Editorial

As detailed earlier this is the last editorial from us. During the last three years we have tried to enhance the quality of the journal. We succeeded to an extent. We once again reiterate that this is an approved SCI journal with CSIR accredited NISCAIR IF of 0.133 as on Jan, 2013.We are extremely happy to bring to the notice of all it has an impact Factor of 0.225 , as per NISCAIR certificate dated 20th Jan, 2014. As such let there be no inhibition in communicating your research articles to this journal. We are trying to make it SCOPUS accredited international journal. Some efforts need to be made in achieving this. Those who have significant experience in administering scientific journals` publication may kindly come forward and lend your support in enhancing its quality and visibility. While leaving the platform to others we earnestly wish the journal to flourish. We are confident that the incoming editorial team would take it to higher pedestal. We request the earth system scientific community, all the members and Fellows of IGU and well wishers of IGU to extend full support to the incoming team.

50th Annual Convention of IGU

We are happy the 50th Annual Convention of IGU was successfully organized jointly by IGU and CSIR-NGRI at CSIR-NGRI, Hyderabad during 8-12 January, 2014. A write up is included in this issue. On behalf of IGU we extend our thanks to all those responsible for the success.

Geophysics- A Science that helps the society

As third and last part of editorial on "Geophysics", an effort is made to bring in to light significant recent developments in Geophysics; subject and theme wise. We, however, draw the attention of the readers, a comprehensive exposition of various recent developments has not been attempted, due to various limitations, and as such the readers may kindly make use of the details basically to have a broad over view of the subject under discussion. We wish to state the series was started basically to infuse confidence in all those associated with education and research in Geophysics. Let us not be of the opinion the future of Geophysics is in limbo, as meritorious young are not showing interest in pursuing higher education in Geophysics. All of us, both young and senior need to co-operate with each other to propagate the importance of earth system sciences including Geophysics. For that we need to first orient ourselves in getting educated about various facets of these valuable and important branches of science. We request one and all to spend at least 10% of their time in going through basics of these sciences to make use of significant developments to address specific problems of interest to our village, city, state and the country. Once we keep that as our goal we can confidently motivate others to adopt these sciences in furthering their own career and addressing societal issues.

Geophysics as a Knowledge Base:

Science should be the driving force in building a sustainable world and not in destroying it. Recent trends in earth system sciences clearly show that scientific and technological developments are aimed at in one hand in exploiting natural resources and thereby degrading the environment and in the other hand scientists are striving to save our Earth from natural and man-made vulnerabilities. We are puzzled many a time at the rate the technological innovations and scientific pursuits are growing. We get drunk from the ideas, but to achieve long lasting development we need to find what is realistic. To enhance the quality of any scientific study, it is essential to upgrade the data acquisition and processing modules. As earth being a non-linear entity and earth processes are both intriguing and intricate, many a time in spite of using state of the art technology we fail to get needed results. This reality is known to only those who have in-depth knowledge of the data collecting and processing gadgets and techniques.

Upgradation can be branched into two categories: one - subject oriented and two - problem oriented. The basic objective of any study is to get near realistic models that have limited error bounds. Such a development is possible if one uses appropriate gadgets and using them optimally, knowing fully the efficiencies and limitations associated with the gadgets. In studies associated with solid earth geophysics we make use of seismic, gravity, magnetic, electro-magnetic, resistivity, magneto-telluric and other techniques. Considerable development is witnessed in 2 to 3 decades, using data generated in space and time. In this presentation an effort is made to bring into focus some of the recent developments that have helped in acquiring quality data and appropriate processing techniques in getting models that can explain the importance of every input parameter and the output synthesis model. Geophysics encompasses all the major segments of earth system: Solid Earth, Ocean and Atmosphere. It has been used significantly in imaging sub-surface structures covering crust-lithosphere-mantle and core, developing super continental models and understanding the role of mantle plumes, modeling ionosphere and troposphere dynamics, demarcating depth extension of continental margins-continental slope-deep ocean basins, understanding the mechanism of collision/ thrust and subduction related earthquake activity, exploring oil and mineral reserves, demarcating land use and land degradation details, addressing natural hazards, explaining earth system processes and their inter-linkage, monitoring coastal dynamics, developing building codes, sequestering carbon, strengthening irrigation practices, constructing groundwater recharging and surface water storing structures and many more utilities that are aimed to enhance the quality of life(*Reddy, P.R., – Proc. of NTCE, 5-6 Feb 2013, pp 1-9; Vasavi College of Engg., Hyderabad*). Covering all these topics, as a part of Editorial is not possible. As such we are confining to some specifics. We believe that these details would be of use to the researchers, especially the young. Kindly note we scanned through a vast literature and selected some important details in structuring the present and the previous two editorials on Geophysics. We owe a lot to all the experts whose studies/ experiences helped us to structure these editorials.

