ISG newsletter

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GEOSPATIAL INFORMATION REGULATION BILL

WATER WATCH FROM SPACE

GIS FOR SELF DRIVEN CARS

INDIAN SOCIETY OF GEOMATICS

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ISG newsletter

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Editorial Board – ISG Newsletter

Editorial

Dear Members,

This issue of Indian Society of Geomatics (ISG) is bringing out a small Newsletter, with the normal updates about the activities, new membership, and of course the coveted awards. We have also received a couple of interesting articles from our respected scientists/members, on request, and I am sure that this will add to the flavour of the Newsletter.

We have tried to include some of the new technologies and policies related to Geospatial domain. The new Geospatial Policy announced in February 2021 under the title "Guidelines for acquiring and producing Geospatial Data and Geospatial Data Services including Maps", has been discussed, and the highlights of this policy along with the gap areas, has been well brought out.

The article on GIS based driverless cars, makes us wonder about the future of things to come, and of course, with the accuracy of the systems needed. Will this be a feasible solution in a highly populous country like India, where rules are broken at the drop of a hat, and Brownian motion reigns supreme! Let us keep our fingers crossed.

At this point I must also mention that the importance of GIS aided help, guidance and medical services, during the current pandemic which is ravaging the world, has been articulated, and work in this direction had already been started by related agencies.

The article, "Colour of water", makes very interesting reading, starting from the fundamentals of physics behind colour theory, propounded by Lord Rayleigh, then demonstrated by Sir C V Raman, and going down to the theory, as is relevant from satellite images and the retrieval of water constituents. Different cases have also been taken up to elucidate the science behind the colour.

At this point I must ponder a little bit about the super pandemic that has engulfed the world, and our own country in particular. Since March 2020, all of us have been experiencing very difficult times, due to the Covid-19, with most of us being affected directly or indirectly. It threw all of us off-guard, and brought the people to re orient their lives. It was a sad reality as many of us had to endure the loss of near and dear ones. With deep sorrow, I have to say that we lost some of our scientific community members, which is indeed a great loss for all of us. Me, and the editorial team would like to take this opportunity to express our deepest condolences to their families.

I thank the contributors and columnists for their cooperation and the editorial team for doing an excellent job, as usual, in floating the ideas of relevant invited articles, coordinating with the authors, and various team members and finally editing the matter judiciously.

We would like to get feedback and comments on this issue which will help us in improving the quality of the Newsletter in future.

Happy reading. Stay safe.

Arundhati Misra
Editor, ISG Newsletter
(arundhati@sac.isro.gov.in)

Message from President, ISG

In the age of digital information system for all walks of life, location information is one of the primary and most essential component. It has been observed since last decade or so that it has also become vital for even traditional segments. Especially in the present COVID-19 situation, it is crucial for the logistics, delivery and e-Commerce. Such information can/are being obtained using various means such as ground-based survey, terrestrial Mobile Mapping Systems, aerial surveys, satellite-based remote sensing and others. Recently Government of India has announced the guidelines to acquire the Geospatial data and geo-spatial services to provide the opportunity to various new players of their involvement with innovative techniques and give a major boost to the various sectors in the country.

India has demonstrated amazing progress in satellite based remote sensing by building and launching satellites with a suite of sensors in optical, infrared and microwave regions of electromagnetic spectrum for earth observation based applications. With the increasing demands of the users, there will be immense requirement of high spatial and temporal resolution sensors for near real time earth observations. It may require innovative solutions to meet the requirements.

Considering the trends, and the recent initiative of the Government in the direction of 'self-reliant' India, the upcoming Space Remote Sensing Policy promises easy access of space based remote sensing data and information to inspire stakeholders to provide unique solutions for the growth of the country. Both the geospatial policy and space remote sensing policy together will provide great opportunity to the stakeholders to bring out innovative solutions for the growth of the county and boost the economy with a major step towards 'Atmanirbhar Bharat'.

It is my pleasure to acknowledge the efforts of the ISG Newsletter team, which brings out its new issue with great combination of science, technology and community information. Apart from scientific articles on '**Colour of water', and** GIS based driverless cars, and the New Geospatial Policy, it also nicely brings out the news articles, relevant to the geospatial community. In today's world of virtual meetings, conferences and online learning, Electronic version of ISG newsletter is highly appreciated.

Wishing all of you best of health and safe reading.

Raj Kumar
Hyderabad
May 2021

The New Geospatial Policy

The way ahead

Arup Dasgupta

The new Geospatial Policy announced in February 2021 under the title "Guidelines for acquiring and producing Geospatial Data and Geospatial Data Services including Maps", is a very welcome step in the right direction. It frees maps from the clutches of Survey of India and Ministry of Defense and hopefully Ministry of Home Affairs as well. Remember the infamous GIRB? The new Policy applies the *coup de grâce* to all the other guidelines, policies and recommendations issued from time to time by various ministries and departments which were mainly meant to control their turf in the name of 'security'.

It is surprising that the Department of Space finds no mention in the document except for a passing mention by Dr Jitendra Prasad, Union Minister of state, during the press conference; though imaging from space does find a mention in the listing of geospatial data sources. It should be noted that the Department of Space fell into the 'security' trap in 2007 but has redeemed themselves somewhat with their recent Draft Space-RS Policy - 2020. Both the Geospatial Policy and the Draft Remote Sensing Policy are very bold steps which will help India to aggressively use geospatial data for its development.

Self Certification of Maps

The first important condition to note is that all maps are now self-certified (Clause 8.ii). No more waiting for Survey of India or other agencies to vet maps and issue that all important certificate, which allows the creator to publish and distribute their products. Usually the work around for government agencies was to label them "For Official Use Only". Now, no need for such subterfuges. Incidentally, will the Google Mapathon data finally emerge from the dungeons of SoI to see the light of day?

Shift in Denial Regime

The second is the shift from area based denial to attribute based denial. Now coastlines and International boundaries are no longer 'no mapping' zones for others. However, sensitive installations - as opposed to areas - are anonymized by omitting their attribute information. A list of negative attributes is under preparation by DST (Clause 8.iii). This is, hopefully a relief from the Vital Area and Vital Bases denial regime.

Under this shift from areas to attributes, it is expected that SoI will remove the Secret and Restricted categories from its OSM series and only withhold attribute information which appear in the negative list to be issued by DST. Incidentally, the OSM already does so by omitting references to VA and VBs. Will this unshackle contour information or will MOD persuade DST to keep elevation information in the negative list? Will Andaman and Nicobar Islands maps now escape the "Secret" category?

Mapping

Coming to mapping *per se*, we need to understand the ramifications of the fine print. Indian entities can map from any source at any scale (Clause 8.v and 8.vii), use Continuous Observation Reference Station, CORS data and also conduct terrestrial mapping, street views (Wonobo comes to mind) and map territorial waters (Clause 8.vi). Threshold values are defined in Clause 8.iv(a) and maps having better than these values can only be made by Indian entities and processed and stored in India only (Clause 8.vii) on a domestic Cloud or servers physically located in India (Clause 8.ix).

Data above the threshold is freely available to all entities, can also reside on any Cloud and can be exported subject to the negative list (Clause 8.ix).

Maps and data below the threshold can be used by foreign companies and foreign owned or controlled Indian companies for Indian customers only through a license to be issued by Indian Entities who hold such data. The licensees can only access via API. Further, the data cannot pass through the licensees or be stored on the licensee's servers or be reused or resold by them (Clause 8.viii).

Threshold Issues

Clause 8.iv(a) defines the threshold values for mapping accuracies as: "**On-site** spatial accuracy shall be one meter for horizontal or **Planimetry** and three meters for vertical or Elevation". The term accuracy here refers to planimetry and elevation. However, Planimetry is not defined in clause 7. Clause 7(a) only defines **Positional** data as Latitude, longitude and elevation/depth of a point or its x, y & z co-ordinates in the territory of the Republic of India. If we conflate 'Planimetry' with 'Position' then the one meter value takes on quite a different meaning. Further what exactly is "on-site"? Is it 'local' or 'relative' as opposed to 'absolute'?

Absolute positioning accuracy is with respect to a map projection system which in turn is tied to a spheroid. The guidelines create an ambiguity here by not mentioning the specifications of the spheroid or the projection system. This also brings up the issue of the CORS network. As stated in a recent Webinar organized by Association of Geospatial Industries and National Remote Sensing Centre, the Indian CORS will use NAVIC and other GNSS resources. Therefore the Indian CORS and the related mapping system will be linked to WGS84 spheroid. SOI's OSM is based on UTM as the projection system and WGS84 as the spheroid. Hence it has to be assumed that the *de facto* system which Indian mappers should use is UTM on WGS84.

The height threshold for mapping is three meter but again the reference datum is not mentioned. In India SOI has been using the

Mean Sea Level as the reference but then the reference becomes the geoid and not WGS84 which can also be used.

Mapping Issues

There is no mention of the Foundation data set which presumably SoI will provide. Clause 8.xiii explicitly mentions that all political boundary data (which should include coastlines - not explicitly mentioned) as prepared by SoI will be the only standard for this purpose and will be available for free and downloadable by anybody including for digital display and printing.

Apart from the administrative boundaries covered in Clause 8.xiii, foundation data should also include land parcels, latitude and longitude framework with ticks to provide an invariant reference for all spatial data, elevation, height points, bathymetry, geodetic control (CORS), transportation, drainage, watersheds, water bodies, land cover and land use.

Further, as such data undergoes rapid change it is necessary that such foundation data needs to be updated frequently. Many countries thus use satellite maps as foundation data as this is the only way to keep the information up to date quickly.

Accuracy and Resolution

Most people use the terms accuracy and resolution interchangeably. The policy also makes this mistake when it states that maps up to one meter on-site spatial accuracy is the threshold below which maps are restricted. In a personal communication it has been clarified that this refers to 1:4,000 scale mapping. This is a tremendous improvement because this scale amply covers Cadastral and Ward maps. The assumption in the policy is that one meter remote sensing data can thus be used for mapping.

A digital imagery resolution is defined by the Ground Sampling Distance of the sensor. Thus one meter GSD represents a square of one meter on the ground and usually corresponds to one pixel of the sensor. However accuracy of mapping is not defined only by GSD but by many other factors such as Modulation Transfer Function and Signal to Noise ratio of the sensor.

A one meter feature on the ground will rarely fit into one GSD of the sensor exactly. Therefore, the practice is to take the eight pixels around the center pixel to determine if the feature is mappable. Thus a one meter feature can be detected if the sensor has a 33 cm pixel GSD. Unfortunately, the draft Remote Sensing Data Policy 2020 has removed restrictions on data with GSD upto and including 50 cm only. This is a significant anomaly between the two policies.

