NEWS AND VIEWS AT A GLANCE

FORTHCOMING EVENTS:

* **4-7 October 2015:**
South Africa International Renewable Energy Conference 2015 (SAIREC), South Africa

* **6-10 October 2015**
42nd Session of the IPCC
Dubrovnik, Croatia

* **19-23 October 2015**
GLOSS-GE-14 and Indian Ocean Sea Level Science Workshop, Dona Paula-Goa, India

* **10-12 December 2015**
International Conference Climate Services 4
Montevideo, Uruguay

* **14-16 December 2015**
2015 Canberra Conference on Earth System Governance: "Democracy and Resilience in the Anthropocene"

  P.S: For further details visit (Source: http://unfccc.int/science/knowledge_resources/calendar_of_science_events/items/6562.php)

* **3rd National Conference on Earthquake Engineering and Seismology**

  Dates: 14 Oct 2015 → 16 Oct 2015

  Location: Izmir, Turkey

  Topics: earthquake engineering, geology, geophysics, seismology, architecture, city and regional planning, disaster and emergency management

  Weblink: http://www.tdmd.org.tr/TR/Genel/KonferansAnaSayfaEN.aspx?F6E10F8892433CFFAAF6AA849816B2EF13C9817A85D7DA3A

* **6th International Conference on Earthquake Geotechnical Engineering**

  Dates: 02 Nov 2015 → 04 Nov 2015

  Location: Christchurch, New Zealand

  Weblink: http://www.6icege.com/

* **Third International Conference on Engineering Geophysics**

  Dates: 15 Nov 2015 → 18 Nov 2015

  Location: Al-Ain, United Arab Emirates

  Topics: Geophysics, Environment, Archaeology, Geotechnic, Forensics, Hydrogeology, Engineering, Sustainability, Near-surface.

  Weblink: http://www.iceg.ae

* **EAGE Workshop on Broadband Seismic**

  Dates: 15 Nov 2015 → 18 Nov 2015

  Location: Abu Dhabi, United Arab Emirates

  Weblink : http://eage.org/event/index.php?eventid=1267&Opendivs=s3

* **Third EAGE Workshop on Rock Physics**

  Dates: 15 Nov 2015 → 18 Nov 2015

  Location: Istanbul, Turkey

  Weblink: http://www.eage.org/event/index.php?eventid=1295&Opendivs=s3

* **International School on Geothermal Exploration**

  Dates: 07 Dec 2015 → 12 Dec 2015

  Location: ICTP Trieste, Italy

  Organizer: The Abdus Salam International Centre for Theoretical Physics

  Weblink: http://www.ictp.it/scientific-calendar.aspx?start_date=01/01/2015&end_date=31/12/2015

* **AGU Fall Meeting**

  Dates: 14 Dec 2015 → 18 Dec 2015

  Location: San Francisco, United States

  Organizer: American Geophysical Union

  Weblink: http://meetings.agu.org/

* **International Conference on Geosciences and Environment**

  Dates: 07 Jan 2016 → 10 Jan 2016

  Location: ANNAMALAINAGAR, India

  Topics: Geology, Environment, Mineralogy, Petrology, Climate Change, Disaster Management, Environmental Pollution, Meteorology, Atmospheric science, Geo technical Engineering, Earthquake, Seismology etc.

  Weblink: http://www.icgenias2015.com

* **36th Asian Conference on Remote Sensing**

  19-23, October, Manila, Philippines

  www.acrs2015.org

* **ISGNSS 2015**

  16-19, November, Kyoto, Japan

  http://www.isgnss2015.org/

* **37 ANNUAL CONVENTION, SEMINAR AND EXHIBITION ON EXPLORATION GEOPHYSICS: Organized by Association of Exploration Geophysicists(AEG)**

  15-17 October,2015, Jaipur,India.

  Last Date for Seminar Registration
  5th October 2015

  For further details: aegindiageophysics@yahoo.com

AWARDS, HONOURS AND RECOGNITION

** Dr. Chinmoy Saha, Member of faculty, Avionics department, has been elected to the position of IEEE Senior Member in recognition of professional standing by officers and Board of Directors of the IEEE.