Geophysics in meeting Energy Needs:

Geophysics is playing an ever increasing and important role in addressing global energy challenges. Novel techniques are required in the hydrocarbon industry to maximize conventional reserves as well as exploit unconventional reserves. Furthermore, as society and governments strive toward low carbon future commitments, new techniques require development and current techniques require adaptation to exploit renewable resources as well as store anthropogenic carbon dioxide and nuclear waste. As such it is essential to properly understand the role of geophysics in both the efficient and sustainable use of the Earth's resources.

To address the role of geophysics in future energy challenges one has to identify and explore the challenges in

i. Hydrocarbon resources, such as conventional oil and gas, and unconventional (e.g., shale-gas, coal-bed methane and gas hydrates),

ii. Renewable resources, such as geothermal exploitation and geotechnical aspects of wind energy, and

iii. Waste storage (e.g., geological storage of CO_2 and nuclear waste storage).

However, due to paucity of space we confine to the first topic, as fossil fuel usage continues and may not be replaced by other energy sources in the next 25 years.

Role of Geophysics in Oil & Gas Industry:

Every earth scientist is fully aware that geology and geophysics are very important in locating sub surface structures that contain Oil & gas. However, many of us are not exposed to many recent developments in exploring and exploiting O& G. The technological development is phenomenal. We give below an over view of some important developments in the oil industry.

Professionals and researchers individually and as a group have made significant strides in exploring and exploiting O& G resources. They have selected various themes to address area specific issues. Permeating through these themes and sub-themes is the development of novel techniques, exploiting new and challenging resources, and advancing multi-disciplinary approaches. These different disciplines are to be brought together to exchange ideas and learn from each other. "Advances in geophysics' aid reservoir description. Such a description is possible by using 4-D seismic technique. So far, the main purpose of 4-D surveys seems to have become to help locate in-fill wells, that is, reducing the risk of drilling these 'exploratory' wells (and following the time-honoured notion that the best place to discover oil is inside an oil field!). For effective 4-D modeling, seismic experts need to install seismic monitoring devises. Permanently installed seismic monitoring seems like a great idea but, the truth is that with current technologies installation of permanent 'kit' is very expensive, and practical folk like production engineers have concerns about both the reliability of the installed equipment and the disruption that might be caused by its installation. If one has to understand the dynamics of a sedimentary basin or an oil reservoir, to ensure better success both in locating reserves and economically exploiting those reserves, without damaging the reservoir or the environment one has to have either permanent monitoring devises or temporary arrangements. However, installation can be useful only when we know in detail structural and stratigraphic details of a basin in general and a sub basin/ reservoir in particular. This information can be obtained through on line monitoring of drilling, well building/development etc. All these operations are part of developmental Geology and Geophysics.

Role of Geophysics in Reservoir Development

Geophysics can provide vital information to maximize production from a reservoir of oil and gas, provided apt methodology is used. Even though type of technique used is more or less similar the environment being different, needs a different outlook in imaging sub surface structures. Many of us are not familiar with the term development geophysics. Since this term conveys a specific meaning we have decided to include the following details, as useful input to the topic under discussion.

What is the reason for the difference between exploration and development geophysics? Why are the quantitative measurements using seismic data common in development geophysics, but that level of detail is not available when using seismic data for exploration? The difference is that in development geophysics one works with calibrated seismic data, whereas in exploration, seismic data are not calibrated. Calibration uses well log data with very good vertical resolving power to determine the image of the lower resolution seismic data. With the vertically-calibrated seismic data a seismic interpreter can move away from the well location where the calibration was performed to unknown areas, to locate new reserves and to take apt measures to properly exploit the oil and gas.