Standards and Interoperability

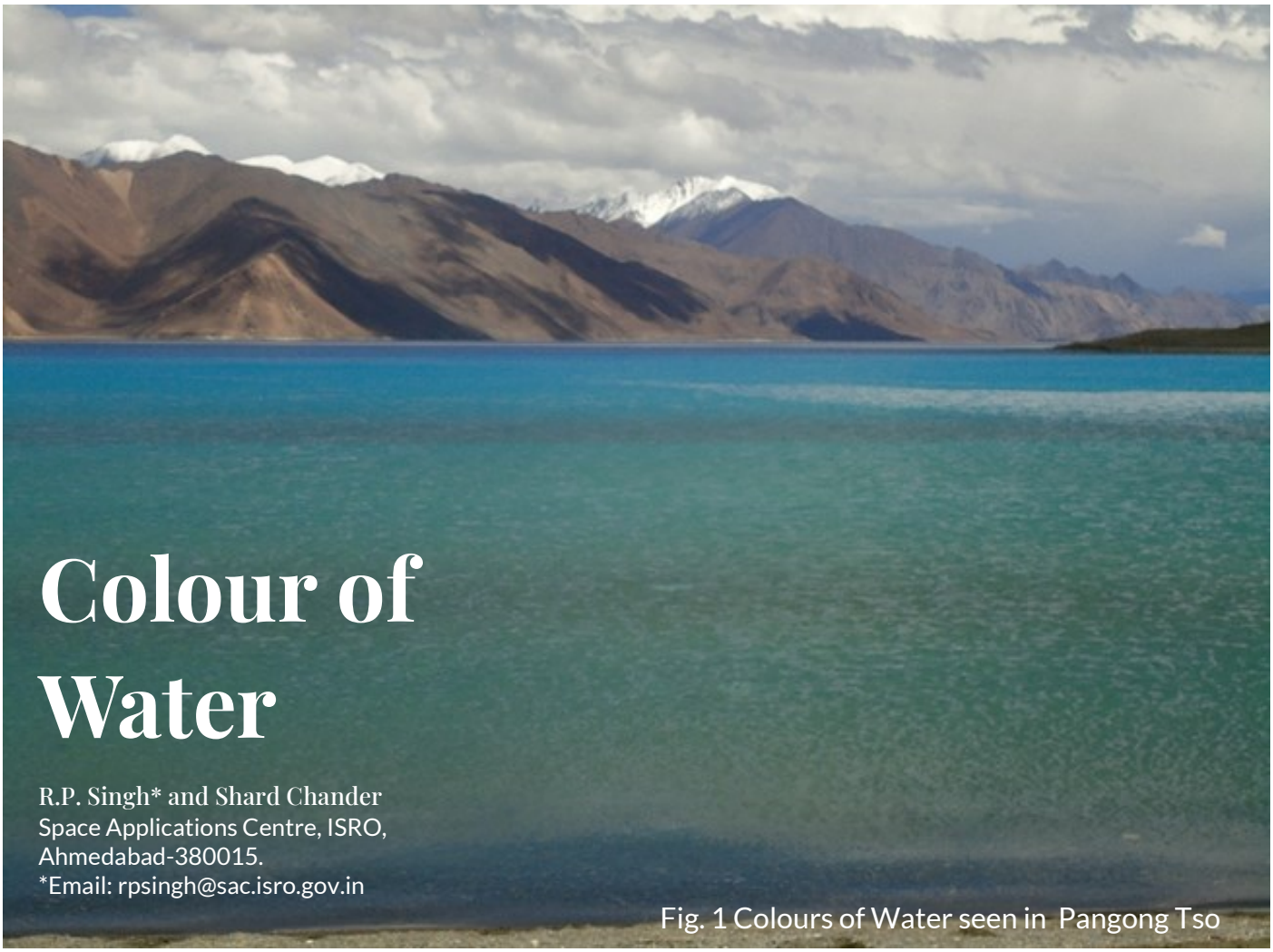
What is 'missing' is a complete absence of Standards for digital mapping and data interoperability. When mapping is thrown open there is bound to be a cacophony of maps and will lead to issues of interoperability in spite of the exhortation to freely share such maps between Indian entities. In this context the OGC, of which SoI is a Board member, has excellent standards which are country and vendor neutral. An International Standards body, ISO TC211, on which the BIS has observer status, deals with Geospatial standards which are generic. These should have been mentioned in the Policy.

Other Anomalies

Clause 7(d) Map: Symbolic representation of real-world objects, regions or themes on a given scale which was generally published in paper form but now also available as web-map-service. This is a surprising definition and seems to hark back to the now defunct SoI Map Policy which defined digital data in this manner. In other sections mention is made of Cloud and other digital sources hence this definition should be amended.

Conclusion

All in all the new geospatial policy is a tremendous step forward. In the webinar quoted earlier it was acknowledged that these are guidelines and that there has to be more definitive policies and processes. It is hoped that both the Departments of Science and Technology and Space are working on these detailed policies and procedures to make the Policy Guidelines implementable.



Colour of Water

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Fig. 1 Colours of Water seen in Pangong Tso

When we see the earth from the space, it looks bluish as Ocean covers the majority of the earth surface. Observations of lakes like Pangong Tso show shades of colours ranging from bluish to greenish tone (Fig. 1). It is surprising why clear water, which looks colourless in glass, suddenly looks full of colour when seen in Lakes and Oceans. All other material looks similar colour irrespective of their amount. The quest of colour of water led to important findings including molecular non-elastic scattering by C V Raman known as Raman Effect.

In fact, scientific observations of blue colour of ocean goes back to Lord Rayleigh who explained it as reflection of blue sky (Rayleigh, 1910). C. V. Raman refuted this idea of Rayleigh through a simple experiment (using Nicol prism held at polarizing angle to the surface of water and quenching the surface reflection) and explained that blue colour of the deep sea is a distinct phenomenon in itself and not merely an effect due to reflected sky light (Raman, 1921).

Jacques-Louis Soret agreed that scattering of light is a cause of ocean colour. However, 19th century scientist Robert Bunsen was of the opinion that the colour of water depends on light absorption by water. Vasily Shuleikinn in 1923 integrated these concepts and developed complete explanation of the colour of sea. It is now known that in very clean, open water, the optical property like colour depends primarily on both the scattering and absorption properties. Water colour can be broadly divided into two components, intrinsic (slight blue tint) and apparent (blue, green, brown etc.). The present article discusses reasons behind the colour of water and briefly explains how water colour observations from satellites help us retrieve water quality parameters. Intrinsic nature of water is discussed first, then it is followed by discussion on apparent colours related with natural water bodies where colour

is a function of dominant dissolved and suspended components. The Blue hue of water is an intrinsic property and is caused by selective absorption and scattering of white light. The colour becomes deeper blue with increase in the path length (several meters) of light in water.

Colour of any material originates due to interaction of visible light with the electrons of the material. It can be resonant interaction like absorption (from chemical/paints), emission (flame), selective reflection, or non-resonant interaction such as interference (Soap bubble), diffraction (grating) or refraction (prism, rainbow). Absorptions in the visible spectrum are usually attributed to excitations of electronic states in matter. In most of these cases photons interacts mainly with electrons. Water is a simple three atom molecule, H_2O and all its electronic energy levels exist in in ultraviolet region and therefore not responsible for colour of water. However, in case of pure water, the intrinsic blueness originates from vibrational transition. This is rare example of colour (in visible region) due to vibrational nature of molecules. This absorption of H_2O consists of band centered at 760 nm (Table 1) and two weaker bands at 660 and 605 nm. Heavy water D_2O is colourless because being relatively heavier molecule (higher isotope mass) all its vibrational transitions are shifted towards lower energy (higher wavelength). An experiment carried out by Braun and Smirnov (1993) found that there is 44% loss of red intensity (absorbance at 660 nm) during transmission of light in 3-m water filled tube. This is the reason why a glass with small amount of path length of light looks colourless while waterbody with long path length looks coloured. The simplest optical interaction of light with surface of water is governed by Snell's Law and Fresnel equations. This geometrical optics explanation is complicated by surface roughness. Once light enters the water, it interacts with water molecules with other present constituents.

Light when incident on any clean lake or open ocean is partly reflected from surface and majority of it is transmitted into the water interacting with its molecules. Due to vibrational nature of water molecules, red orange and green wavelength of light get absorbed more so the remaining light seen is blues and violets. This is the main reason why ocean and many clear lakes look blue. The other equally important factors in natural conditions such as reflected blue skylight and land scattered back from the bottom surface is dependent on sun and viewing geometry. The blue to blue –green hues seen in glaciers also are due to back scattered light after it has gone through selective absorption in its path of interaction. As large quantities of water appear blue, therefore a large piece of compressed ice or glacier appear blue.

Table 1. Vibrational transitions lines of Liquid (20^0C) Water
(Source: Braun and Smirnov (1993)

S.No	Vibrational modes	Wave number ($1000\ cm^{-1}$)	Visible Wavelengths (nm)
1	n_1	3.40	
2	n_2+n_3	5.15	
3	$n_{1+}n_3$	6.90	
4	$n_{1+}n_{2+}n_3$	8.40	
5	$2n_{1+}n_{13}$	10.3	
6	$3n_{1+}n_3$	13.16	760
7	$n_{1+3}n_3$	13.51	740
8	$3n_{1+}n_{2+}n_3$	15.15	660
9	$n_{1+}n_{2+3}n_3$	15.15	660
10	$4n_{4+}n_1$	16.53	605

Water in natural conditions show different colours due to presence of suspended and dissolved particles. Transparent water with a low accumulation of dissolved materials appears blue. Dissolved organic matter, such as humus, peat or decaying plant matter, can produce a yellow or brown color. Few Algae or dinoflagellates produce reddish or deep yellow waters. Water appears green when rich in phytoplankton associated chlorophyll. Soil surface runoff can produce variety of yellow, red, brown and gray colors. Common cause of

water colour is the presence of minerals such as iron content which can result in red and brown colours. Generally, Ocean water is classified broadly into two cases, i.e. Case-1 and Case-2 categories. Open ocean water and water away from the anthropogenic activities come under the case -1 where only natural biological activities play a role in governing the bio-geo chemistry. All other waters "*everything else*" fall under the second category i.e. Case-2 (coastal and inland). In coastal Case-2 waters, chlorophyll concentration is higher due to terrestrial inputs and looks green in colour. The colour we observe in rivers, lakes, reservoirs are governed by many other factors that include local geography, geological constituents, soil runoff and sediment, organic matter input, bottom albedo, wind-induced re-suspension etc. Satellite based remote observation allow us to know the water quality parameters for different rivers, reservoirs, lakes and oceans. Variation in the colour of water due to varying bio-geophysical quantities and associated bathymetry and bottom reflectance manifests in spectral signature observed from spectrometer. Fig. 2 shows the colour variations in different water bodies observed from Airborne AVIRIS-NG spectrometer, which flew as part of ISRO-NASA collaboration in different sites in India. We can see that water near Veeraval looks blue due to lesser-suspended sediments, while water in Hoogli and Bhitarkanika looks whitish due scattering from high suspended sediment concentration. In Chilika Lake, deep sea looks more bluish as compared to inland and near coast water. Bio optical models are developed for relating measured radiance from satellite instrument with in situ water colour parameters.

