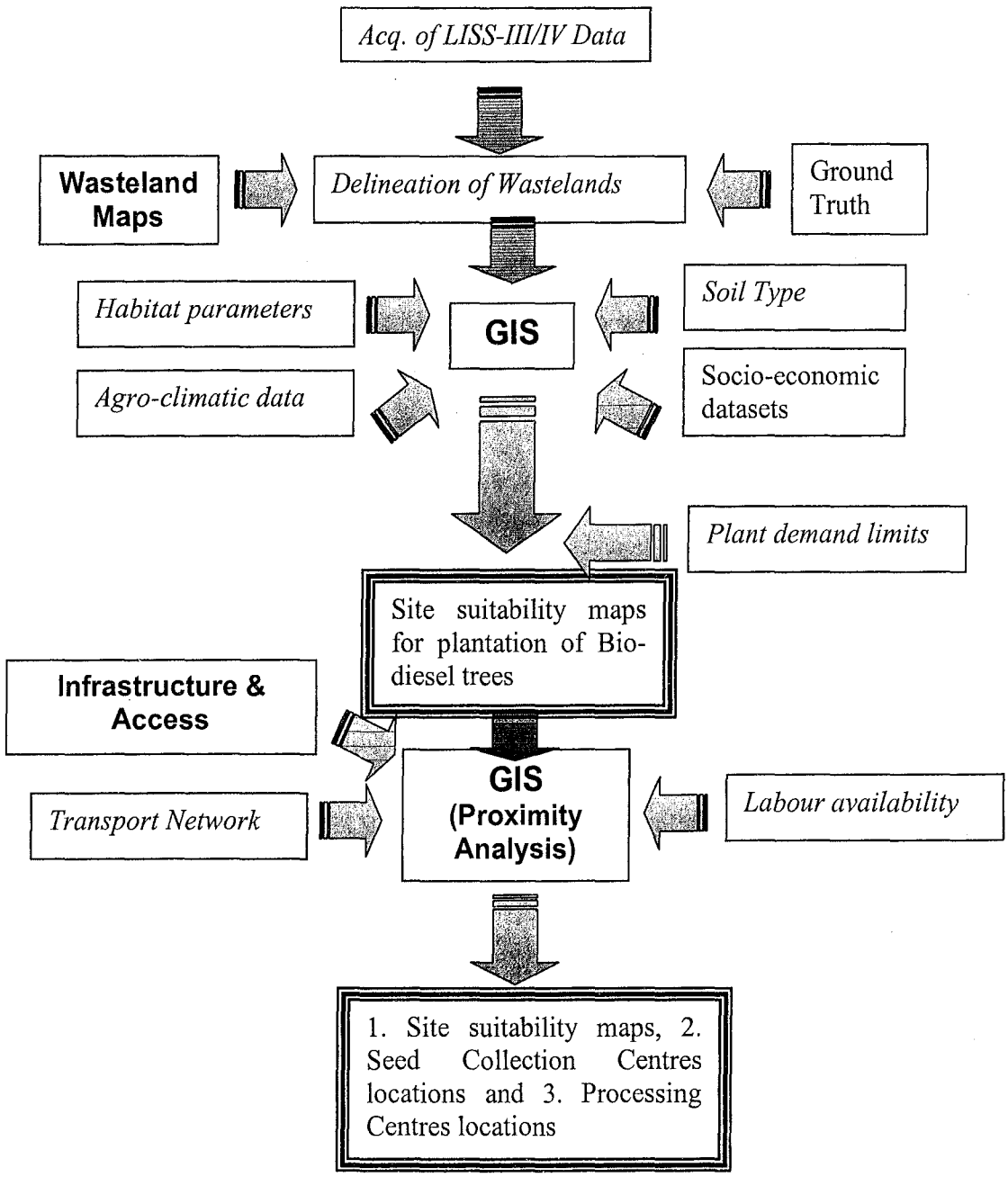
S.N.	Area of expertise
1.	Forest ecologist
2.	Soil scientist
3.	Biodiesel experts
4.	Remote sensing specialist
6.	GIS specialist

Advice on the various issues related to the formation of biodiesel would be an important input to generate a realistic scenario for the site suitability.

Methodology

Site suitability and feasibility analysis on the basis of availability of wastelands, rural poverty, agro-climatic conditions, and infrastructure for processing will be carried out as below:

Methodology flowchart



Sources

IRS LISS-III/IV data, Wasteland maps, and Soil Maps along with the socioeconomic status of the area from pertinent sources. Cloud free satellite data may be browsed for optimal landcover season. The acquisition presumes proper selection for maximum landcover feature segregation due to seasonality and thus the vegetation and other related natural features give varied spectral signatures. November to March time period provides better phenological conditions to understand different vegetation cover classes with deciduous vegetation.

High resolution PAN data may be acquired for the date of pass as that of the LISS- III/IV. Features with high degree of change need perfect matching in shape and pattern and the same should be ensured and the same day acquisition helps in achieving the perfect matching.

Query and Analysis

Once the data is developed we can begin to ask questions related to our project such as:

- Where are all the sites suitable for planting biodiesel trees?
- What is the dominant soil type for Jatropha?
- If we build a new approach road here, how will save the cost?
- How many houses lie within 100 m of this site?
- What is the total number of population having less than Rs.100 per day income (may be considered as labour) within 10 km of the proposed site?

  etc....

Outputs

The proposed methodology will give following outputs:

1. Site suitability maps for plantation of Biodiesel plants.
2. Site suitability maps Seed Collection Centres and Processing Centres.

The outputs can be more with widened scope of few more value added solution.

Conclusion:

Since biodiesel trees are locale specific and can grow in certain specific and harsh conditions, require planning before they get planted for commercial purposes. A site suitability study as well as monitoring using state of the art techniques like Remote Sensing and Geographic Information System (GIS) is important to harness the full potential of the land available for the purpose. Remote sensing data in conjunction with ground truth information and other collateral data can be used to facilitate the up-to-date repository of data in GIS domain. GIS can be a handy tool to retrieve, manipulate and query such spatial datasets to generate site suitability maps for planting biodiesel trees.