The concept of petroleum reservoir geophysics is relatively of recent times. In the past, the role of geophysics was largely confined to exploration and, to a lesser degree, the development of discoveries. As cost-efficiency has taken over as a driving force in the economics of the oil and gas industry and as major assets near abandonment, geophysics has increasingly been recognized as a tool for improving the bottom line closer to the wellhead. The reliability of geophysical surveys, particularly seismic, has greatly reduced the risk associated with drilling wells in existing fields. The ability to add geophysical constraints to statistical models has provided a mechanism for directly delivering geophysical results to the reservoir engineer.

As geophysical techniques have matured over the years, they have provided an increasingly fine level of detail and are now used almost routinely for many purposes related to reservoir production. The most widely used technique, just as in exploration, is reflection seismics, where it is almost exclusively 3-D. Emerging techniques, having successfully proven their capabilities but in various stages of commercial availability, including cross-well, forward and reverse VSP, single-well imaging, and passive seismic monitoring (gravity, electromagnetic, and other techniques are described elsewhere in this issue). The distinct advantage provided to reservoir geophysics over exploration geophysics lies in the quantity and quality of existing data on the reservoir target, enabling surveys to be focused on specific targets and allowing calibration (necessary in order to have confidence in the results, as well as to improve imaging) of the geophysical observations to the formation. As geophysical techniques become more familiar to the engineer, and as engineering practices become more familiar to the geophysicist, continuing and increased use of reservoir geophysical techniques can be expected. (*excerpts from W.D.Pennington article in Geophysics-2001, V.66, No.1, pp-25-30)*

4-D Seismic monitoring method:

As detailed above monitoring of reservoir dynamics is crucial for successful production operations.4-D or Time lapse 3-D is the link between seismic observables and reservoir variables such as fluids, pressure or temperatures through time. The properties that potentially altered include: pore pressure; reservoir pore fluids; temperature; reservoir medium properties; micro earthquakes and induced fractures; reservoir rock properties. To monitor these factors some seismic observables are to be analyzed and related with the changes within the reservoir during specific time. The observables include times on surface seismic data; amplitudes; anisotropy measurements; frequency and phase changes. Once these are monitored several production maps are constructed for each year to determine production trends that could help to determine the behavior of the fluids in the reservoir during the time lapse period. The maps constructed involve total oil, gas and water production, as well as water cut, water injection and surface tubing injection pressure map.

In nutshell, Multicomponent time-lapse (4-D) seismology enables more accurate determinations of rock/fluid property characteristics, their geometry, and changes over time. Multicomponent 4-D seismology involves repeated or time-lapse acquisition of seismic data in three orientations at each receiver location: two orthogonal and one vertical. The horizontal components of source and receiver displacements enable the recording of shear (S) waves, which are a powerful complement to P-waves. When three components or source are used, nine times the data of a conventional (P) wave 3-D are recorded, thanks to advancements in today's acquisition and processing systems. It is clearly established that the cost effectiveness and power of multicomponent 4-D will increase as new systems are developed. These techniques are routinely used now to understand reservoir dynamics. Multicomponent 4-D will increase the fidelity of seismic data to determine rock/fluid properties and their changes in the subsurface. Seismic wave propagation characteristics determined from multicomponent 4-D, including traveltime, anisotropy and attenuation, are critical to the dynamic characterization of petroleum reservoirs(*excerpts from M.S Thesis of Catalina Acuna, Colorado School of Mines, Golden, USA—2000*).

Enhanced Oil Recovery (EOR):

Crude oil development and production in oil reservoirs can include up to three distinct phases: primary, secondary, and tertiary (or enhanced) recovery. During primary recovery, the natural pressure of the reservoir or gravity drive oil into the well-bore, combined with artificial lift techniques (such as pumps) which bring the oil to the surface. But only about 10 percent of a reservoir's original oil in place is typically produced during primary recovery. Secondary recovery techniques extend a field's productive life generally by injecting water or gas to displace oil and drive it to a production well-bore, resulting in the recovery of 20 to 40 percent of the original oil in place. Till the end of last century in India oil recovery on an average hovered around 21 to 23%, as compared to global average of 40%.Since then efforts have been made to enhance oil recovery. Low drilling recovery rates are a major part of the oil supply problem for India. Historically, recovery rates have averaged only around 28% in currently producing Indian oilfields, well below the world average. It is hoped that allowing foreign investment will bring in technology that is not available to Indian state firms, thereby increasing overall recovery rates. ONGC currently is undertaking a project to increase recovery rates in the Bombay High offshore field and several others as well, aiming to boost the overall recovery rate for its production assets from 28% to 40%.