** Prof. Madhav Gadgil, Chairman of the Western Ghats Ecology Expert Panel (WGEEP) will be sharing the Tyler Prize 2015 for Environmental Achievement with American marine ecologist Dr. Jane Lubchenco for their leadership and engagement in the development of conservation and sustainability policies in the United States, India and internationally. The main reason behind Prof. Gadgil receiving this award is his landmark report on preserving the unique ecosystem of the Western Ghats, and the inclusion of local committees.

** Dr.G.Satheesh Reddy, Distinguished Scientist & Director, DRDO has been conferred with Fellowship of Royal Institute of Navigation for his significant contribution in the field of inertial and satellite based Navigation and avionics technologies. Dr.Reddy is the first and the only one to be elected from India.

SCIENCE NEWS

Presently, Science News from different channels is giving importance to topics pertaining to three Cs---Climate change & Global warming, Calamities & Pollution and Cosmology & Planetology. For this issue I have selected a mixture of topics covering the three Cs. The first two are affecting our very existence on the Earth. The third provides a hope that in future Man can colonise planets and exoplanets that have life supporting environment. It is essential for us to look at both the scenarios, with equal importance. It is essential for us to be positive and try to plug the leakages responsible for overall deterioration, witnessed due to both natural and Man induced setbacks. Our initiatives should be aimed at extracting the best out of degraded situation, developing an outlook:

"We can complain because rose bushes have thorns, or rejoice because thorn bushes have roses." - Abraham Lincoln

I do hope the following news items will be useful, in acquiring needed knowledge base to remould our nature to help ourselves and the society.

*****Air pollution is world`s top environmental health risk, WHO says**

Air pollution is the world's biggest environmental health risk, causing at least one in eight deaths around the globe, the World Health Organization has said.

The assessment was reached at the first ever discussion on air pollution and its health impacts at WHO's World Health Assembly, which was held at Geneva. Delegates at the assembly adopted a resolution to address the health impacts of air pollution. The new estimation significantly increases the threat posed by air pollution and has dire health implications for countries such as India, where pollution load is high and public health infrastructure underdeveloped.

WHO had last year ranked Delhi as the most polluted among 1,600 cities across the world, worse than Beijing which had previously held the dubious tag. WHO's assessment points to a huge surge in disease burden and deaths due to air pollution exposure. Deaths due to air pollution, which include outdoor as well as indoor pollution, have increased four-fold across the globe over the past decade, the latest data shows. While the total number of deaths due to air pollution is pegged at 8 million every year, data shows that China and India are by far the worst affected countries.

The latest resolution, passed during the 68th World Health Assembly, called for all countries to develop air quality monitoring systems and health registries to improve surveillance for all illnesses related to air pollution. WHO also asked its member countries to promote clean cooking, heating and lighting technologies and fuels; and strengthen international transfer of expertise, technologies and scientific data in the field of air pollution. Experts say policies and investments supporting cleaner transport, energy-efficient housing, power generation, industry and better municipal waste management would reduce key sources of urban outdoor air pollution. In rural areas, reducing outdoor emissions from household coal and biomass energy systems, agricultural waste incineration, forest fires and certain agro-forestry activities can lead to a potential reduction in air pollution.

The WHO assessment says, "Reducing outdoor air pollution also reduces emissions of CO_2 (carbon dioxide) and short-lived climate pollutants such as black carbon particles and methane, thus contributing to the near- and long-term mitigation of climate change."

At its next assembly, WHO will propose a roadmap for an enhanced global response by the health sector that reduces the adverse health effects of air pollution.

(**Source:** http://economictimes.indiatimes.com/news/environment/pollution/air-pollution-is-worlds-top-environmental-health-risk-who-says/articleshow/47507162.cms?prtpage=1)

*****Vanishing wetlands**

They recharge groundwater, act as a drain during floods, recycle nutrients, purify water, provide livelihood and are a haven for naturalists. February 2 is celebrated as World Wetlands Day. It marks the signing of the Convention of Wetlands at Ramsar. This is an international treaty for sustainable utilisation and conservation of wetlands keeping in mind their ecological functions.

India's ecological diversity is unparalleled. But today, it is being destroyed at an alarming rate. One of the ecosystems that have been ravaged today is the wetlands. These are complex ecosystems that are mostly covered with water permanently, or sometimes, after rains. They include diverse habitats like lakes, swamps, floodplains and salt marshes. Many decades ago, numerous patches of wetlands were present around Indian towns and villages. Today, one-third of the country's wetlands are already wiped out or severely degraded because of habitat destruction and encroachment. Most landfills around cities and towns would have been thriving wetlands once upon a time.