Narrowband (Hyperspectral) Vegetation Indices: Recent Advances

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Few years back we (Ray and Dadhwal, 1995) had written an article in this newsletter about the various vegetation indices and their usefulness. That article contained information about a few narrow-band indices. However, post 1995, a large amount of work has been carried out in developing and using narrow-band indices for quantifying biophysical characteristics. One of the reasons for this development is the availability of data from very high-spectral resolution (1-3 nm) ground based spectroradiometer and also airborne and spaceborne (e.g Hyperion of Terra mission) hyperspectral sensors. Also narrow-band indices have been shown to be crucial for providing additional information with significant improvements over broad-bands, in quantifying biophysical characteristics of agricultural crops, especially those related to crop phenology and stresses due to weeds, water and nitrogen. Thus introductory information on narrow-band indices might be useful to the remote sensing community.

1. Hyperspectral Data and Sensors

Conventional remote sensing is based on the use of several rather broadly defined spectral regions, where as hyperspectral remote sensing is based on the examination of many narrowly defined spectral channels (Campbell, 1996). Sensor system such as SPOT multi-spectral, IRS-LISS, Landsat - MSS and TM provide 3-7 spectral channels. Hyperspectral sensors can provide as many as 200 or more channels each only 10 nm or less wide. Although hyperspectral remote sensing applies the same principles and methods as conventional remote sensing, it requires specialized data sets, instruments, field data and software to the extent that it forms a specialized branch of remote sensing.

Like the other conventional remote sensing broadband data the hyperspectral data can also be available from sensor on-board three levels of platforms, satellite based, aircraft based (air-borne) and ground based.

Though there are many satellite-based sensors, which have provided narrow band data for land applications, including MOS-B on-board IRS P4, the first true satellite based hyperspectral sensor is Hyperion of NASA's EO-1 system. The Hyperion provides a high-resolution hyperspectral imager capable of resolving 220 spectral bands (from 0.4 to 2.5 μm) with a 30 meter resolution. The instrument can image a 7.5 km by 100 km land area per image and provide detailed spectral mapping across all 220 channels with high radiometric accuracy (http://eo1.usgs.gov/instru/hyperion.asp). Other upcoming hyperspectral sensors include hyperspectral imaging spectrometer with 105 spectral bands on-board Australian Resource Information Environmental Satellite-1 and Warfighter-1 with 200 channels onboard ORBVIEW-4. The various hyperspectral imagers flown on aircrafts include AVIRIS (Range: 380-2500nm; No. of Bands:224; Resol.:10nm); ISRO's AIS (Range:450-880nm; No. of Bands: 143; Resol.:3nm) and CCRS's CASI (Range: 458-1000 nm; No. Bands: 96; Resolution: 6.8nm). However majority of works on narrow-band indices have been carried using ground based sepctroradiometers. The two most common spectroradiometers are those of ASD (Analytical Spectral Devices) and GER. These instruments generally have spectral resolutions around 3 nm in visible and VNIR range and 10 nm in middle infrared range.

2. Narrow-band Indices

The reflectance and absorption features in narrow-bands are related to specific crop

physico-chemical characteristics such as biochemical composition, physical structure, water content, and plant ecophysical status (Strachan, 2002). Many studies indicate that broad band indices could be better predictors of photosynthetic capacity than narrow-band indices because the sensitive bands saturate too rapidly (Yoder, 1992). However, these broad band indices can be poor indicators of physiological changes at fine temporal scales under stress conditions because most physiological changes only produce changes at specific wavelengths of the reflectance pattern (Gamon et al., 1992). Penuealas et al. (1994) have classified narrow-band indices into three categories: i. Physiological indices, ii. Multivariate indices, and iii. Derivative analysis indices.

i. Physiological indices.

These indices are mostly simple ratio (SR) or normalized difference (ND) indices, located at specific wavelengths depending upon the typical absorption features of leaf pigments or leaf water. Leaf pigment (chlorophyll, carotenoid and anthocyanin) content can provide valuable insight into physiological performance of leaves. The chlorphylls have strong absorption peaks in the red and blue regions. However, since the blue peak generally overlaps with the absorption of carotenoids, it is not generally used for estimation of chlorophyll. In the red region the 660-680 nm has highest chlorophyll absorption. However it should not be used as it saturates with relatively low chlorophyll content. The ND and SR indices located at 750 and 700 are closely associated with chlorophyll content (Sims and Gamon, 2002). Penuelas et al. (1994) have developed an index called NPCI (Normalized Pigments Chlorophyll ratio Index, (R880-R430)/(R880+R430)), which is highly correlated to chlorophyll content. Since carotenoid absorption peaks overlap with that of chlorophyll, generally ratio of carotenoid to chlorophyll is estimated instead of absolute carotenoid. Such indices compare the reflectance of blue region with that of red region. The indices of this category include PRI (Photochemical Reflectance Index) developed by Gamon et al. (1992), SIPI (Structure Insensitive Pigment Index) developed by Penuelas et al. (1995) and PSRI (Plant Senescence Reflectance Index) developed by Merzlyak et al. (1999). These indices are defined as follows:

PRI = (R531-R570)/(R531+R570)
SIPI = (R800-R445)/(R800-R680)
PSRI= (R680-R500)/R750

PRI can estimate rapid changes in the relative levels of xanthophyll cycle and thus serves as an estimate of photosynthetic light use efficiency (Penuelas et al., 1995).