The global average recovery factor for a typical oilfield is approximately 40 to 45%. This results in a large amount of identified oil left behind despite an existing production infrastructure. The need to improve the recovery factor and the accelerating of the associated production is the main driver behind the many EOR schemes in practice around the world. The challenge to EOR lies in the complex interaction of injected agents with the existing reservoir fluids in an ever-changing down-hole environment. Many of these challenges are well known from the development of the field. The difficulty is ensuring the proper chemical interaction and subsequent flow conformance of the EOR sweep front to recover more oil, more quickly. Making the right parametric decisions regarding a chosen EOR technique, while evaluating dynamic economic conditions, compounds these complex challenges.

To ensure successful long-term recovery, engineers and geoscientists use earth models, numerical simulators, pilot studies, and sophisticated monitoring tools to make the best decisions. A dynamic reservoir model, using the full-field model built from the initial development plan, is constantly updated with the latest monitoring data acquired from surface seismic, single well logs, and inter-well data. It is the application of this collective knowledge of accurate reservoir data coupled with detailed production history that leads to the best decisions for these complex EOR problems. Most of the current world oil production comes from mature fields. Increasing oil recovery from the aging resources is a major concern for oil companies and authorities. In addition, the rate of replacement of the produced reserves by new discoveries has been declining steadily in the last couple of decades. Therefore, the increase of the recovery factors from mature fields under primary and secondary production will be critical to meet the growing energy demand in the coming years. As much as two thirds of the conventional crude oil originally discovered in different countries, including India, remains unproduced;

left behind due to the physics of fluid flow. In addition, hydrocarbons located in unconventional rocks or that have unconventional characteristics (e.g., oil in fractured shales, kerogen in oil shale, bitumen in tar sands) constitute an enormous potential domestic supply of energy. The application of enhanced oil recovery (EOR) technologies to overcome the physical forces holding these hydrocarbons underground can turn these well known accumulations into oil reserves, enhancing energy security while helping to support economic growth.

Improved Oil Recovery (IOR) methods encompass Enhanced Oil Recovery (EOR) methods as well as new drilling and well technologies, intelligent reservoir management and control, advanced reservoir monitoring techniques and the application of different enhancements of primary and secondary recovery processes. An integrated approach involving not only earth scientists, but also drilling and reservoir engineers, reservoir modelling specialists, experimental physicists, production engineers, chemists and business and marketing experts is needed for a successful operation. Since the subject is very vast and requires in depth knowledge of reservoir dynamics and Global oil business, only a brief exposition of opportunities to increase oil recoveries and final recovery factors in reservoirs ranging from extra heavy oil to gas condensate is given below.

It is well known that EOR projects have been strongly influenced by economics and crude oil prices. The initiation of EOR projects depends on the preparedness and willingness of investors to manage EOR risk and economic exposure and the availability of more attractive investment options. In the U.S., chemical and thermal EOR projects have been in constant decline from mid 1980's. It is important to indicate that statistics on EOR activity is often masked because it goes unreported. EOR gas injection project statistics remained constant since mid 1980's and exhibited a growing trend since year 2000, especially with the increase of CO_2 projects. Indeed, since 2002 EOR gas injection projects outnumber thermal projects for the first time in the last three decades. However, thermal projects have shown a slightly increase since 2004 due to the increase of High Pressure Air Injection (HPAI) projects in light oil reservoirs. Chemical EOR methods still have not captured the interest of oil companies. However, there is an increase in EOR chemical projects in the U.S. and abroad that have not been documented in the literature for different reasons. Thermal methods, specifically steam injection, still dominate as the preferred EOR method for heavy oil reservoirs. High-pressure air injection (HPAI) represents one of the thermal recovery processes showing an increased interest in recent years in both carbonate and sandstone formations. Lack of understanding and dissemination of information regarding HPAI designs and risk mitigation have been probably responsible for the limited number of cases deployed as full-field projects, despite significant success in ongoing projects. Hydrocarbon gas injection continues to be the preferred recovery process in offshore fields, gas condensate reservoirs, or fields in remote locations without access to gas markets. N_2 EOR projects seem to be in decline. CO_2 injection is getting most of the attraction as an EOR method and potentially as a sequestration strategy in recent years. However, CO_2-EOR projects in operation are mostly concentrated in the U.S. (especially in the Permian Basin) and associated to natural sources of CO_2. CO_2-EOR/sequestration projects are not expected to grow in the near future until industrial sources of CO_2 are produced at much lower costs and the proper regulatory framework is in place. Chemical EOR methods have made a relatively small contribution to the world's oil production during the last decade. China is the country with the largest oil production coming from Chemical EOR projects. However, chemical EOR is not expected to impact world's oil production for at least two decades, if it is ever implemented at commercial scales. The combination of conformance technologies (gel treatments) to improve injection profile and sweep efficiency with chemical EOR flooding is starting to gain more interest. Despite the growing research interest on chemically assisted methods (e.g., spontaneous imbibitions, wettability modifiers and ITF reductions) and surfactant-polymer (SP) flooding to improve oil recoveries in carbonate formations, these projects are not expected to impact global oil production in the near future(*excerpts from Schlumberger EOR;Fontus EOR; TORCO EOR; Energy.Gov office of fossil energy-USA*).It is good to notice that use of CO_2 in enhancing oil recovery has attracted the attention of Indian scientists and oil industry (please see paper by Dimri—present issue).As detailed above a concerted effort has to be made to make the technique useful, cost effective and environmental friendly.