Fig. 2 Colours of Water observed from Airborne AVIRIS-NG Spectrometer

The optical properties that govern the colour are divided into two classes: inherent optical properties (IOPs) and apparent optical properties (AOPs). IOPs are those that depend only upon the medium like absorption, scattering, beam attenuation coefficient and volume scattering function. Whereas apparent optical properties also depend upon the directional structure of the ambient light field within the medium, i.e., remote sensing reflectance, diffuse attenuation coefficient (K_d) etc. One uses radiative transfer equation (RT) to simulate the radiance and irradiance taking into account the various processes that can happen to photon on the way from sun to remote sensing detector, using inherent optical properties as input. Inversion of RT modeling helps to estimate the bio-geophysical parameters of water from satellite measurements.

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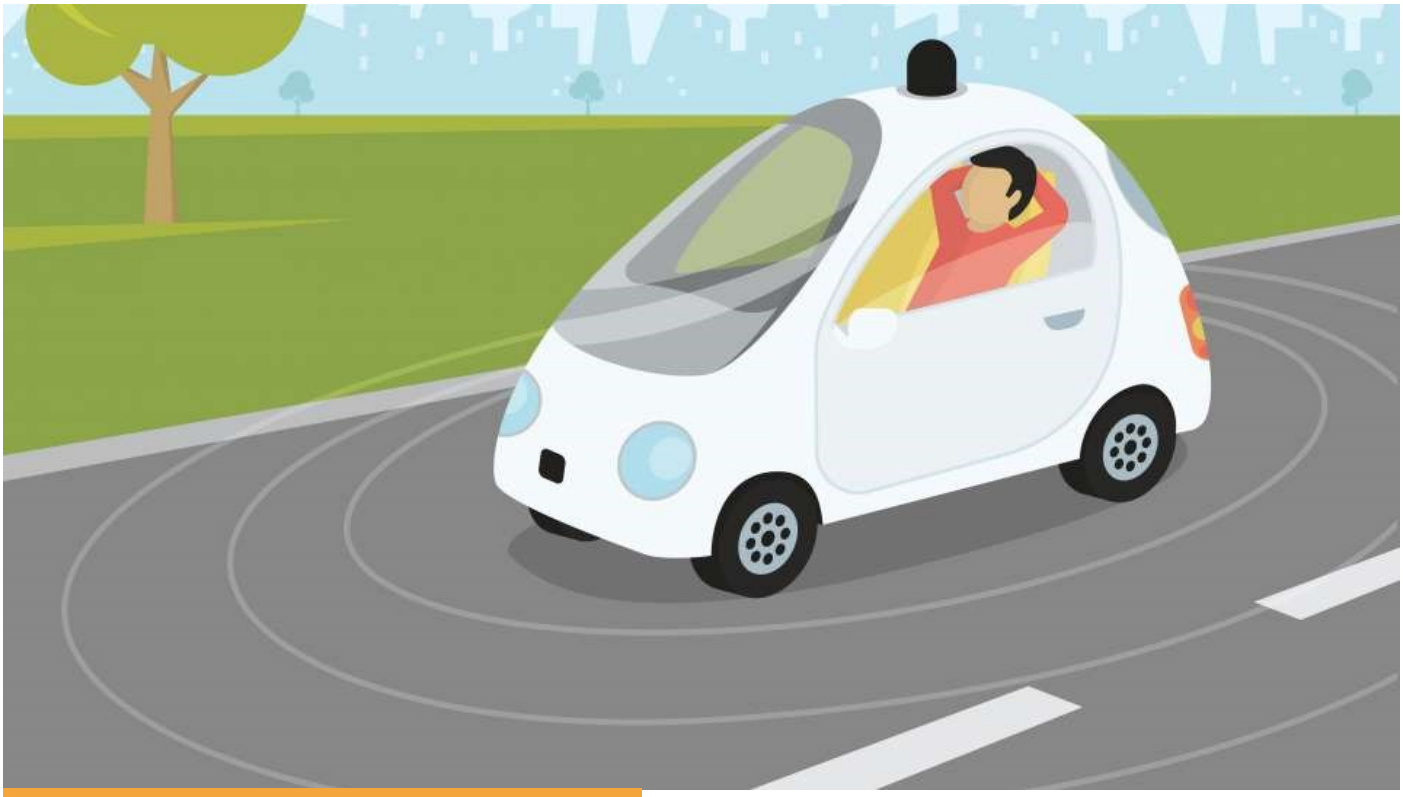


GIS for Self Driven or Driverless Cars

Pushpalata B. Shah
Vice President GIS Solutions, Scanpoint Geomatics Limited, Ahmedabad

Keywords: driverless cars integrate GIS, GIS navigation, GIS technology, GIS in Transportations, GIS applications, important application of GIS, GIS automotive navigation system

Link to the Blogpost:
https://sgligis.blogspot.com/2021/03/gis-for-self-driven-or-driverless-cars.html

Tesla was the first company to come out with self-driving or driverless cars. This was followed by Google. And slowly we will be ending up with driverless taxis like we have driverless trains. The metro in Mumbai is designed to be driverless but initially, there will be a motorman present for confidence building as well as to avoid panic among end-users.

How can a car be driverless? It is next to impossible. How can a robot replace the human driver? First of all, he has to see all around, look out for who is overtaking from both sides, the right side or left side (remember we are in India), he has to honk at the fellow crossing the road despite a red signal, and attend to a customer call asking for another service. Driving is a big multitasking job. Will technology be able to meet the challenge?

We talk of satellites being eyes in space. So why can't we have eyes for the cars? Okay, so there will be cameras that will replace the driver visualizing what is around him/her. Remember the display when you put on the reverse gear and use the display for maneuvering in the reverse direction? So, the camera is going to interpret this picture and maneuver correctly? Here, comes the role of another type of sensor; the laser-based sensors that will measure the distances of all the objects around the car and assist the car in going reverse. And of course, there will be some robot which will

perform the task of both hands and legs for operating the steering wheel and the clutch and the brake combo!

Similarly, there will be other laser-based sensors that can measure objects in front of a speeding car and these sensors will then feed inputs to a calculator that will come out with a figure for the ideal speed to be maintained; and then the calculator communicates to the robotic brakes that they have to wake up and reduce the speed. So, fine I don't have to keep altering my foot between the clutch and the accelerator and end up with a sore knee at the end of a long journey. Artificial Intelligence will do the job for me.

Now there is another hitch in this story. Will the car tell the petrol station how much petrol/ diesel is to be filled? Or does the owner have to keep track of this and manage it by himself? Will the automation drive cover the fueling stations also? For now, let us individually take up this responsibility.

And what about my interrupting the vehicle for a washroom break? Will it take me to a washroom station? Will I be able to command and control the car? If it is my car it should obey me, isn't it? And I need another halt at any ATM; will this also be by command and control? How will it locate all these utility centers?

The human sensors of vision, neurotic activation and communication, and movement of hands and feet are all technologically replaceable. But who will give the directions? Or what technology is adopted for achieving this?

GIS and maps fit in this role of guiding the vehicle in the proper direction. High-resolution real-world maps along with the GPS coordinates of the car are used for programming the route for a selected destination. The high definition geospatial details for every individual street then become a major requirement. High-resolution maps with every possible detail on the road is the requirement.

The availability of high-resolution geospatial data should be timed well with the release of driverless cars in the market. The new map policy being introduced in our country has already created a flurry in the market. There will be a huge market for high-resolution maps of every nook and corner of the country. Drones will play a very big role in generating such maps and the market requirement is already building up. So, here we go, to our native places, with loads of baggage in the trunk and hours of free time for enjoying the nature and company of loved ones.

All this automation is based on three strong technological pillars . The first pillar is Sensors of all kinds; the other is Artificial Intelligence and the third is a Geographical Information System (GIS) with a high-resolution real-world map. While the sensors do the job of building intelligence about any obstructions in the path and traffic signals, artificial intelligence works at the backend of the robotics, and the GIS with the well-defined road map guiding the vehicles. So, once again a question arises, are we inching towards more jobless persons, or are we relying on technology to overcome human errors? Will we continue to panic or will we have a joy ride?

OBITUARIES

DR SHIBENDU SHANKAR RAY
Jul 02, 1963 – May 04, 2021

Dr. Shibendu Shankar Ray, our colleague with an ever-smiling face was a prominent figure as far as scientific pursuits are concerned in the field of applications of space technology and geomatics for agriculture. He has been instrumental in bringing forth new ideas in monitoring of crops, spatial data collection and optimizing many routine input activities to a remote sensing program.

He joined SAC, ISRO on December 02, 1991 and after serving for two decades at SAC and while heading the agriculture division he was encadred to the Ministry of Agriculture & Farmers' Welfare in April, 2012 where he was made the founder Director of Mahalanobis National Crop Forecast Centre (MNCFC), New Delhi. He brought about yeoman changes in the way data is collected, analysed and interpreted to meet societal needs for agriculture monitoring. The FASAL, NADAMS, CHAMAN programs of the MoA&FW have been highly benefitted from his expertise.

As an institution builder and manager of various national level programs he has used his knowledge and experience, obtained from various countries and their technologies in similar fields. His active involvement in the use of geomatics for agriculture and allied activities has been recognized by the Indian Society of Geomatics which conferred upon him the National Geomatics Award in 2015. In addition to that, he was also the recipient of many awards of various societies, including the ISRO award of excellence. He was an easily approachable person with a down to earth attitude.

His untimely demise due to Covid-19, has left all of us in a state of shock. The Society would deeply miss an enthusiastic and highly energetic person who had brought laurels to the programs which he had handled. The Indian Society of Geomatics offers its homage to the departed soul along with prayers that his soul attains eternal peace and the family and all members associated with him, get courage to bear this huge loss.

SURYAKANT A SHAH
OCT 23,1964 – MAY 10, 2021

Suryakant A Shah joined SAC as an active Member of Systems Team in VAX Computer Centre of Image Processing & Data Products Group (IPDPG), RSA. His contribution, in Operations, Maintenance of VAX/VMS Computer System as well as in running of the Computer Centre, was quite important. He happily provided various Computer Centre related services to all types of users of VAX Computer Centre.