For detecting stress due to water, the water absorption band between 930-980 nm can be compared with a reference wavelength (900 nm), which does not absorb water. Such an index developed by Penuelas et al., (1993), is called WBI (Water Band Index) which is expressed by R970/R900. Similarly the WBR (Water Band Ratio) is defined as R960/R930. The water stress can be detected by a three-band ratio (TBR) developed by Pu et al. (2002), which is defined as follows:

TBR ={(Average (950~1000)}/0.5*{Average (860~930)+Average (1040~1075)}

The TBR tries to remove the linear reflectance effect and thereby enhances the water absorption feature.

ii. Multivariate Indices

In this, the entire spectral signature is used to estimate plant variables based on multiple variable analysis such as principal component analysis or discriminant analysis. The principal component analysis tries to derive a new set of uncorrelated (orthogonal) variables, thereby reducing the number of variables. It is a statistical technique to identify a relatively small number of factors that can be used to represent relationships among sets of many inter-related variables. In one of our studies, using spectroradiometer (300-1100 nm) for LAI estimation, we have found that the first four principal components (PC1, PC2,

PC3 and PC4) could explain 96 percent of the variance in the whole data set. The discriminant analysis is carried out to find out the most optimal hyperspectral band to discriminate (separate) between different land cover classes using multivariate reparability measures, such as Wilks' Lambda, Pillai's trace and Average canonical correlation. Thenkabail (2002) has found that to discriminate between agricultural crops (wheat, barley, chickpea, cumin, lentil and vetch) the six most optimum hyperspectral bands are 489,547,675,718,904 and 975 nm. The reflectance of these bands can be directly used to estimate biophysical parameters or can be used through indices like NDVI or SR.

iii. Derivative Analysis Indices

Demetriades-Shah et al. (1990) suggested that derivatives of canopy reflectance may be used to eliminate the contribution from soil background reflectance, thus improving the possibility of isolating the ecophysical state of the canopy. The derivative analysis indices are based on the shape of the spectral reflectance curve. Among these indices the most popular is the inflection wavelength of red edge. Red edge is the near infrared reflectance region between 670 – 780 nm. The red edge describes the position of the maximum slope of reflectance and defines the transition between the red and near infrared portions of the spectrum (Horler et al., 1983). The position and shape of red edge change under stress condition, hence indicator of plant parameters. The blue shift (shift towards lower wavelength) indicates stress condition, whereas the red shift (shift towards higher wavelength) indicates healthier condition. The red edge is characterized by inflection wavelength, which is the wavelength, at which the rate of increase of reflectance is the maximum.

Penuelas et al. (1994) have defined many derivative based indices, which are derived from the first and second derivative curves of spectral reflectance. They have also found that these indices have highly significant correlation with crop physiological parameters such as chlorophyll content, nitrogen content, water potential etc. These indices are described below.

dg - Minimum of the first Derivative Reflectance in the green, at approximately 570 nm
dG – Maximum of first Derivative Reflectance in the green, at approximately 525 nm
GGFN - Normalized difference between dG and dg = (dG-dg)/(dG+dg)
dRE – Maximum of the first Derivative of the reflectance in the red edge, at approximately 700-710 nm
EGFN – Normalized Difference between dRE and dG = (dRE-dG)/(dRE+dG)
ddg - Minimum of the second Derivative of Reflectance in the green, at approximately 530 nm
ddRE - Maximum of the first Derivative of the reflectance in the red edge, at approximately 690 nm.

iv. Spectral Absorption Features Indices

This is another set of indices, which are based on the characteristics of absorption troughs in the spectral curves. Absorption features in reflectance spectra are characterized in terms of their wavelength position (μm), depth, area and asymmetry (relative value) with a spectral normalizing technique. The absorption position is defined as the wavelength position of minimum reflectance of an absorption feature. The absorption depth is the depth of the feature minimum relative to the hull. The width of the absorption is the full width in half maximum, whose unit is μm. The absorption area is the area of the absorption feature which is the product of the depth and width. The asymmetry of an absorption feature is derived as the ratio of the area left of the absorption centre to the area right of the absorption centre. The spectral absorption features in 1650-1850 nm has been used to study the crop water status by Tian et al. (2001)

3. Conclusion:

The above-mentioned narrow-band indices can be efficiently utilized to characterize ecophysical

status of crops. Most of these indices have been used to estimate pigment content (especially chlorophyll), crop water status, leaf nitrogen content, leaf area index, photosynthetic light use efficiency. Many plant biochemical compositions (e.g. lignin, pectin and cellulose) can also be estimated using the typical absorption features of the organic compounds (Table 1). Thus in near future the narrow-band indices will be extremely useful in crop management at field scale and thus leading towards precision agriculture.

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Table 1. Absorption features of some key plant materials

Material	Wavelength (nm)
A-carotene	420-500
B-glucan (a hemicullulose)	1450, 1770, 1930 2090, 2330, 2500
Carnauba wax	930, 1040, 1210, 1390, 1410, 1540, 1730, 1820, 1930, 2010, 2050, 2140, 2310, 2350, 2390, 2430
Cellulose	1480, 1930, 2100, 2280, 2340, 2480
Chlorophyll-a	380-450, 675
Chlorophyll-b	410-470, 610
D-ribulose 1,5-diphosphate carboxylase	1500, 1680, 1740, 1940, 2050, 2170, 2290, 2470
Humic Acid	1500, 1680, 1740, 1940, 2050, 2170, 2290, 2470
Lignin	400-700, 1920, 2300, 2340
Lutein (a xanthophyll)	400-500
Pectin (apple)	1440, 1720, 1920, 2090, 2240, 2360, 2480
Pectin (citrus)	980, 1190, 1440, 1560, 1680, 1730, 1780, 1930, 2080, 2250,
Protochlorophyll	410-470, 580
Starch	990, 1220, 1450, 1560, 1700, 1770, 1930, 2100, 2320, 2480
Tannic Acid	990, 1120, 1460, 1660, 1930, 2130, 2260, 2320, 2500
Xylan (a hemicellulose	1210, 1450, 1720, 1790, 1930, 2090, 2260, 2330, 2500

2003 AN EVENTFUL YEAR FOR SPACE PROGRAMME IN INDIA

The year 2003 was an eventful one for Indian Space Programme. Not only did ISRO enhance the space services by launching follow on satellites in the communication and remote sensing series but also took up new initiatives. The commissioning of geo-synchronous Satellite Launch Vehicle (GSLV) after its successful second test flight and the announcement of India's first scientific mission to the moon, Chandrayaan 1, by the Prime Minister on Independence Day were important mile stone of ISRO. Four satellites were launched during the year, two of them by Indian Launch Vehicles

The applications of space systems for various developmental tasks continued during the year. The telemedicine network using INSAT was further expanded. Pilot projects were initiated to prepare for the utilization of EDUSAT, an exclusive satellite for educational use, planned for launch in 2004.