This is a disturbing scenario because wetlands play an important role by providing ecological security. They perform extraordinary functions like recharging ground water, acting as a drain safety during floods, recycling nutrients and purifying water. When protected, these wetlands can bounce back to life like Odisha's Chilika Lake. Today, Chilika Lake is one of the few thriving wetland ecosystems in our country and it remains an inspiring success story for conserving wetlands. We must ensure that the ecosystems that support our livelihoods are conserved for eternity and not destroyed in the process of economic progress.

(**Source:** http://www.thehindu.com/features/kids/vanishing-wetlands/article6860776.ece)

*****Floods wreak havoc in Assam, Arunachal Pradesh: 200,000 people affected**

The early monsoon incessant rains in mid June caused several rivers—including the Brahmaputra—to overflow, wreaking havoc in India's northeast states of Assam and Arunachal Pradesh. Thousands of people have been affected, crops destroyed and normal life disrupted with the rains washing away portions of roads and triggering landslides. According to the Assam State Disaster Management Authority (ASDMA), 195,243 people have been affected by the floods. The rains have caused rivers, including the Brahmaputra, to overflow and breach the embankment, thereby flooding villages and destroying crops. An estimated 553 villages in 13 districts of the state have been affected by the floods. Among the worst affected districts are Assam's Dhemaji, Lakhimpur and Barpeta In the Tinsukia and Sonitpur district, four relief camps have been set up by ASDMA. Majuli, a large river island in Jorhat district, is one of those severely hit by the rains. Chunks of the island are eroded every year during the monsoons, threatening the very existence of the island in the future.

The situation is similar in nearby Arunachal Pradesh. A large portion of the national highway, NH-415, has been washed away by the rain water, disrupting road communication between the state capital Itanagar and Banderdewa via Karsinga. Ironically, the road connecting Itanagar and Banderdewa was reopened just a few months back after restoration work.Floods are an annual worry for the region, claiming many lives and destroying vast swathes of crop land and property worth millions.

(**Source:** http://sevensistersproject.com/floods-wreak-havoc-in-assam-arunachal-pradesh-200000-people-from thethirdpole.net)

Heavy rains in Gujarat state, especially Saurashtra resulted in flash floods. While all this happened till end of third week of June, second summer was witnessed for almost a month, especially in southern states, reminding of plight experienced by farming community during 2014.Quixotic monsoon pattern devastated many parts of North India in July, especially Uttarkand and Kashmir. While floods devastated North and North east India tentacles of drought grasped many central

and southern parts of our country leading to suicides by debt ridden farmers.

*****Carbon Dioxide from Inland Waters**

Humans are not the only ones who release carbon dioxide into the atmosphere. Inland waters, full of carbon-rich plant and soil material, are among the natural sources of the greenhouse gas. In recent years, scientists have found that the amount of carbon dioxide emanating from inland waters is substantial enough to warrant inclusion in the global carbon cycle—it is about a quarter of the amount pumped out yearly by fossil fuel burning.

Swedish Scientists carried out studies to know how much of this carbon dioxide is the product of sunlight breaking down the carbon-rich material dissolved in the water. A data set of 1086 lakes across Sweden served as the basis for the study. Satellite data of cloud cover over the lakes provided insight into the amount of sunlight reaching the lakes. Model simulations revealed the extent to which photons break down the matter dissolved in the water. After modeling the amount of carbon dioxide emissions from lakes in Sweden—countrywide, about 150 kilotons of carbon per year—they extrapolated the result to come up with a number for lakes and reservoirs worldwide. They calculated that annual sunlight-induced carbon dioxide emissions were between 13 megatons of carbon under overcast sky and 35 megatons of carbon under clear sky.

That means that sunlight is responsible for up to 10% of the total carbon dioxide that comes from lakes and reservoirs worldwide. The study contributes to the growing body of evidence that lake-dwelling microbes contribute to the aquatic carbon cycle more substantially.

(**Source:** Palus, S. (2015), How much carbon dioxide does sunlight release from lakes? Eos, 96,doi:10.1029/2015EO027309. Published on 8th April 2015.).