Subsequently, he worked in major Projects & Programs covering important areas of our Centre. His contributions, as the focal person for Projects like Web based "Campus GIS" activity in establishing Geodatabase of Office Assets and Spaces, Development of Prototype of Organizational & National Spatial Data Infrastructure (SDI), an ISRO initiative towards building Digital India, implementation of software tools for extraction of data from HDF & BUFR, revamping of SACNet & Vyom websites using advanced web-technologies, establishment of Photos Repository Archival System at PPG, were instrumental.

As focal person of "Courier" Editorial Board he brought out & circulated the quarterly in-house magazine in soft copy. His initiative towards implementation of Product Management Life Cycle (PLM) in SAC environment is worth mentioning. His approach of being the bridge between SAC management and various SAC Areas/Groups & Projects, as an active member of PPG team, has helped in smooth executing of many Programs.

His untimely demise, due to Covid-19, has left a void that no one can fill. We all are shocked since his soul left for heavenly abode so early. The Indian Society of Geomatics (ISG) would deeply miss an enthusiastic and sensitive person. The ISG offers its homage to the departed soul along with prayers that his soul attains eternal peace while his family and all members associated with him get immense courage to bear this huge loss.

NEWS highlights

#1

ISRO's contribution to India's COVID19 battle

ISRO's Vikram Sarabhai Space Center (VSSC), which is the country's lead centre for the development of rockets and related technologies has come forward to the aid of COVID19 patients. It has indigenously developed three different types of ventilators and a portable Medical Oxygen Concentrator (MOC) named "SHWAAS", which can deliver over 95 per cent enriched level of oxygen to support patients who are on oxygen therapy. It comes at a time when the country is having to import various kinds of medical equipment and oxygen cylinders to bolster the fight against COVID-19. The device enhances the oxygen gas content by selectively separating the nitrogen gas from ambient air through Pressure Swing Adsorption (PSA). As per the information provide on the ISRO website, SHWAAS is capable of supplying enriched oxygen continuously at 10 LPM adequate for two patients at a time. Further, as India continues to struggle with the COVID-19 pandemic, ISRO extended a helping hand not only by the indigenous developments of required equipment but also by sending medical oxygen supplies for the local public in Kerala, Tamil Nadu and Andra Pradesh. Apart from it, Space Application Centre at Ahmedabad has successfully converted 2 Liquid Nitrogen Tanks of about 1.65 lakh litres into liquid oxygen tanks for storage and supply in Ahmedabad and nearby hospitals.

Technology transfer has been done to around 50 companies for the commercial production of the three ventilators and the oxygen concentrator. Based on designs, features and specifications, the three ventilators are named as, Prana, VaU and Svasta. While Prana is meant to deliver respiratory gas to the patient by automated compression of an Ambu bag, Svasta is designed to work without electric power, and the VaU is a low-cost ventilator equivalent to commercially available high-end ventilators. All three are user-friendly, fully automated and with touch-screen specifications, meeting all safety standards. It was informed by VSSC, Director that doctors and other experts have checked its efficacy and confirmed it meets international standards Likely to be priced around ₹ 1 lakh, the ventilators developed by ISRO are cost effective and easy to handle compared to the mini conventional ventilators that are currently priced around ₹ 5 lakh.

'Shwaas' oxygen concentrator indigenously developed by ISRO Photograph:(WION)

Ref: https://www.wionews.com/; https://www.hindustantimes.com/; https://www.republicworld.com/; https://www.pib.gov.in/

#2

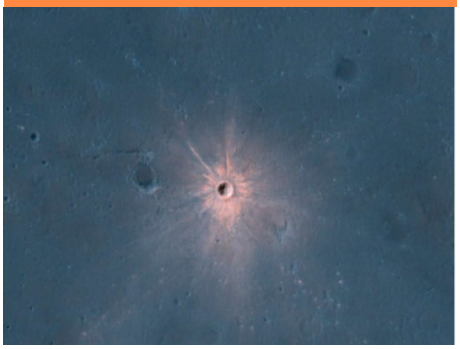
ISRO Demonstrates India's First Free-Space Quantum Communication

The Indian Space Research Organisation (ISRO) has successfully demonstrated free-space Quantum Communication over a distance of 300 metres, for the first time in the country. The free-space QKD was demonstrated at Space Applications Centre (SAC), Ahmedabad, between two line-of-sight buildings within the campus. The experiment was performed at night, in order to ensure that there is no interference of the direct sunlight. As informed by ISRO, a number of key technologies were developed indigenously to accomplish this major feat, which included the use of indigenously developed "NAVIC" receiver for time synchronisation between the transmitter and receiver modules, and gimbal mechanism systems instead of bulky large-aperture telescopes for optical alignment. The Quantum Key Distribution (QKD) technology underpins Quantum Communication technology that ensures unconditional data security by virtue of the principles of quantum mechanics, which is not possible with the conventional encryption systems. The conventional cryptosystems used for data-encryption rely on the complexity of mathematical algorithms, whereas the security offered by quantum communication is based on the laws of Physics. Therefore, quantum cryptography is considered as "future-proof", since no future advancements in the computational power can break quantum-cryptosystem. The experiment is being considered as a major breakthrough towards ISRO's goal of demonstrating Satellite Based Quantum Communication (SBQC), where ISRO is gearing up to demonstrate the technology between two Indian ground stations.

Ref: *https://www.ndtv.com/; https://www.business-standard.com/*

#3

Fresh Crater found on Mars



Bright ejecta from the fresh crater on Mars

Lack of atmosphere and its proximity to the asteroid belt makes Mars a more likely target for meteors to hit it much harder than they do on Earth. Mars Reconnaissance Orbiter (MRO) has a variety of instruments on it that make it possible to both track down areas of interest and then follow up with high resolution imagery, including High Resolution Imaging Science Experiment (HiRISE), the camera that took the picture above. During one of its flyby, this satellite imaged a new crater that showed up as a bright spot in the image. Scientists theorize it to be due to shallow subsurface materials that were blasted into the open on impact. This contrasts with many new craters, which show up as dark spots as dust from the ejecta is covered in a darker material.

Ref: https://www.universetoday.com/

#4

Environmental-friendly rocket fuels: ISROsene

ISROsene is a green propellant for use in future rocket & satellite propulsion systems that significantly minimises environmental impact while improving overall efficiency and economy. It is based on Glycidyl Azide Polymer (GAP) as fuel and Ammonium Di-Nitramide (ADN) as oxidizer at testing level, which is known to eliminate the emission of chlorinated exhaust products from rocket motors preventing Ozone destruction. It is a rocket grade version of kerosene that can serve as an alternative to conventional hydrazine rocket fuel. ISRO has successfully tested the demonstration of electric propulsion system for station keeping operations in the South Asia Satellite, launched on May 5, 2017. Attempts are on the way to develop a 300mN high-thrust electric propulsion system towards more green sources for space trips. Aim is to lessen the use of chemical fuels in satellites that in turn will help the satellites to become lighter by saving on fuel weight. Amidst these challenges and aspirations, ISRO has been making a remarkable switch towards environmental-friendly rocket fuels by working on liquid oxygen-methane and similar green propellants. Engines powered by methane and liquid oxygen (MethaLOX in short) utilises a clean burning fuel that leaves no residue, as opposed to kerosene. Clean burning makes it certain that the engines can be re-used many times with negligible or almost no refurbishment. It is widely used in reusable rockets as methane. To accentuate, it is important to develop partially, fully reusable launch vehicles. ISRO looks to increase the payload numbers and development of even more powerful cum green engines and boosters so that payload can be increased.

Ref: https://www.theindianwire.com

#5

Foundational module of the new Chinese space station: Tianhe

Tianhe, the core module in China's new, next-generation space station, departed from Wenchang Spacecraft Launch Site in Hainan, China, on top of a Long March 5B rocket on April 28, 2021. It is approximately 55 feet long and weighs in at around 24 tons. The completion of Chinese space station is expected to be by the end of 2022. When completed, it will be a quarter of the size of the International Space station and contain three modules, with the ability to support three taikonauts (Chinese astronauts) for stays lasting up to six months. Tianhe will provide a living space and life support to taikonauts visiting the station. If the planning goes well, the station will become the twelth object humans have called home in orbit, since Russia's Salyut-1 in 1971. It will also become the only other operational space habitat outside of the International Space Station.

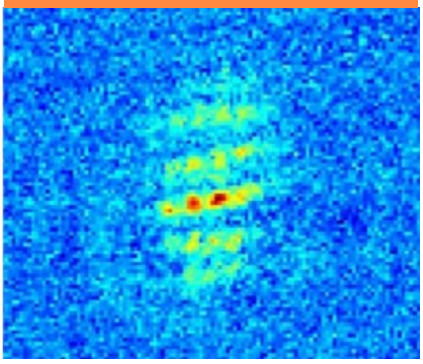
Ref: https://www.cnet.com

The core module of the Chinese Space Station is being built in low Earth orbit.

#6

Atom interferometry demonstrated first time in space

Scientists from Germany have successfully demonstrated atom interferometry in space onboard a sounding rocket. Atom interferometry is a technique generating atomic interference by spatial separation and subsequent superposition of atoms and it underlies most of the precision measurements using atom interferometers. It is possible to measure the gravitational field of the Earth or detect gravitational waves by using this technique. In the future, it is planned to investigate the feasibility of high-precision atom interferometry to test Einstein's equivalence principle.



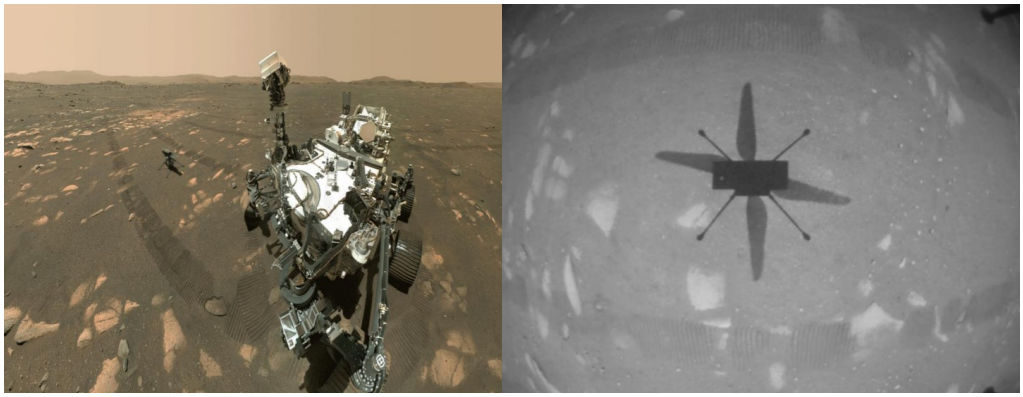
An example of an interference pattern produced by the atom interferometer. photo/©: Maike Lachmann, IQO

Ref: https://www.techexplorist.com

#7

Ingenuity helicopter flies successfully on Mars

NASA was successfully able to fly tiny Ingenuity helicopter on Mars on April 19, 2021 for approximately 40 seconds. Ingenuity climbed to a maximum altitude of 3 meters and maintained a stable hover for 30 seconds as indicated by the altimeter data relayed back to Earth via the Perseverance rover. The rover was able to take images and video of the flight. This is the first ever powered, controlled flight on another world. Ingenuity's downward facing navigation camera captured the lead image, showing the helicopter's shadow on the surface of Mars.