Even though some significant developments have been noticed in India in recent times in enhancing oil extraction percentage, we have to go a long way in achieving world average that hovers around 45 %.So, it is imperative that area specific EOR techniques need to be introduced making use of experiences from oil fields of US and Russia. A decision has been taken in 2013 to introduce EOR in Rajasthan oil fields, under Cairn India-ONGC co-operation. If properly administered following set rules, these operations may boost production to at least 35 to 40%.

New Initiatives:

To meet future energy demands, let us look into the ongoing research strategies.

Our energy demand is increasing unabated. Even though fossil fuels are polluting our environment, there seems to be no way to stop extraction of these natural energy resources, as large scale introduction of non conventional energy resources in different sectors….transport, lighting, communication, food production etc., will not take a shape (even if entire world takes up appropriate steps to introduce such energy sources) in the next 20 years. As such, we have to live with the devil and use whatever is available knowing very well the ill effects of such a practice. Since a decade considerable importance is given to Gas Hydrate exploration. Even though nothing substantial is yet emerged we are happy to note some good progress in the exploration sector. Let us peep into some of the details (A detailed exposition of Gas Hydrates has already appeared in the Jan, 2014 issue of this journal).

Gas Hydrates:

As an unconventional hydrocarbon resource, methane hydrates have been the focus of our quest for meeting our energy demands and it was this objective that India's National Gas Hydrate Program (NGHP) was launched. Steered by the Ministry of Petroleum & Natural Gas and technically coordinated by Directorate General of Hydrocarbons (DGH), NGHP is a consortium of National E&P Companies (Oil and Natural Gas Ltd., Gas Authority of India Ltd.) and National Research Institutions (National Institute of Oceanography, National Geophysical Research Institute and National Institute of Ocean Technology). It is heartening to note that Geophysics played a significant role in developing methods for the delineation, characterization and assessment of gas-hydrates. Seismic technique, in particular, helped in demarcating Bottom Simulating Reflectors (BSR).

As per the Road Map prepared by the experts production of methane from gas hydrates is still a far-fetched thought. However, as detailed by Sain and Gupta (JIGU,Jan, 2014, V.18, no.1,pp11-17) recent success in test production of methane gas from gas hydrates through carbon dioxide replacement method in the permafrost of Alaska (USA) and depressurization method in Nankai trough off Japan has increased considerable interests in the national gas hydrates programs of India and many other countries. It is expected that the gas-hydrates will be produced commercially by 2020.