The major events for ISRO during 2003 were:

April 10, 2003 – INSAT-3A Launch:

The multipurpose satellite, INSAT-3A, was launched. The communication payloads of INSAT-3A include 120C band, six upper extended C- band and 6 Ku-band transponders and a Satellite Aided Search Rescue Transponder. The metrological instruments include Very High Resolution Radiometer, Charge Coupled Devise Camera and Metrological data Relay Transponder.

May 8, 2003-GSLV-D2 Launch:

Developmental test flight of India's Geo-Synchronous Satellite Launch Vehicle (GSLV) was successfully carried out from Satish Dhawan Space Centre, Shar, Shriharikota. With this second successful test, GSLV was commissioned into service for launching 2000 kg class satellites into Geo0synchrous transfer orbit.

August 15, 2003-Chandrayaan -1 Announced:

The Prime Minister Announced, in his Independence Day Address, that India will undertake Chandrayaan-1, a scientific mission to moon. Chandrayaa-1 envisages placing a 525 kg spacecraft in the 100 km polar orbit of the moon. ISRO's Polar Satellite Launch Vehicle, PSLV, will launch the spacecraft. Chandrayaan-1is expected to be a forerunner for more ambitious planetary missions in the years to come.

September 1, 2003 – Madhavan Nair takes over as ISRO Chairman:

Mr G. Madhavan Nair, Director Vikram Sarabhai Space Centre, took over as chairman, ISRO, Secretary, Department of Space and Chairman, Space Commission. He took over from Dr. K. Kasturirangan, who was nominated as Member, Rajya Sabha.

September 28, 2003 – INSAT 3E Launched: INSAT-3E, the fourth satellite in the INSAT- 3 series, was launched successfully. The 2775 kg communication satellite carries 24 C-Band transponders an d12 upper extended C- band transponders.

October 17, 2003-PSLV Launches RESOURCESAT -1: In its eighth flight conducted from Satish Dhavan Space Centre (SDSC) SHAR, Sriharikota, ISRO Polar Satellite Launched Vehicle PSLV–C5, successfully launched the Indian Remote Sensing Satellite, RESOURCSAT -1, precisely into the 820 km Polar Orbit. RESOURCESAT -1 is the most advanced remote sensing satellite built by ISRO so far. It carries a high resolution Linear Imaging Self Scanner (LISS 4) with 5.8 meter spatial resolution, LISS-3 with spatial resolution of 23.5 meter and an Advanced Wide Field Sensor (AWiFS) with spatial resolution of 56 meter.

December 5, 2003 – Cryogenic Engine Tested: the indigenous cryogenic engine successfully undergoes endurance test. The engine, along with two steering engines as used in actual flight, was tested for 1000 seconds while it is required to operate for 720 seconds. The test marked an important milestone in the development of the indigenous cryogenic stage for GSLV.

FOREST COVER IN THE COUNTRY

Forest Survey of India (FSI) has been monitoring the forest cover of the country on a two year cycle, using data from remote sensing satellites, and presenting the results of assessments in the State of Forest Reports (SFR). The SFR 2001 is the eighth report in this sequence. **This is the first time that forest cover of whole country has been assessed digitally at 1:50,000 scale.** This is also the first time that tree cover that can not be captured by the remote sensing satellites, has been estimated through field survey and inventory. This provides the nation with complete picture of the extent of forest and tree cover in the country.

The present assessment shows that forest cover (20.55 %) and tree cover (2.48 %) constitute a healthy 23.03 % of the country geographical area. A comparison of forest cover assessment of 2001 with that of 1999 reveals that there is an overall increase of 38,245 km or 6.0 percent. This constituent an increase of 1.16 percent of the country's geographical area.

(State of Forest Report 2001 (Forest Survey of India, Ministry of Environment and Forests, Dehradun)

Basket Search

NEWS

ASIA

Indonesia to launch micro-satellite in 2005

Indonesia is set to launch its first imagery viewer micro-satellite in 2005 to carry out remote sensing of its territory and natural resources. The micro-satellite will operate in a polar-orbiting system. It would measure climatic temperature and humidity, record topography (including forests), monitor cloud cover and water bodies. It would also have a capability to receive, measure, process and transmit data from around the world.

(Http:/www.xinhuanet.com)

Iran aims for satellite launch

Iran Defense Minister has vowed that the country will launch a satellite of its own whin 18 months. "Iran will be the first Islamic country to enter the stratosphere with its own satellite and its own indigenous launch System"

(http://news.abc.co.uk)

INDIA

Dedicated Satellite for Health Purposes

India Plans to launch **"Healthsat"** – a dedicated satellite for telemedicine and health purposes, using an indigenous geosynchronous launch vehicle rocket by the end of 2005. The dedicated satellite would cost between US$ 13,44 m and US $ 22.4 m.

India to provide Satellite Imaging to Maldives

India will provide satellite imaging and aerial services to the Maldives for creating digital mapping of the island country. ISRO will set up a remote sensing unit in the Maldives for analyzing and updating the data.

India, US plan to cooperate in space

India and US are exploring possibilities of strengthening co-operation in the space sector. Both the government has agreed to to hold joint a joint space conference in Bangalore in June 2004. According to ISRO officials the areas of collaboration could include satellite communication, remote sensing, satellite navigation, search and rescue operations, earth observation, health and tele-education and medicine.

ISRO provides Satellite data on Inter-linking of rivers

ISRO has started providing satellite imagery data on river basins and water resources in the country to a task force on inter-linking of major rivers.

Israeli telescope to ride on GSAT -4

The ISRO and the Israel Space Agency (ISA) have agreed to co-operate for including the Tel Aviv University Ultra Violet Experiment TAUVEX, on board ISRO's GSAT-4 satellite planned for launch by India's GSLV during 2005.

The Municipal Corporation of Delhi (MCD) has come up with the idea of using satellite maps of Delhi to check unauthorized buildings and commercial misuse of residential properties.