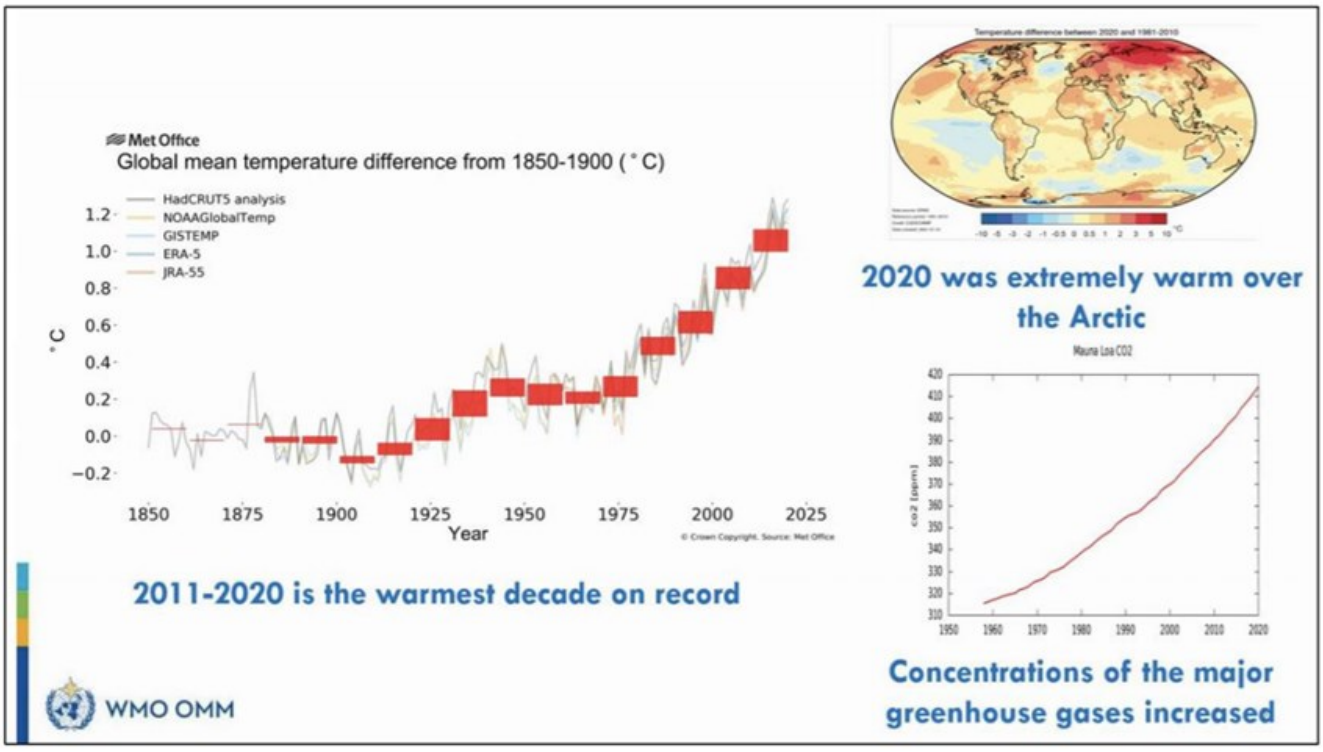


NASA's Perseverance Mars rover's selfie with the Ingenuity helicopter, seen here and image of the helicopter's shadow on Mars taken by Ingenuity's downward facing camera. (*Credit: NASA*)
Ref: https://www.universetoday.com

#8

World on the verge of climate 'abyss'

The year 2020 recorded as one of the three warmest years with global average temperature being 1.2 degree Celsius above pre-industrial level (as per the World Meteorological Organization's flagship State of the global Climate report). "We are on the verge of the abyss", Secretary-General António Guterres said at a press conference announcing the findings. Amongst its findings, the 2020 WMO report noted that concentrations of the major greenhouse gases continued to increase in 2019 and 2020. It also reported that the global average for carbon dioxide concentrations have already exceeded 410 parts per million (ppm), with a further warning that if the concentration follows the same pattern as in previous years, it could reach or exceed 414 ppm this year. In addition, record low Arctic sea-ice extent were observed in the months of July and October 2020, while the Greenland ice sheet lost approximately 152 gigatonnes of ice, between September 2019 and August 2020. The UN chief underscored that 2021, "must be the year for action", calling for a number of "concrete advances", before countries gather in Glasgow in November, for COP26 – the 26th session of Conference of the Parties (COP26) to the UN Framework Convention on Climate Change (UNFCCC).



State of the Global Climate in 2020 (Source: WMO)

#9

Nuclear energy for deep space missions

ISRO's journey of exploring remote and challenging environments sets the need for investing in the nuclear thermal propulsion (NTP). As ISRO's lead centre for design, development, fabrication, and testing of all Indian made satellites, UR Rao Satellite Centre (URSC), envisions using Radioisotope Thermoelectric Generator RTG for power generation and thermal management of ISRO's deep space missions. RTGs provide power by using thermocouples to convert

thermal energy generated by the natural decay of radioactive isotopes into 8 of moving parts in thermocouples reduces the chances of failure and wear out. Nuclear-propelled rockets are more fuel efficient and lighter than chemical rockets. Hence, they would travel further, are faster, and would shorten the trip time. Nuclear or radioactive energy can be employed both as an alternative to and as a complement of other sources of energy. RTGs are an unmatched alternative to solar power. Solar power is not an option for space objects meant to operate on the dark sides of planets where sunlight is obscured. ***Ref:*** https://ww.orfonline.org/

#10

Newly discovered bacteria on space station could help astronauts grow plants on Space

In a new study, researchers at NASA's Jet Propulsion Laboratory (JPL), the University of Southern California, Cornell University and the University of Hyderabad in India discovered and isolated strains of bacteria aboard the International Space Station. The scientists think it's possible that these bacteria could help plants grow in extreme environments like space. The bacterial strains found as part of this study all belong to the family Methylobacteriaceae, and they were spotted all over the space station during two consecutive flights. The team found four total strains, three of which ere previously undiscovered. (The previously discovered strain belongs to the genus Methylorubrum.) Methylobacterium species are often involved in important plant processes like nitrogen fixation, phosphate solubilization and abiotic stress tolerance. They're also known to promote plant growth and help protect against plant diseases, according to the statement. Because of their ties to plant health and growth, the team thinks that these bacterial strains could have "biotechnologically useful genetic determinants" that could be helpful in growing crops in space.

The Veggie experiment, which is used to grow lettuce on the International Space Station. In anew study, researchers have discovered new bacteria on the space station that they think could support future food growing efforts in space.
(Image credit: NASA 265B2821) . ***Ref:*** https://www.space.com/

#11

Mangalyaan expected to last for seven years: way to go

The planned life span of ISRO's Mangalyaan mission after its insertion into the Mars orbit on September 24, 2014 was 6 months and it was to complete on March 24, 2015. However, the MOM is still functioning and sending pictures. In a written response to a question in the Lok Sabha on India's second lunar mission, Jitendra Singh, the minister of state in the Prime Minister's Office, said Chandrayaan-2 was a highly complex mission to develop and demonstrate the key technologies for end-to-end lunar mission capability, including soft-landing and roving on the lunar surface. In August last year, Singh had announced that Chandrayaan-2 orbiter has captured the images of craters on the Moon. They were christened "Sarabhai crater" after Vikram Sarabhai, father of the Indian space programme. The Sarabhai Crater captured in 3D images shows that it has a depth of around 1.7 kilometres, taken from its raised rim, and the slope of crater walls is in between 25 to 35 degree. These findings will help space scientists to understand further the process on the lunar region filled with lava, Singh had said. The mission comprised an orbiter, lander and rover. Unfortunately, the lander crashed on the lunar surface along with the rover Pragyan. ISRO has identified the deficiencies of Chandrayaan-2 and has taken corrective measures for the next mission Chandrayan-3 which is set to be launch within first half of 2022.
Ref: https://www.livemint.com/; https://www.theindianwire.com

Chapter activities

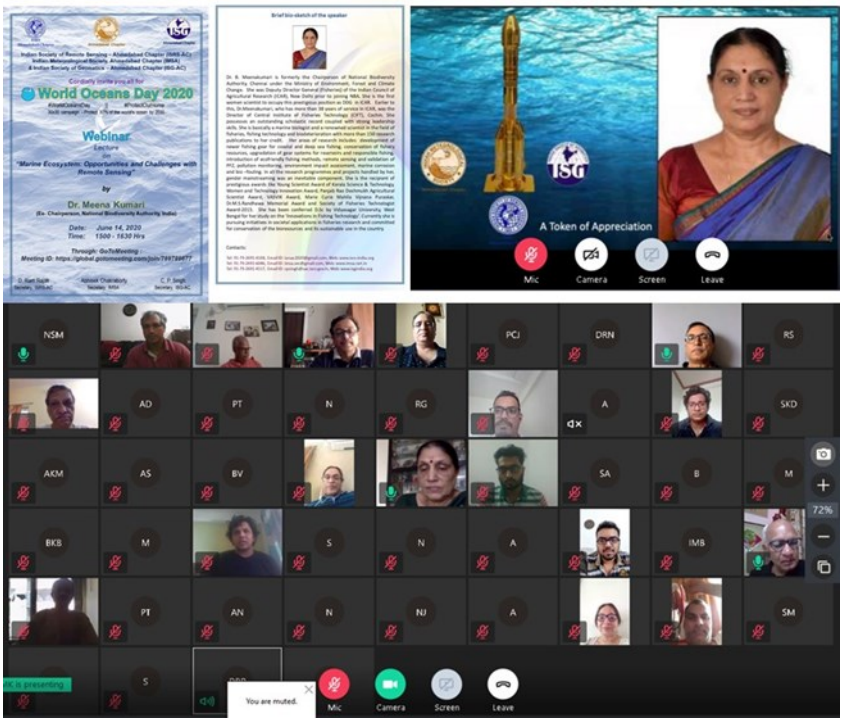
Ahmedabad Chapter

November 16, 2019:
GIS Day Celebration at CEPT University

The 20th International GIS Day was celebrated by ISG-AC and CEPT University. A total of 70 participants (research scholars, and alumni) from CEPT University actively attended and participated in various educational and interactive sessions, lectures, GIS games, geography, mapping, etc

June 14, 2020:
World Oceans Day-2020 Celebration (Online Lecture)

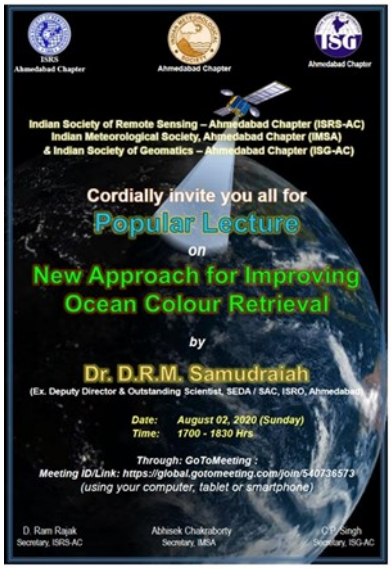
World Oceans Day-2020 (which falls on June 8th) was celebrated jointly with ISRS-AC & IMSA on June 14, 2020 at 15:00 hrs with an online popular lecture by **Dr. Meena Kumari**, Ex-Chairperson – National Biodiversity Authority, India on "Marine Ecosystem: Opportunities and Challenges with Remote Sensing" on this occasion. 66 members attended this event.