Shale Gas:

A review on shale gas prospects by Sain et al(in this issue) states that there is a sizeable deposit of shale formations in several sedimentary basins of India with different total organic content (TOC) and maturity history. The Cambay, K-G, Cauvery and Damodar valley are the four major basins of shale gas reservoirs as indicated by considerable thickness of shales and good thermal maturity with vitrine reflectance of more than 1.0. They further state that to understand the geophysical properties of shale gas reservoir rocks it is important to know the factors controlling the rocks physical properties. Rock physics along with seismic modeling provides crucial links between microscopic rock properties and macroscopic physical characteristics such as the seismic velocity and resistivity. Geophysics plays significant role for predicting in-situ rock parameters such as the TOC, porosity, and mineral composition. They further state that the change in v_p/v_s in silica-rich formations may be a useful attribute for seismic characterization of shale-gas rocks. The details are encouraging. However, as detailed earlier (Reddy, P.R, 2013, JIGU,vol.17, No.2, pp:195-199), we need to be careful in carrying out high pressure fracking operations in extracting oil and gas from compact and thick shale formations to avoid environmental problems.

Let us hope for the best.

We do believe that continued focused pursuits would lead to indigenous production of sufficient quantities of O & G and help us in achieving stable economic development.

Use of Geophysics in locating natural and accidental oil spills:

While Oil and Gas are needed for meeting energy demands, many of us are not exposed to the pit falls associated with Oil exploration, exploitation, and crude transportation, refinement of crude and disposal of effluents. As easily accessible shallow on land reserves have been exhausted significant strides have been made, in the last 15 years, in extracting deep sea reserves. Since deep sea drilling, well development and other operations are manifold complicated, different types of problems have been faced by the Oil Industry both in ensuring the safety of reservoirs and transportation of crude to refineries. The accident occurred in Gulf of Mexico (B.P Oil Spill) brought in to focus the dangers faced by deep sea operations. Since this mega spill has shaken the oil industry significant scientific studies have been carried out to understand oil spill dynamics. Even though many successful research studies have been carried out, we have selected the one detailed below, for its innovative character.

Scientists of University of South Florida, USA have found Black Gold Amidst Overlooked Data (*The description of the new technique given below was published in January,2009, Geophysical Research Letters*). "About half of the oil in the ocean bubbles up naturally from the seafloor, with Earth giving it up freely like it was of no value. Likewise, NASA satellites collect thousands of images every year, but some of them get passed over because no one thinks there is a use for them. Scientists recently found black gold bubbling up from an otherwise undistinguished mass of ocean imagery. Chuanmin Hu, an optical oceanographer at the University of South Florida, St. Petersburg, and colleagues from the National Oceanic and Atmospheric Administration (NOAA) and the University of Massachusetts–Dartmouth (UMass), found that they could detect oil seeping naturally from the seafloor of the Gulf of Mexico by examining streaks amid the reflected sunlight on the ocean's surface. Most researchers usually discard such "sun glint" data as if they were over-exposed photos from a camera. "Significant sun glint is sometimes thought of as trash, particularly when you are looking for biomass and chlorophyll," said

Hu. "But in this case, we found treasure." The new technique could provide a more timely and cost-effective means to survey the ocean for oil seeps, to monitor oil slicks, and to differentiate human-induced spills from seeps. Oil decreases the roughness of the ocean surface. Depending on the angles of the camera and of the light reflection, oil creates contrasting swaths that can show up in airborne images as either lighter or darker than the surrounding waters. The detection and monitoring of oil spills and seeps by satellite are not new. Visible, infrared, microwave, and radar sensors have all been used, with synthetic aperture radar (SAR) being the most popular and reliable method in recent years . SAR imagery can be very expensive, the authors note, and timely, repeat coverage is not always possible, particularly in tropical regions. Using imagery from the Moderate Resolution Imaging Spectro-radiometer (MODIS) instruments on NASA's Terra and Aqua satellites, Hu and colleagues assert, is far cheaper because the data is collected daily and provided freely by NASA, without the need for special observation requests. And the polar orbits of Terra and Aqua allow images of oil slicks to be collected several times per week in tropical regions and perhaps several times a day at higher latitudes.Hu actually happened upon the oil imagery while looking for signs of harmful algal blooms—commonly referred to as "red tide"—in the western Gulf of Mexico. Examining MODIS images, he kept noticing streaks across the sun glint reflections. After conferring with study co-authors Xiaofeng Li and William Pichel of NOAA and Frank Muller-Karger of UMass, Hu became aware that the streaks could be oil from natural seeps on the seafloor. Hu and colleagues then defined a geographic area of the western Gulf and obtained MODIS images for the month of May for nine consecutive years (2000 to 2008) from NASA's Goddard Space Flight Center, Greenbelt, Md. The team reviewed more than 200 images containing sun glint, and found more than 50 with extensive oil slicks.