*****Earth is running out of groundwater**

Human activity is leading to the rapid draining of about one third of the planet's largest underground water reserves and it is unclear how much fluid remains in them, two new studies have found. Consequently, huge sections of the population are using up groundwater without knowing when it will run out, researchers said. "Available physical and chemical measurements are simply insufficient. Given how quickly we are consuming the world's groundwater reserves, we need a coordinated global effort to determine how much is left," added Famiglietti, who is also the senior water scientist at NASA's Jet Propulsion Laboratory. Scientists used data from special NASA satellites to measure groundwater losses. In the first paper, they looked at 37 of Earth's biggest aquifers between 2003 and 2013. Eight of these were classified as "overstressed," meaning they were being sucked dry with almost no natural replenishment to offset the usage. Five other aquifers were determined to be "extremely or highly stressed."Scientists warned the situation would only worsen with climate change and population growth. The most overburdened aquifers are in the world's driest places, where there is little natural replenishment. Researchers found that the Arabian Aquifer System, providing water for more than 60 million people, is the world's most overstressed source. The Indus Basin aquifer of northwestern India and Pakistan is the second-most overstressed, and the Murzuk-Djado Basin in northern Africa is third. The second paper concludes that the total remaining volume of the world's usable groundwater is poorly known and huge discrepancies exist in estimated "time to depletion."

(**Source:** http://timesofindia.indiatimes.com/home/environment/global-warming/Earth-is-running-out-of-groundwater-Study/articleshow/47704442.cms.)

*****Microbubbles catch a seismic wave**

Trapped in Earth's crust are vast quantities of methane, carbon dioxide, and other types of gas, much of it stored as microbubbles in the fluid-filled pores of rocks and ice. When that gas escapes to the surface, the consequences can be severe: Greenhouse gases released by melting permafrost, for example, threaten to accelerate global warming. A decade ago, researchers in the UK and Israel suggested that one might be able to identify subterranean stores of gas in the patterns of seismic waves. As microbubbles expand and contract under the oscillating pressure of a passing seismic wave, the thinking went, they should dissipate energy and attenuate the wave. A team led by Nicola Tisato of ETH Zürich and the University of Toronto has now reproduced that effect in the lab.The researchers estimate that in a real-world scenario of, say, a tremor passing through a CO2 reservoir in a carbon sequestration facility, bubble-induced attenuation would be strong enough to decrease the wave's amplitude by nearly a third. (N. Tisato et al., Geophys. Res. Lett. 42, 3880, 2015.)

*****Urban Rainwater Harvesting:**

As the race to bridge the gap between limited water availability and increasing demand for water narrows in India, rain water harvesting has been increasingly recommended in urban areas to harness the available water, rather than relying on expensive and unsustainable means of procuring water.

The report titled 'Urban Rainwater Harvesting - Case studies from different agroclimatic regions' published by the Centre for Science and Environment, argues that although RWH has been made mandatory in all cities, there continues to be a considerable lack of information and understanding on the extent and potential role it plays to save and increase water reserves. There is also not enough information on its social and financial benefits.

*****The need for information about the challenges to implement RWH**

The report states that more information is needed on the issues, challenges and potential of RWH across different regions of India to be able to truly use it as a means of water augmentation. This is because India's rainfall is unevenly distributed with respect to time and space across different agroclimatic regions. This calls for different strategies to be devised to harvest rainwater in different parts of the country.The report presents an analysis of case studies on RWH initiatives in 12 different sites in India, and a detailed analysis on two of the successfully implemented RWH projects from different agroclimatic settings -- one from a scanty rainfall area (Rajasthan) and the other from very high rainfall area (Goa).

The report ends by stating that these case studies scientifically establish that it is possible to practice RWH in varied types of agroclimatic zones and the needs and strategies may vary from site to site. However, the returns are very high as compared to the simplicity of establishing and using RWH. For example, for as low as 10 cm of rainwater harvested on 1 ha. area, 1 million litres of water can be collected for recharge or storage.

These case studies provide positive examples of successful RWH efforts made in the country and should encourage further discussions within ULBs or water management organisations on the potential of mainstreaming RWH into their current and future plans for urban areas.