July 18, 2020:

Popular Lecture on "Do Forests Attract Rain?"

After the ISG-AC AGM a popular online lecture was organised on the topic "Do Forests Attract Rain?" **by Shri Rohit Pradhan**, Scientist, SAC, Ahmedabad, which was attended by 91 members.

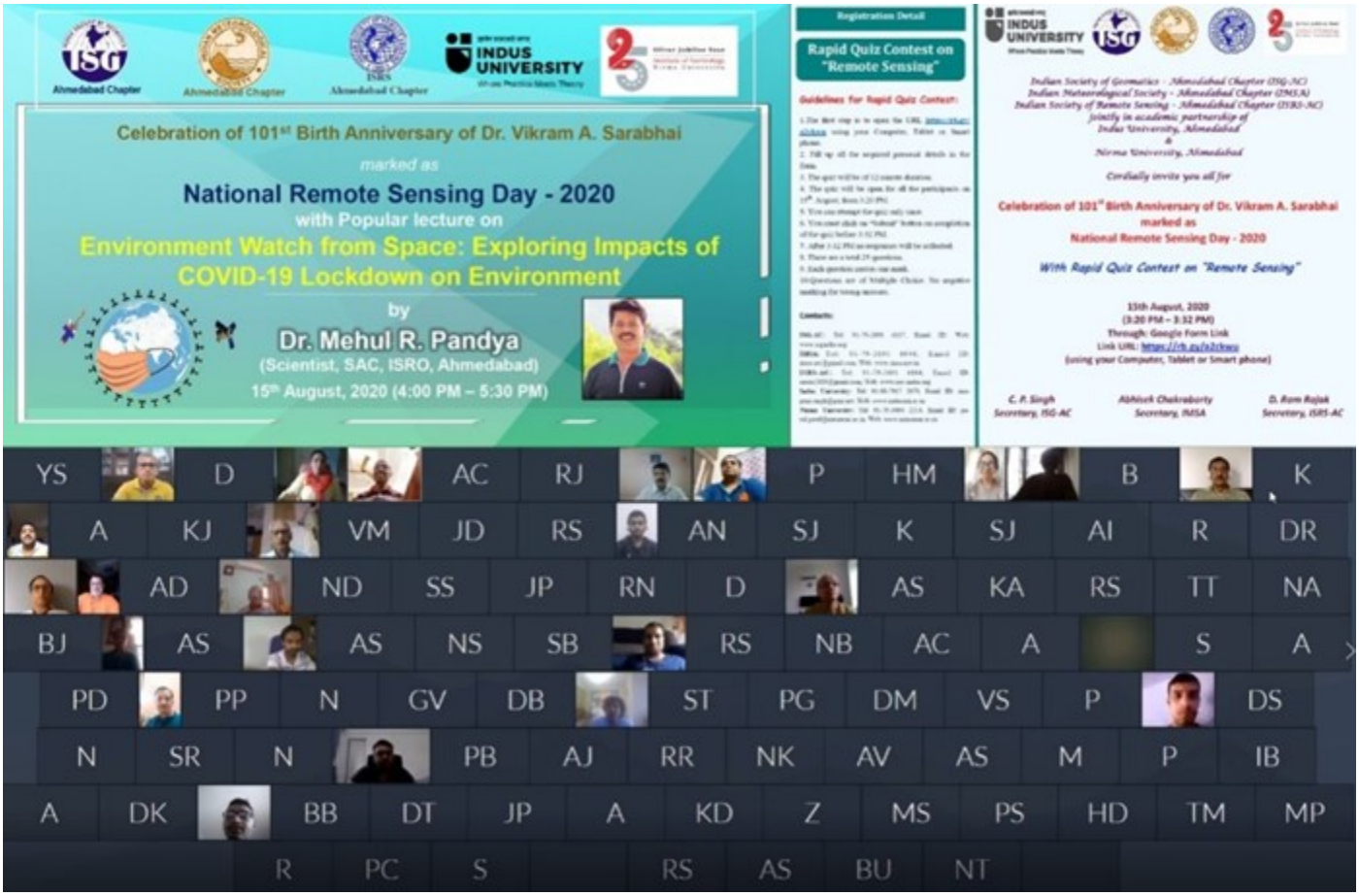


August 02, 2020: Online Lecture on "New Approach for Improving Ocean Colour Retrieval"

An online lecture was organised jointly by ISG-AC, ISRS-AC and IMSA for members on the topic "New Approach for Improving Ocean Colour Retrieval" by **Dr. D.R.M. Samudraiah**, Ex. Deputy Director & Outstanding Scientist, SEDA / SAC, ISRO, Ahmedabad at 17:00 hrs.76 members took the benefit.

August 15, 2020: NRS Day Celebration

National Remote Sensing Day 2020 (NRS Day), the 101st birth celebration of Dr Vikram A Sarabhai was jointly organised by Indian Society of Remote Sensing (ISRS-AC), Indian Society of Geomatics (ISG-AC), Indian Meteorological Society Ahmedabad (IMSA) in academic partnership of Indus University Ahmedabad and Nirma University on 15-Aug-2020 during 3:00 PM to 7:00PM. A popular lecture on "Environment watch from Space: Exploring Impacts of COVID-19 Lockdown on Environment" by **Dr Mehul Pandya** was organised which was attended by about 160 online participants.

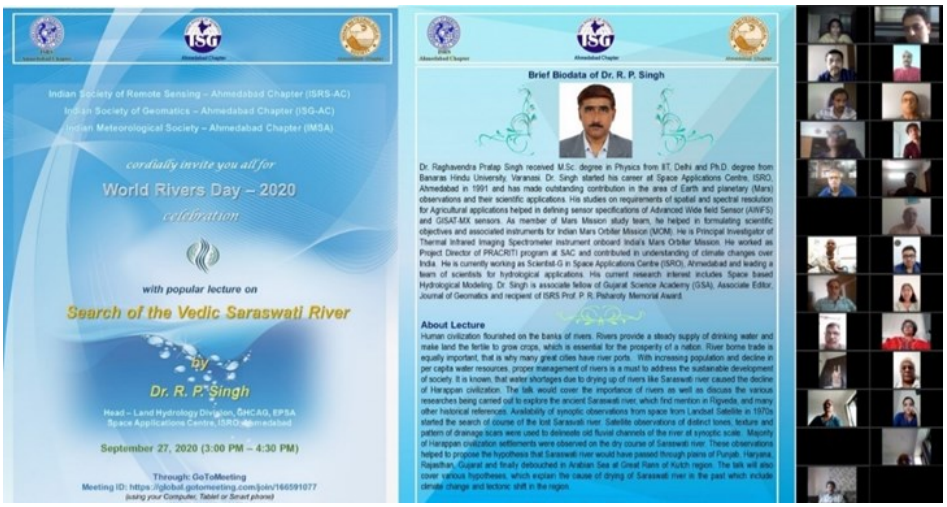


September 16, 2020: World Ozone Day Celebration

ISG-AC with IMSA and ISRS-AC jointly organised an online popular lecture on "Ozone layer and ozone pollution: Issues, challenges and future ahead" by **Dr. Manish Naja**, Chairman, Atmospheric Science Division, Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital, to celebrate World Ozone Day. There were 87 attendees.

September 19, 2020: National Webinar on Remote Sensing and GIS for Plant and Environmental Studies

ISG-AC with Botany Department, M.G. Science Institute, Ahmedabad and ISRS-AC jointly organised a National Webinar on Remote Sensing and GIS for Plant and Environmental Studies.Three eminent scientists from nationally renowned Organizations were invited to talk and interact with the participants. The key-note speaker was **Dr Prakash Chauhan**, Director, IIRS, Dehradun, who spoke on "Space Technology for Environmental Studies". This was followed by further Knowledge Sharing by **Dr. Shibendu Ray**, Director, MNCFC, New Delhi on, "Satellite Remote Sensing for Agricultural Applications" and **Dr. C. P. Singh**, Scientist-SF, SAC-ISRO, Ahmedabad on, "Geomatics for Ecosystem Management". There was a record registration of 842 participants from all across India. The event was telecast live on YouTube. An e-certificate of participation to students was distributed after the event.



September 27, 2020:
World Rivers Day Celebration

World Rivers Day was jointly organised by ISG-AC, ISRS-AC and IMSA at 15:00 hrs. with popular lecture on "Search of the Vedic Saraswati River" by **Dr. R. P. Singh**, Head – Land Hydrology Division, SAC, Ahmedabad. The lecture was delivered in Hindi and it was very much appreciated by all 105 the participants.

October 31, 2020:
Webinar on World Cities Day

ISG-AC and Center for Applied Geomatics, CRDF, & Faculty of Technology, CEPT University organised a webinar on "Urban Planning in India- Framework and challenges in Implementation" by **Shri R. Srinivas**, Town and Country Planner, Head, Metropolitan & Union Territories Division, Government of India during 31st October, 2020 between 4:00pm to 5:30pm to mark the World Cities Day.

November 18, 2020: GIS Day Celebration by ISG, ISRS, INCA and SGL

ISG main body, ISG-AC, ISRS-AC, INCA-GB and Scanpoint Geomatics Ltd. (SGL), Ahmedabad organised a webinar with 2 lectures: 1. "Education and career opportunities in the geospatial sector" by **Shri Shashikant Sharma** and 2. "Potential and directions of geospatial technologies in the context of Atmanirbhar Bharat and Make in India vision of our honourable Prime Minister" by **Shri Arup R Dasgupta** on GIS Day – 2020 (10:00 hrs - 12:00 hrs). A national level student's **map-making competition** was also organised which was first of its kind event where detailed standard operating procedure was laid out by ISG-AC, ISRS, INCA and SGL team. SGL received 520 registrations and students were sent link for downloading IGIS software. However, installation issues and dearth of technical knowhow on working with such specialised softwares for first time GIS users brought down the entries to 18. All these 18 entries were evaluated by 8 judges, and winners were declared and awarded with cash prize, certificate and IGIS license of one year.