India develops first space Robot

India is all set to launch its first "Space Robot" (SR), with an in-built 'RUDUC' communication signal processor, will be used to capture damaged satellites and space debris from crashing to Earth according to CSRDC (Communication Services Research and Development Centre) – CSRL (Communication and Space Research Labs) and ISRDO (Indian Satellite Research Development organization).

Space Imaging Signs deal with Antrix

The Space Imaging announced that it has signed an agreement with Antrix Corporation, a division of the Indian Space Research Organization (ISRO), to extend its sale and marketing agreement through 2010. The agreement gives space imaging exclusive rights to market and sell data from ISRO's RESOURCESAT – 1 (IRS-P6) satellite worldwide outside of India. The agreement also includes the Indian Remote Sensing (IRS) 1-C and IRS-1D and CARTOSAT (P-5) satellites.

ERDAS Imagine V8.7 now available

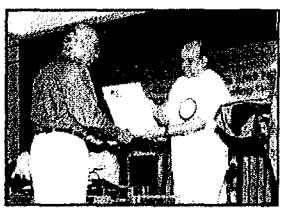
Leica Geosystems announced that ERDAS IMAGINE V8.7, a geographic imaging suite, is now shipping worldwide. The latest version of ERDAS IMAGINE features JPEG2000 support (including GeoJP2), improvements to its mosaic tool and a faster, smoother multi-threaded IMAGINE Geospatial Light Table (GLT) viewer, ERDA IMAGINE 8.7 is fully compatible with Leica Geosystem's new process-driven photogram metric software suite, the Leica Photogrammetry Suite.

Satellite images now in JPEG2000 FORMAT

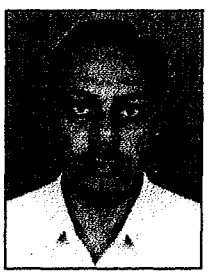
WITH THE NEW Lurawave.jp2 GEO Edition, Aglo Vision LuraTech, a Germany based company, presents a new version of the proven JPEG2000 compression tool LuraWave.jp2 which is specially tailored to the requirements of the GIS sector. Developers and users of geoinformation systems now have access to a highly professional programme for the compression of aerial and satellite images in the JPEG2000 format.

Awards and Honours

- Dr. K. N. Shankara, Director, Space Applications Centre, Ahmedabad, has been honoured by Government of India with Padma Shree award for the year 2003 for his original contribution in the field of space applications.



- The Bhaskara Award for 2002 was awarded to Dr. A. K. S. Gopalan, former Director, Space Applications Centre, Ahmedabad during ISRS Annual Convention, 2003 at Thiruvananthapuram for his contribution in various areas of remote sensing such as data products and applications.



- Dr. Bhawani Singh Gohil, Scientist, OSD/MOG of Space Applications Centre, Ahmedabad has been awarded the prestigious "Shri Hari Om Ashram Prerit Dr. Vikram Sarabhai Research Award" for the year 2001 for his outstanding contributions in the field of Space Applications.

Chapter's Activities

The Chapter engaged itself in many productive and innovative activities to promote the cause of remote sensing and facilitate exchange of ideas among the remote sensing users and experts. Details of some of the major activities are highlighted for the benefit of the readers.

- **WORLD ENVIRONMENT DAY CELEBRATION**

ISRS-AC, Van Chetna Kendra, Vastrapur, Ahmedabad and Gujarat State Forest Department jointly organized an Exhibition on "Remote Sensing for National Development", at Van Chetna Kendra, Vastrapur, Ahmedabad on the occasion of "WORLD ENVIRONMENT DAY", on June 05, 2002. The exhibition was inaugurated by Director, Doordarshan Kendra, Ahmedabad. The exhibition was visited by large number of students, members and general public.

- **TREE PLANTATION PROGRAMME**

ISRS-AC, Gujarat State Forest Department and Ahmedabad Urban Development Authority (AUDA), jointly organized a tree plantation programme on July 19, 2003 to bring awareness regarding urban environment improvement among school children, parents, local people, and family of ISRS-AC members. Around 300 saplings were planted by students, members and local people in a AUDA plot at Vastrapur. The programme was inaugurated and graced by Dr. K.L. Majumdar, Dy. Director, RESIPA, Space Applications Centre (ISRO), Ahmedabad.

- **NATIONAL REMOTE SENSING DAY CELEBRATION**

ISRS-AC and Mount Carmel High School, Ahmedabad jointly organized a debate competition on "IS SPACE TECHNOLOGY USEFUL TO COMMON MAN" on August 13, 2003 for the students of XIth and XIIth standard and poster competition on theme of "MAN AND SPACE" for the students of VIIIth, IXth and Xth on August 11, 2003. Apart from Mount Carmel, 14 other schools of Ahmedabad took part in the programme.

(We provide a glimpse of al these events through some the photographs taken during the occasion on the following page)