(**Source:** http://www.indiawaterportal.org/articles/rwh-tale-two-successful-states)

*****Warming oceans are affecting the monsoon rains.**

The study by IITM scientists, published in the journal Nature Communications, says monsoon rains over central India have decreased significantly in the last 100 years partly because of rapid warming

in the Indian Ocean. Scientists say all oceans are warming, but the Indian Ocean has warmed more than others, because of global warming and an increase in the intensity and frequency of rain-disrupting weather pattern El Nino that changes atmospheric circulation and weakens winds over the ocean."It is an important study that says how the warming of the Indian Ocean is one of the reasons for the weakening of the monsoon," IITM director Dr M Rajeevan stated. The monsoon is the lifeline of Asia's third-largest economy where millions of people make a living from farming. The weather office has warned of lower rains this year, dealing a blow to farmers already grappling with the effects of unseasonal showers in February and March."A warming Indian Ocean has resulted in surplus rains over the ocean at the cost of the monsoon rains over land, simultaneously drying the Indian subcontinent," said Dr. Roxy Mathew Koll, the lead author of the study, which is part of an Indo-French collaboration under the National Monsoon Mission set up by the Ministry of Earth Sciences. "The question remains on whether the monsoon will decrease further. The critical role of the warm Indian Ocean deserves special attention for its decisive effect on the food security of a large fraction of the world's population, and its role in inducing a drought over the Indian subcontinent."

(**Source:** http://www.hindustantimes.com/india-news/warm-ocean-weakening-monsoon-in-india-says-study/article1-1360021.aspx)

*****Shock waves spark star- birth in the Sausage Traces of dark matter interaction**

Red and dead galaxies in clusters can come back to life and start forming stars again – if galaxy clusters merge, according to researchers using an array of ground-based telescopes to examine the merging galaxy cluster CIZA J2242.8+5301, known as the Sausage. The unexpected burst of star-birth is taking place because of the shock wave arising from the merger of galaxy clusters. This is the first evidence that such shock waves can trigger star-birth in these circumstances. The result is the rapid formation of cold dense gas clouds, which form massive stars, in galaxies that had otherwise virtually ceased star formation.

(**Source:** http://bit.ly?1GZpfr4)

*****Messenger meets Mercury**

NASA`s MESSENGER spacecraft ended its mission to Mercury on 30 April, 2015 with an unseen 14000 km per hour crash on the planet`s surface, forming its own impact crater. The impact was not observed because it took place on the far side of the planet from Earth. MESSENGER was a planetary exploration mission that went into orbit around Mercury on 17 March 2011 (after launch in 2004) for what was intended to be a one-year mission. In the four years of its operation, the spacecraft mapped 45% of Mercury`s surface, picking up on chemical and mineralogical anomalies, tracked its magnetism and space environment and found ice collected at the poles. The mission also noted unusual surface compositions, perhaps reflecting an ancient giant impact; the existence of chemically distinct regions across the planet suggests a chemically heterogeneous mantle beneath. The planet has a magnetic field that suggests an active core dynamo, but the core may have a solid outer shell or iron sulphide above a liquid iron core with possibly a solid inner core. The mission also examined Mercury`s tenuous exosphere and space environment, finding traces of water and regular peaks in calcium thought to indicate input from the debris of comet 2P/Encke-debris from which gives rise to the Taurid meteor shower on Earth.

(**Source:** http://messenger.jhuapl.edu)

*****Messenger explores Pluto**

Scientists struggle to explain perplexing features revealed by the first close-up of the icy body's surface. New close-up image of a region near Pluto's equator reveals 100-million-year-old ice mountains rising as high as 11,000 feet (3,400 meters). A dearth of craters and an abundance of youthful ice mountains unveiled in mid July in the first close-up image of Pluto have startled