November 28, 2020: GIS Day Celebration by CEPT University and ISG-AC

ISG-AC and CEPT University celebrated GIS Day with a popular lecture and student's events on November 28, 2020.The popular lecture on "GIS for Public Health: Covid and beyond" was delivered by **Dr. Udit Bhatia**, IIT – Gandhinagar. The lecture was very well received by the 66 participants.

December 01, 2020:
Antarctica Day Celebration

A popular lecture on "India in Antarctica" by **Dr. Rasik Ravindra**, former DDG, GSI and Former Director, NCPOR was organised jointly by ISG-AC, ISRS-AC and IMSA to mark the Antarctica Day, which is celebrated on 1st December to commemorate the anniversary of the Antarctic Treaty.

December 18-19, 2020: ISRS – ISG National Symposium

- The symposium was organized by Indian Society of Remote Sensing (ISRS) and Indian Society of Geomatics (ISG) through their local chapters at Ahmedabad, ISRS-AC & ISG-AC and was hosted by Space Applications Centre (SAC), ISRO, Ahmedabad. It was the 1st virtual National Symposium of ISRS-ISG. ISRS & ISG had constituted three committees to advise, steer and organise the symposium. The symposium was announced by Secretary, ISRS through email and website on Sep 27, 2020. The National Advisory Committee (NAC) was chaired by Chairman, ISRO and Symposium Steering Committee (SSC) was chaired by Director, SAC with Alternate Chairman as President, ISRS. Chairman of ISRS-AC and President of ISG were the Chair and Alternate Chair of the Symposium Organising Committee (SOC). For smoothly organise all elements of the symposium, SOC had constituted 7 sub-committees. Website development, delegates registration, information dissemination, abstract and presentation submission, online platform operation etc. were handled by an Event Manager, MM Activ. The First circular was released on Oct 20, 2020 through emails and websites.
- On December 18, 2020, the Symposium was inaugurated online by Honourable Secretary, DOS & Chairman, ISRO, Dr. K. Sivan in the august presence of Dr. K. Radhakrishnan, former Chairman, ISRO & Secretary, DOS who was the Guest of Honour of the inaugural function.
- The event was attended online by more than 300 authors from various parts of the country in 22 technical sessions. The delegates participation included students, researchers, scientists, academicians along professionals mostly from RS & GIS fields. The virtual exhibition had participation from organisations from both public and private sectors. Two prestigious lectures, Vikram Sarabhai Memorial Lecture and ISG Millennium Lecture were delivered during the symposium by eminent personalities. ISRS Awards and ISG Awards were presented during the annual convention of the societies. ISRS Annual General Body Meeting and ISG Annual General Body Meeting were also conducted. An online cultural program designed and executed by SAC colleagues was a delight to watch. Best symposium presentation awards were announced during Valedictory Session.
- In technical sessions, a total of 270 extended abstracts were submitted, out of which 241 were selected by the expert of the subject for the presentation during the symposium. These selected papers were divided into 180 Oral presentations and 61 (32+29) Poster presentations. The presentations were arranged in 22 parallel sessions (20 Oral and 2 Poster sessions). The range of presentations in oral session varied from 8 to 11 presentations.

- Major themes of sessions were: Space Based Observations for Environment Monitoring, Monitoring Environmental Changes due to COVID-19, Extreme Environmental Conditions and Climate Change, Atmospheric Trace gases and Aerosols, Climate Change Indicators, Impact and Assessment, Current and Future Satellite Missions for Environment Watch, Early Signals of Climate Change and Mitigation Measures, Cryosphere Processes and Climate Change, Desertification, Land degradation and Droughts, Disaster Management and Weather Forecasting, Land-Ocean-Atmosphere Interaction: Science & Applications, Sensor Technologies and Data Processing (UAV, LiDAR, SAR, Hyper-spectral etc.), Big Data Analytics, Data Mining and Advanced Algorithms, Agriculture, Water and Other Natural Resources Management, Forestry, Environment and Ecosystem Management, Entrepreneurship development in the Field of Earth Observation: Technology & Applications, Astronomical and Planetary Remote Sensing, GNSS systems and applications. Symposium also included Lead Talks by eminent scientists on various topics of Environment, Water, Agriculture, Meteorology, Planetary Science, Hyperspectral Applications, Geoinformatics, Climate Change and Advances in Sensors.

February 28, 2021:

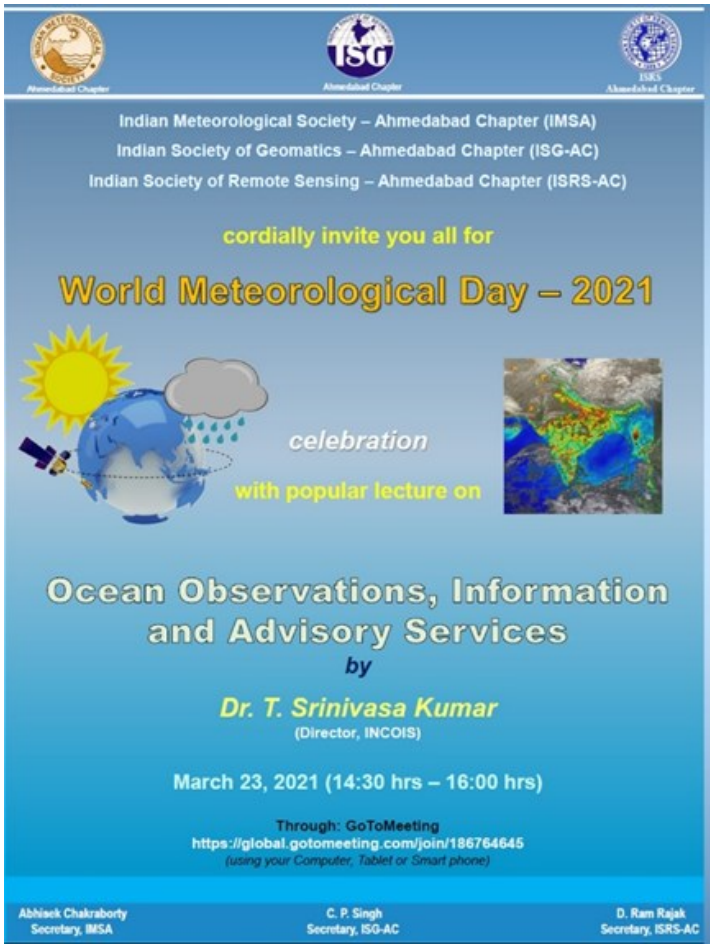
National Science Day Celebration

ISG-AC, ISRS-AC, IMSA, SAC and GujCOST celebrated national Science Day jointly on February 28, 2021 with a with popular lecture on "Raman Scattering: Its usefulness in Science and Society" which was delivered by Dr. Som Kumar Sharma (Associate Professor, PRL). It was attended by more than 50 members and looking at the large turnout of students (more than 300) invited by GujCOST and SAC through VSSE, we webcasted the event through YouTube channel of ISG-AC as well.

March 23, 2021: World Meteorological Day Celebration

ISG-AC, ISRS-AC and IMSA joined hands to celebrate World Meteorological Day – 2021 with a popular lecture on "Ocean Observations, Information and Advisory Services" by Dr. T. Srinivasa Kumar, Director, INCOIS through online platform.

Members of all three societies very well received this lecture and around 80 members participated in this lecture. The Q&A session was very lively. Dr Abhisek Chakraborty, Secretary IMSA coordinated this program Dr CP Singh, handled the Q&A session. The winter issue of e-Megha (IMSA Newsletter) was also released during this event.



Pune Chapter

September 16-18, 2020: Webinar talks:

Nine online talks were organised which include, 'Hydro-climatic Extremes and Geospatial Technology' by Dr. A. K. Sahai, 'Early warning systems and spatial intelligence for integrated forest fire management' by Dr. Chadi Abdallah, 'Geospatial Technology: Trend & Transformation' by Nikhil Kumar, 'Location Driven Smart Services for Telecom and Utility Operations' by Ravi Achalla, 'Cloud security importance during Covid Situation' by Mr. Sameer Gupte, 'Wire to Wire: The Journey of Building an AI for Geospatial Analytics startup' by Mr. Rajath, 'g Governance - A Way Forward' by Shri Sandeep Shrivastava, 'Geospatial Technology for Environmental Planning & E-Governance' by Prof. R. B. Singh and 'Roles of Spatial Intelligence in E-Governance of Maharashtra State' by Dr. Sanjay Patil.

Jaipur Chapter

29 Sep– 07 December 2020: Workshop

Three-Month long Workshop on "Fundamentals of Remote Sensing and GIS" was organized by Jaipur Chapter.

Ludhiana Chapter

June 5, 2020: World Environment Day:

Various online competitions were organized to mark the world environment day, such as Slogan writing, Poster making and Essay writing.

November 18, 2020 - International GIS day
International GIS day was organized in association with ISG and ISRS.

December 5, 2020: World Soil Day

World soil day was organised in association with ICAR-NAHEP-CAAST, School of Natural Resources Management, Punjab Agricultural University, Ludhiana and Indian Society of Soil Science. On the ocassion two popular lectures by eminent scientists were arranged and online poster making competetion was also organised.