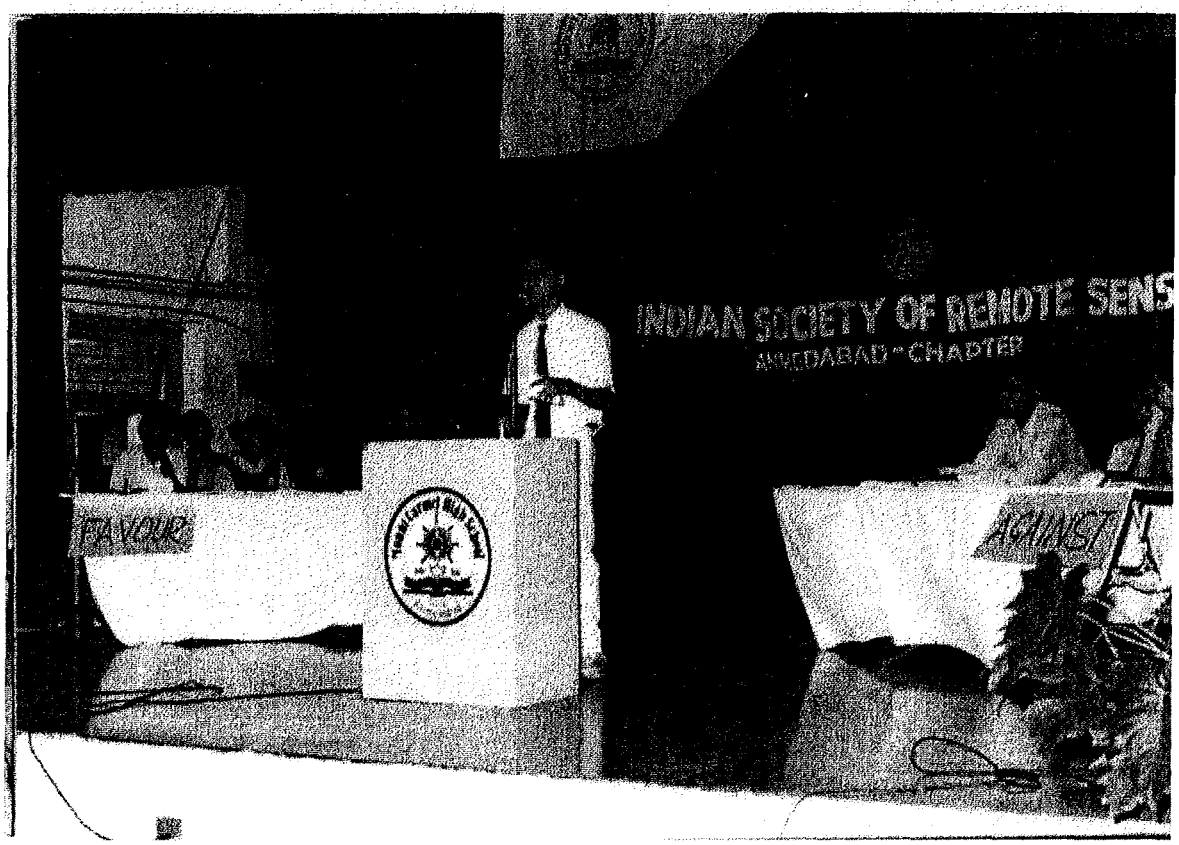
- **TECHNICAL INPUT FOR UPCOMING FOREST INFORMATION CENTRE**

Gujarat State Forest Department is planning to set up State level Forest Information Centre in Thaltej (near Centre for Environmental Education). On the request of State Forest Department ISRS-AC has provided technical inputs for formulating Forest Information Centre.

Tree plantation programme (July 19,2003)

Painting Competition on National Remote Sensing Day (August 11,2003)

Debate Competition on National Remote Sensing Day (August 11,2003)



- **SUPPORT TO ISRS /ISPRS COMMISSION VII WEBSITE**

Websites for ISPRS – Technical Commission VII and ISRS Nationals chapter are being maintained by ISRS-AC (Shri C. Patnaik and Dr S. S. Ray are webmasters for ISRS & ISPRS respectively).

- **ISRS-AC WEBSITE**

Website (http://www.isrs-ac.org) is maintained and updated by Shri K. K. Mohanty for disseminating information about chapter activities, notices, member's profiles, major events of main society and to increase professional interaction among the members and the remote sensing community at large. This has resulted in minimizing the postal expenses and immediate dissemination of information.

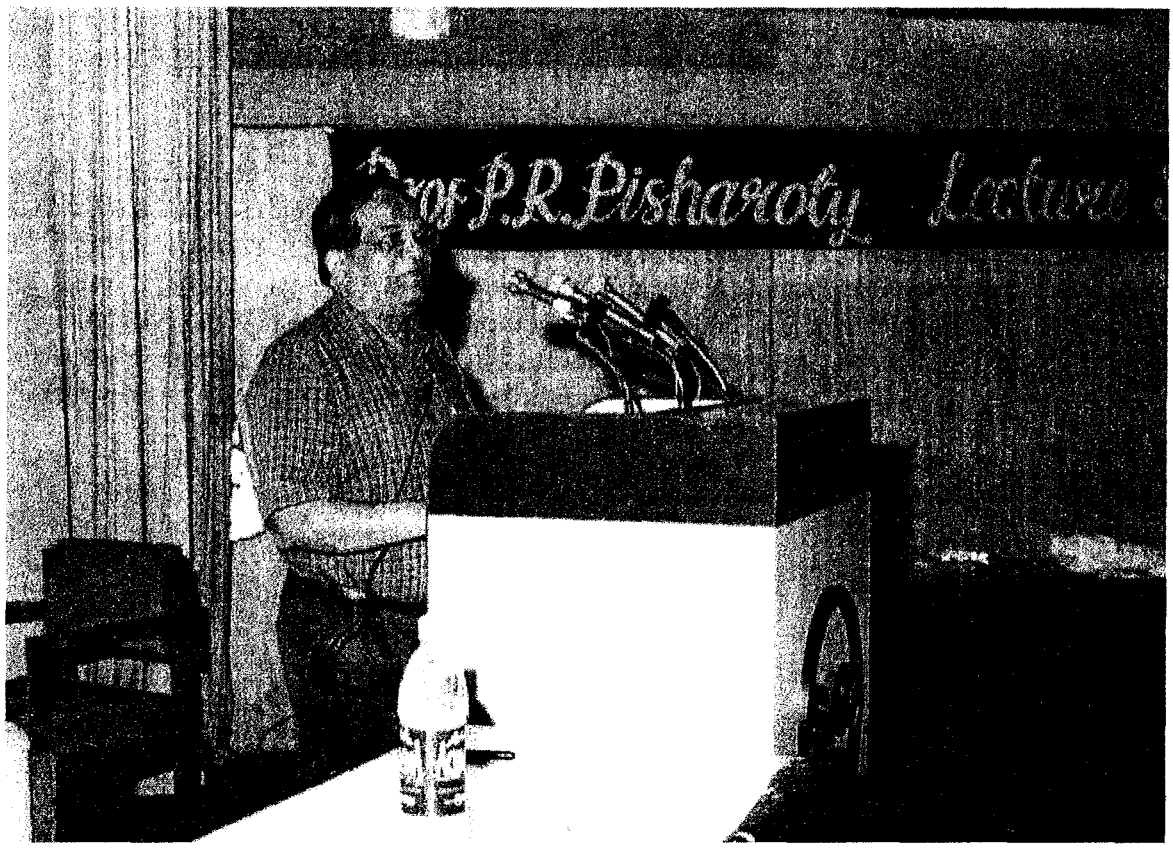
- **ISRS –AC NEWS LETTER**

During the year issue of **"SIGNATURE"**, the newsletter of ISRS-AC Volume 17 No.1, March-April has been brought out and is also available on Chapter's website.