Exactly how much oil naturally seeps out of the seafloor is unknown, and most estimates are very crude because there has never been a proper global survey made for the public record. Researchers identified the natural seepage rate as a critical unanswered question when the National Academy of Sciences compiled its third Oil in the Sea report in 2003. "This capacity for detecting oil in the ocean has great potential, not just for oil seeps but for responding to oil spills," said Chris Reddy, a marine chemist at the Woods Hole Oceanographic Institution in Massachusetts. "Scientists might be able to use this to forensically study old spills, to watch how new ones evolve in real time, and to rule out a spill when there is none. Ultimately, this could lead to a better use of our public resources." The technique could be useful for detecting and monitoring oil spills from ships and other platforms, though Hu emphasized that the spills must be large enough (at least hundreds of meters or feet) to be visible in the MODIS imagery. If there is suspicion of a large human-caused spill, for instance, researchers would be able to review ocean imagery to see if the slick was present before the alleged spill, indicating a natural seepage. On the other hand, MODIS satellite imagery collected on a regular basis could help coastal managers track and mitigate the effects of large accidental spills. The new method is not perfect, as cloud cover or a lack of sun glint can limit its use. Hu and colleagues suggest it may be best used as a complement to SAR, which penetrates cloud cover and can be tilted to get the necessary imaging angle. "If you can get an image on a two- to three-day time frame and anywhere on the globe, that's pretty spectacular," said Reddy. "The first few days are critical to tracking oil in the ocean, so it helps to be able to use technology in real time to make informed decisions about cleanup."

We can learn from this study that researchers can help in many ways not only in exploring Oil & Gas reserves but also in protecting the environment by timely detecting setbacks .So, what is needed is a concerted research effort and looking at data/ models without pre conceived notions.

In this issue:

In total there are eight papers and a short note. In the first paper Nagaraju and Chetty have detailed about "Imprints of Tectonics and Magmatism in the south eastern part of the Indian shield: Satellite image interpretation". The attempt to correlate genetic and spatial relationship of lineaments with regional tectonics and magmatism has yielded useful results. In the second paper Sain et al have reviewed shale gas prospects in Indian sedimentary basins. They opine that shale gas extraction is the next generation major energy resource after gas hydrates and coal bed methane. In the next paper Choudhary et al brought into focus the importance of ionospheric precursors in understanding genesis of high magnitude earthquakes. They have analysed the temporal variation of the ionospheric parameters ten days before and five days after the M 9.0 Tohoku earthquake, Japan. In the fourth paper "Use and Abuse of Excess CO_2 –An Overview" Dimri presented a comprehensive exposition of the role of CO_2 in affecting the climate and its use in enhancing production of oil from oil field. In the next paper "Understanding area specific recharge process from vadoze zone resistivity variations – a case study in basalt watershed, Ujjain district, Madhya Pradesh" Rangarajan et al pointed out that to evaluate reliable estimation of recharge for a large basin, soil hydraulic conductivity followed by resistivity characteristics have to be adopted. In the sixth paper Kumar et al studied in detail "Cold fronts/upper air troughs and low level subtropical anticyclones in south Indian ocean and Indian summer monsoon rainfall" and concluded the movement of cold fronts with associated westerly waves during the southwest monsoon influences Indian summer monsoon significantly. In the next paper Sarma presented a brief review on NGRI initiatives for the past 50 years in developing theoretical, lab and field techniques pertaining to Electrical Resistivity, Self Potential, Induced Polarisation, Spectral Induced Polarisation and Electrical Resistivity Tomography. In the eighth paper (short note) Mukherjee has detailed about "Kinematics of 'top-to-down' simple shear in a Newtonian rheology". In the last paper Reddy detailed about the necessity to safe gaurd Fresh water lakes. He exposed problems encountered in restoring Kolleru Lake.

News and Views:

In this subsection some salient features of the panel discussion held during the 50^{th} annual convention of IGU on "Higher Education in Geosciences" is detailed along with News about fourth coming scientific seminars/ symposia. Particulars of awards, other than those presented during the 50^{th} annual convention of IGU are also included in addition to Science News.

While bidding farewell, we wish all of you "A Happy Ugadi".

P.R. Reddy

P. Koteswara Rao