Upcoming events 2021

International Geoscience and Remote sensing symposium 2021 (IGARSS 2021)
https://igarss2021.com

12-14 Jul (Physical)
12-16 Jul (Virtual)

5-6 Aug

International conference on range technology (ICORT 21)
https://www.drdo.gov.in/icort-21

International Conference on Remote sensing and applications (ICRSA 2021)
https://waset.org/remote-sensing-and-applications-conference-in-august-2021-in-kuala-lumpur

23-24 Aug
Hybrid event

13-16 Sept
In-person event

SPIE Remote sensing 2021
https://spie.org/conferences-and-exhibitions/remote-sensing?SSO=1

The 16th 3D Geoinfo conference 2021 (3dgeoinfo 2021)
https://3dgeoinfo2021.github.io

11-14 Oct
Virtual event

6-10 Dec
Virtual event

India Geoscience and Remote sensing symposium 2021 (InGARSS 2021)
https://www.ingarss2021.com

From ISG Secretariat

ISG NEW LIFE MEMBERS

Member-ship No	Name	
ISG-L-2157	Dr.	Indrani Chaudhury Singh
ISG-L-2158	Mr.	Tushar Arunkumar Bose
ISG-L-2159	Dr.	Bipasha Paul Shukla
ISG-L-2160	Mr.	Vibhuti Bhushan Jha
ISG-L-2161	Dr.	V. Sathiyamoorthy
ISG-L-2162	Dr.	Alok Kumar Mathur
ISG-L-2163	Dr.	Rojalin Tripathi
ISG-L-2164	Mrs.	Shivani Shah
ISG-L-2165	Mr.	Abhinav Srivastava
ISG-L-2166	Dr.	Atul Kumar Varma
ISG-L-2167	Dr.	H Ramamohan
ISG-L-2168	Dr.	Subrat Sharma
ISG-L-2169	Mr.	Y Uma Maheswara Rao
ISG-L-2170	Dr.	Saswat Bandyopadhyay
ISG-L-2171	Mr.	Indranil Misra
ISG-L-2172	Mr.	Tushar Shukla
ISG-L-2173	Mrs.	D. Krishnaveni
ISG-L-2174	Dr.	M. Geetha Priya
ISG-L-2175	Ms.	Nagajothi Venkatesan
ISG-L-2176	Ms.	M. Gomathi
ISG-L-2177	Mr.	Ashim Sattar
ISG-L-2178	Dr.	C. Shaji
ISG-L-2179	Dr.	Abhishek Kumar Rai
ISG-L-2180	Mr.	Gopi Krishna Kasyap Vattipalli
ISG-L-2181	Dr.	Sanyasinaidu Dadi
ISG-L-2182	Mr.	Parmit Chhasiya
ISG-L-2183	Dr.	U. Surendran
ISG-L-2184	Mrs.	Krishna Mukhopadhyay
ISG-L-2185	Mr.	Rabindranath Nanda
ISG-L-2186	Mr.	B. Naresh Kumar
ISG-L-2187	Dr.	N. Shenbagaraj
ISG-L-2188	Mr.	J Leo Stalin
ISG-L-2189	Mr.	Naresh Kumar M
ISG-L-2190	Mr.	Vikram M K
ISG-L-2191	Dr.	Arup Borgohain
ISG-L-2192	Mr.	Chirag Gupta
ISG-L-2193	Mr.	Chandan Goswami
ISG-L-2194	Mr.	Puyam S Singh
ISG-L-2195	Dr.	Kasturi Chakraborty
ISG-L-2196	Mr.	B. K Ramesh
ISG-L-2197	Dr.	Jaishree Tailor
ISG-L-2198	Ms.	J Renuka
ISG-L-2199	Dr.	Divya Priya Balasubramani
ISG-L-2200	Mr.	Lalit Bhalotia
ISG-L-2201	Dr.	Anandita Sengupta
ISG-L-2202	Mr.	Bhaskar Kannoju
ISG-L-2203	Mrs.	Kusum Lata
ISG-L-2204	Dr.	Harsimran Kaur
ISG-L-2205	Ms.	Kawaldeep Kaur
ISG-L-2206	Mr.	Mayank Mishra
ISG-L-2207	Mr.	Sukhdeep Kumar
ISG-L-2208	Mr.	Prabha Kumari
ISG-L-2209	Dr.	Sudhakar Reddy Chintala
ISG-L-2210	Dr.	Lakshmi Srikanth
ISG-L-2211	Dr.	R D Deshpande
ISG-L-2212	Mrs.	Neeraj Chahar
ISG-L-2213	Ms.	Kavita Vaijanath Mitkari
ISG-L-2214	Ms.	Lopamudra Kanungo
ISG-L-2215	Mr.	Hari Rajan S
ISG-L-2216	Dr.	Varinder Saini
ISG-L-2217	Mr.	Nilay Nishant
ISG-L-2218	Mr.	Arunkumar Yadav
ISG-L-2219	Mr.	Nitin Kumar Pande
ISG-L-2220	Mr.	Nilesh M Desai
ISG-L-2221	Mr.	Sunni Kanta Prasad Kushwaha
ISG-L-2222	Dr.	Hema H C
ISG-L-2223	Dr.	Rudradeb Bhattacharya
ISG-L-2224	Dr.	Sushma Bisht
ISG-L-2225	Mr.	Karthik Nagarajan
ISG-L-2226	Dr.	Gopal Sharma
ISG-L-2227	Dr.	Ashwani Kumar Aggarwal
ISG-L-2228	Mr.	Tapas Kumar Nahak
ISG-L-2229	Mr.	Gautam Borah
ISG-L-2230	Mr.	Anjan Debnath
ISG-L-2231	Dr.	Som Kumar Sharma
ISG-L-2232	Dr.	Prashant Persai
ISG-L-2233	Dr.	Navneet Munoth
ISG-L-2234	Mrs.	Arunima Mahapatra
ISG-L-2235	Dr.	Saikat Kumar Paul
ISG-L-2236	Mr.	Rohit Kumar
ISG-L-2237	Mr.	Praveen Kumar Singh
ISG-L-2238	Mr.	Pir Mohammad
ISG-L-2239	Dr.	Ravi Kumar Kandula
ISG-L-2240	Mr.	Naveen
ISG-L-2241	Dr.	C. Gajendran
ISG-L-2242	Mr.	Utkarsh
ISG-L-2243	Ms.	J Revathi
ISG-L-2244	Mr	Sujith J
ISG-L-2245	Ms	Bhagyamma. S
ISG-L-2246	Mr	Sanjay Shekar N. C.
ISG-L-2247	Mr	LtCol. Rohit Malhotra
ISG-L-2248	Dr	Dileep Kumar Gupta
ISG-L-2249	Mr	Pradeep Balan
ISG-L-2250	Dr	Sandeep Pattnaik
ISG-L-2251	Dr	Ratnakar Swain
ISG-L-2252	Mr	T. Varatharajaperumal
ISG-L-2253	Dr	Sandeep Gupta
ISG-L-2254	Mr	Deepankur Singh
ISG-L-2255	Mr	Amanjot Singh
ISG-L-2256	Ms	Anwesha Majumdar
ISG-L-2257	Mr	Amritpal Digra
ISG-L-2258	Dr	Bharat Bhushan Vashisht
ISG-L-2259	Ms	Saloni Deshpande
ISG-L-2260	Mr	Piyush Kumar Shukla
ISG-L-2261	Dr	Saif Said
ISG-L-2262	Mr	Anugrah Anilkumar Nagaich
ISG-L-2263	Mrs	Tanushri Jaiswal
ISG-L-2264	Dr	A D Prasad
ISG-L-2265	Dr	Dharmaveer Singh

Total New Life-Members: 73

ISG awardees

Year 2019	1.1	**Shri Vinod Mahadeorao Bothale** National Geomatics Award for Excellence	
	1. 2	**Dr. Sameer Saran** National Geomatics Award for Excellence	
	2	**Dr Dibyajyoti Chutia** National Geomatics Awards – Technology	
	3	**Dr. Gudikandhula Narasimha Rao** Prof. Kakani Nageswara Rao Young Achiever Award	
	4	**Mr. KLN Sastry** President's Appreciation Medal for Contribution to the ISG Society	
	5	**ISG Ahmedabad Chapter** ISG Chapter Award for Best Performance	

Year 2020	1	**Dr A S Rajawat** ISG Fellow Award	
	2	**Dr Shakil Romshoo** ISG Fellow Award	
	3	**Dr Ajai** National Geomatics Award for Excellence	
	4	**Dr Prasun Kumar Gupta** Prof. Kakani Nageswara Rao Young Achiever Award	
	5	**Ms Darshana Rawal** President's Appreciation Medal for Contribution to the ISG Society	
	6	**ISG Shillong Chapter** ISG Chapter Award for Best Performance	

Indian Society of Geomatics

To,
The Secretary, Indian Society of Geomatics
6202, Space Applications Centre (ISRO)
AHMEDABAD – 380 058. INDIA

Sir,

I want to become Life Member/ Sustaining Member/ Patron Member of the Indian Society of Geomatics, Ahmedabad. Membership fee of Rs. _____ is being sent to you by Online/ Cash/ DD/ Cheque. (DD/ Cheque/ Transaction No._____ dated_____drawn on Bank _____). I **agree to abide by the Constitution of the Society.**

Date:

Place: **Signature**

- Name: Mr/Ms/Mrs/Dr_____
- Address: _____

_____PIN: _____

Phone: _____ Mobile: _____Email: _____

- Date of Birth _____
- Qualifications_____

- Specialisation: _____
- Designation: _____ Organisation. _____
- Membership in other Societies: _____
- Mailing Address: _____

_____PIN: _____

Proposed by:
(Member's Name and No)
Signature of Proposer

For Office Use: A/P/L Member No.		Receipt No.		Date:	

Indian Society of Geomatics (ISG), Room No. 6202 Space Applications Centre (ISRO), Ahmedabad-380058, Gujarat. Url: www.isgindia.org Phone: +91-79 26916202 / 4335
Email: secretary@isgindia.org or sasharma@sac.isro.gov.in Fax +91-79-26916287

Membership Fees

S.No.	Membership	Life/Patron Membership fees		Annual Subscription
	Category	₹ Indian	**US $** Foreign	₹ Indian
1.	Life Member a) Admitted below 45 years of age	2500	250	
	b) Admitted after 45 years of age	2000	200	
2.	Sustaining Member	---	---	2000
3.	Patron Member	50000	3000	---

MEMBERSHIP GUIDELINES

- Online payment to be made to ISG account and transaction number to be mentioned in the form.
  Bank: State Bank of India. **Branch**: Jodhpur Tekra, Ahmedabad
  IFS Code: SBIN0003967 **Account No**:10327867093
- Financial year of the Society is from April 1 to March 31.
- Subscription through DD / Cheque can also be made in the name of 'Indian Society of Geomatics' and payable at Ahmedabad.
- Scanned copy of the filled and signed form may be sent by email
- Any life member of the Society can countersign application as proposer.
- For further details, contact Secretary, Indian Society of Geomatics.
- ISG has chapters already established at the following places. Ahmedabad, Ajmer, Bhagalpur, Bhopal, Chennai, Dehradun, Delhi, Hissar, Hyderabad, Jaipur, Ludhiana, Mangalore, Mumbai, Mysore, Pondicherry, Pune, Shillong, Trichi, Srinagar, Vadodara, Vallabh Vidya Nagar, Visakhapatnam and Trivandrum. Applicants for membership have the option to contact Secretary/Chairman of the local chapter for enrolment. Details can be found at the website of the Society: **www.isgindia.org**.
- Journal of the Society will be sent to Life Members by softcopy only.

Indian Society of Geomatics (ISG), Room No. 6202 Space Applications Centre (ISRO), Ahmedabad-380058, Gujarat. Url: www.isgindia.org Phone: +91-79 26916202 / 4335
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