- **PROF. P. R. PISHAROTY MEMORIAL LECTURE**

Prof P. R. Pisharoty Memorial Lecture (First) was organized on November 21, 2003 at Space Applications Centre (ISRO). The lecture was delivered by Dr. K. N. Shankara, Director, Space

Applications Centre (ISRO), Ahmedabad on "Space Inputs for Disaster Management". The lecture was attended by 300 members of the Society and scientists/students from SAC, PRL, CEPT and Gujarat University.



SAC Director Dr. K. N. Shankara delivering Prof P.R. Pisharoty Memorial Lecture

- **POPULAR LECTURES**

A popular lecture on "Remote Sensing of Environment" was organized at NIRMA UNIVERSITY AUDITORIUM, Ahmedabad on 6th June 2003. The lecture was delivered by Shri J. S. Parihar, Mission Director, RSAM and Chairman, ISRS-AC. The lecture was well attended by students (300) and faculty member of the Nirma Institute of Technology.

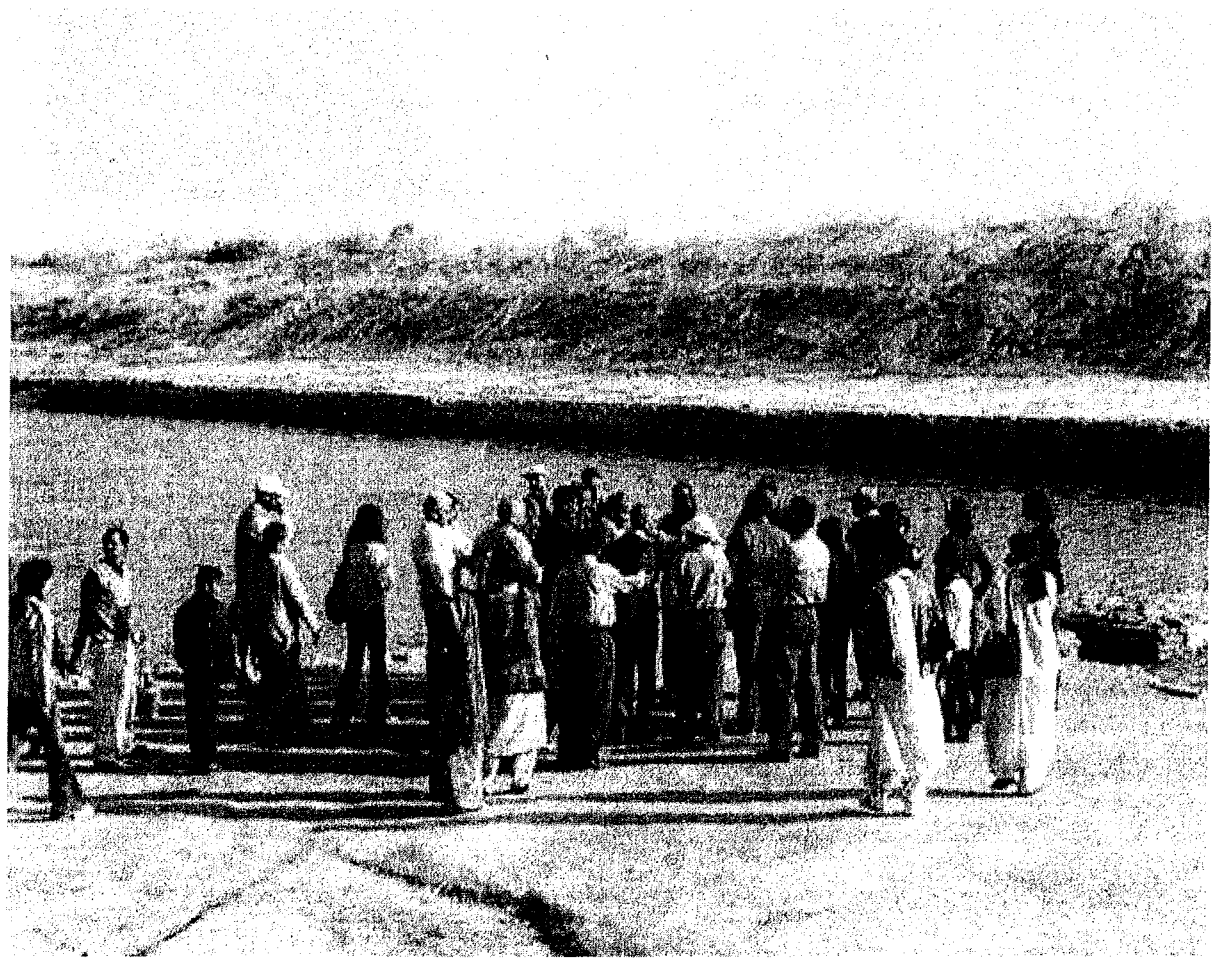
A special popular lecture on "Geomatics Education in Academic Institution" is being organized along with the AGM on March 30, 2004 at Space Applications Centre, Ahmedabad. The lecture is to be delivered by Shri T. P. Singh, Director, BISAG, Gandhinagar.

- **EXCURSION CUM EDUCATIONAL PROGRAMME**

ISRS-AC, jointly organized a one day excursion cum educational visit programme with "Santhigiri Ashram", Ahmedabad and Pranav Bharati Foundation on July 27, 2003. On this occasion seedling of Ayurvedic medicinal plants were planted near Goyal Water Park, Sanand Road, Ahmedabad. ISRS-AC members and their family members participated in this programme. The programme was inaugurated and graced by Dr. K.L. Majumdar, Dy. Director, RESIPA, Space Applications Centre (ISRO), Ahmedabad.

ISRS-AC, jointly with Indian Society of Geomatics (ISG-AC), Indian Meteorological Society-Ahmedabad (IMSA), Indian National Cartographic Association – Gujarat Branch (INCA-GB) organized two day Educational Excursion tour to Watershed Development Sites in Shetrunji Basin (Palitana), Archaeological site (Lothal), Coastal Environmental site (Alang) and Wildlife Sanctuary (Velavadar) on 17th and 18th January, 2004. Around 100 participants attended the programme. The scientific field excursion was extremely useful to understand and appreciate the importance of Harappan civilization, Wildlife management, watershed development and coastal environmental degradation.

Members and their Families at Lothal



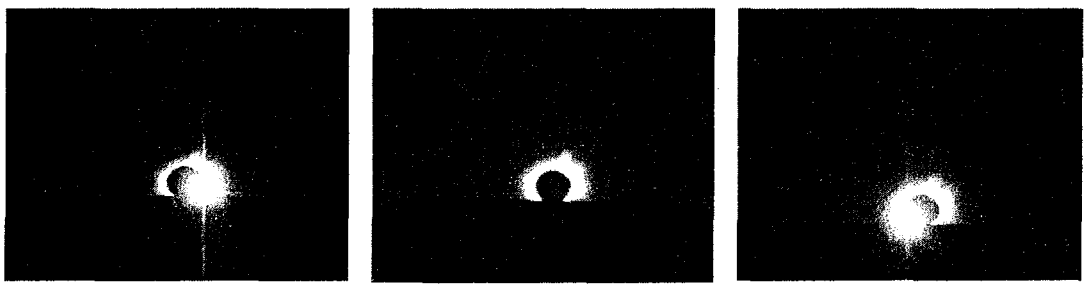
Members and their Families at Palitana

- **DR. RAVI SHARMA BENEVOLENT FUND**

Late Ravi Sharma, Sr. Scientist, Remote Sensing Applications Centre. U.P was battling for the life against dreaded "BLOOD CANCER". In response to request from ISRS-Lucknow Chapter, ISRS-AC appealed to its members and non-members and collected Rs. Sixty thousand eight hundred and seventy three (Rs. 60, 873/-) as voluntary contributions towards Ravi Sharma Benevolent fund. The contributions were sent to ISRS-Lucknow Chapter. Rs. Fourty two thousand eight hundred and fifty four (Rs. 42, 854/-) was contribution from Ahmedabad and of Rupees Eighteen thousand nineteen (Rs. 18, 019/-) was received as a draft of Commonwealth Bank of Australia in favor of "Dr. Ravi Sharma Benevolent Fund", payable by Bank of America, Mumbai received by ISRS-AC from two members (ShriM. G. Shaikh & Shri Salim Vhora) from Australia and the same was sent to Lucknow.

A Visit to Antarctica

Dr. Satyendra M. Bhandari, Life Member ISRS and Member ISRC-AC Council, recently visited Antarctica during Nov. 10-27, 2003 to make observations of the unique Total Solar Eclipse on Nov. 23, 2003. The 5-member Indian Eclipse Expedition to Antarctica was a Special one – the Expedition Team traveled to Maitri, Antarctica and back, by air, for the first time. Usually, all Indian Expeditions to Antarctica travel to the icy continent by ship. The Eclipse Expedition was highly successful and has generated unprecedented record of long duration shadow-band activity as a result of the horizon grazing elevation of the Sun during eclipse. These shadow-band measurements would be used to study the turbulence structure of the lower atmosphere over Antarctica. The team also made a variety of measurements of the solar coronal structure. All measurements were made from a high glacial blue ice site, surveyed and selected a-priori, about 20 kms from the permanent Indian Antarctic Station Maitri (Lat.: 70°.75 S, Long.: 11°.74 E) under low (-10° C to -15 ° C) temperatures, high wind chill and fortunately cloud-free conditions. Both the eclipse and the expedition had several unique characteristics.



Spectacular Diamond Rings and the Solar Corona with prominent Coronal Streamers observed during Nov. 23, 2003 Total Solar Eclipse near Maitri, Antarctica by the Indian Antarctic Eclipse Team

New Members Enrolled By ISRS-AC During 2002-03

Life Members

1. Dr. M.B. Dholakia, A/402,Chinmay Crystal, Vastrapur, Ahmedabad
2. Dr. N.K. Sheraria, 301/A, Devpuja Apt., Nr. Rosewood Estate, Satellite, Ahmedabad.
3. Shri Ramanuj Banerjee, MWRG/RESIPA, Space Applications Centre(ISRO), Ahmedabad
4. Shri Ritesh K. Sharma, MSDD/MSG, Space Applications Centre(ISRO), Ahmedabad
5. Shri Akshay Sethia, AGM Projects, 11, Ishan Appt., Nr. Parimal Garden, Ahmedabad

Annual Members

1.Ms. Manali S. Shah, 6-Gandhi Baug, Nr. Law College, Ellisbridge, Ahmedabad

RELAX ZONE

C. Patnaik
Agricultural Resources Group
Space Applications Centre, Ahmedabad

Rearrange the letters to form meaningful words. Use the marked letters of each word to form a final word as suggested.

P S T E C R L A

M R U C E O P T

N D C T S A E I

R O C E T V

R U E F B F

M O R T L P A E

Does a chameleon influence the theme?

How many times is **FLOW** written here? Move in any direction but do not jump letters.

		W				
	L	O	W			
O	W	O	L	O		
W	O	L	F	O	O	W
	W	W	O	L	W	
		W	O	O		
			W			

BOOK POST

SIGNATURES

Newsletter of Indian Society of Remote Sensing – Ahmedabad Chapter

To,

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If undelivered please return to :

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Remote Sensing Applications & Image Processing Area (RESIPA)
Space Applications Centre (ISRO), Ahmedabad – 380 015

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