scientists, sparked debate, and intensified a thirst for more images to help explain how this little, old dwarf planet could show signs of relatively recent geological activity."We now have an isolated small planet that is showing activity after 4.5 billion years," Alan Stern of Southwest Research Institute (SWRI) in Boulder, Colo., said at a briefing at the Johns Hopkins University's Applied Physics Laboratory at which the image was revealed. "We are seeing the fact that these very small planets can be very active after a very long time. And I think it is going to send a lot of geophysicists back to the drawing boards to try to understand how exactly you do that," he added.The lack of any signs of cratering across a large region of Pluto is the "most striking" new geological finding so far, according to John Spencer, also from SWRI in Boulder and a lead scientist on the mission team. "This means this is a very young surface, because Pluto has been bombarded by other objects in the Kuiper Belt, and craters happen."The images of Pluto show regions with an "amazing diversity" of surface composition and geomorphology. "All of us thought it was probably a few processes that were at work [on Pluto]," said Grundy, an astronomer at the Lowell Observatory in Flagstaff, Ariz. "Now it looks like this is a much more complicated system where the interplay of physics and chemistry and thermodynamics is leading to just a huge palette of processes." Often, strange geological features on icy moons can be attributed to flexing, and therefore heating, caused by the powerful gravity of a nearby giant—an effect known as tidal heating, he explained. But now, "for the first time, we have seen an icy world that isn't orbiting a giant planet," Spencer said. Thus, tidal forcing "can't happen on Pluto. There is no giant body that can be deforming Pluto on an ongoing, regular basis to heat the interior."Other potential explanations for Pluto's geological activity include heat from radioactive elements within the dwarf planet and a reserve of energy stored from Pluto's formation, he said.

A swath of cliffs and troughs stretches about 600 miles (970 kilometers) from left to right across Pluto's largest moon Charon, suggesting widespread fracturing of Charon's crust, possibly a result of internal processes.

After the briefing, Stern noted that discoveries will continue now that the New Horizons spacecraft is "pregnant" with the many data sets it has collected and will transmit to Earth over the next 16 months. "It's just going to be a really satisfying year and a half."

Citation: Showstack, R. (2015), "Amazing" activity evident on Pluto's surface, Eos, 96,doi:10.1029/2015EO032899. Published on 16 July 2015.

*****Asteroseismology**

Asteroseismology also known as **stellar seismology** is the science that studies the internal structure of pulsating stars by the interpretation of their frequency spectra. Different oscillation modes penetrate to different depths inside the star. These oscillations provide information about the otherwise unobservable interiors of stars in a manner similar to how seismologists study the interior of Earth and other solid planets through the use of earthquake oscillations.

Asteroseismology provides the tool to find the internal structure of stars. The pulsation frequencies give the information about the density profile of the region where the waves originate and travel. The spectrum gives the information about its chemical constituents. Both can be used to give information about the internal structure. Asteroseismology effectively turns tiny variations in the star's light into sounds. In addition, asteroseismology helps to constrain the other characteristics of stars such as mass and radius more accurately than basic brightness measurements. By relating periodic fluctuations in a star`s brightness to the acoustic and gravity waves that cause them, asteroseismology offers tantalizing glimpses into stellar interiors. Able to reveal rich information about a star`s internal density, composition, rotation, and convective

mixing, it is already beginning to challenge some long- held theoretical notions. As more stars are observed for the purposes of asteroseismic analysis, the technique could conceivably test and improve our knowledge of every juncture in a star`s life-from the moments just before it`s birth to the time of its silent or fiery death.

(**Source:** Asteroseismology by Conny Aerts, May 2015,Physics Today, vol 68, number 5, pp-36 to 42)

*****India's Mars Orbiter (Maangalyan) delivers new Photos, successfully withstood Solar Conjunction**

The Indian Mars Orbiter Mission has released (March and May, 2015) a series of new images acquired by the MOM spacecraft that is currently in its extended mission following the completion of all its mission objectives during a 160-day primary mission in Martian orbit after its arrival in September 2014. Entering its extended mission phase, the Mars Orbiter will be operated for as long as possible to provide mission operators and engineers the maximum amount of data to assess the performance of all spacecraft systems given the nature of the MOM mission that first and foremost set out to demonstrate the technical aspects of interplanetary missions. As a bonus, the five instruments installed on the spacecraft are delivering science data and photos to contribute to the study of planet Mars. Sun, Mars and Earth conjunctions occur every 26 months as Earth and Mars circle the Sun in their respective orbits. Every conjunction is different depending on orbital geometry and solar activity. Basic spacecraft tasks were successfully handled autonomously by MOM's systems such as pointing the solar arrays toward the sun for optimized power generation, performing regular desaturations of the reaction wheels by using its thruster system, and listening for signals from Earth once conjunction ended. The mission team identified this time around conjunction as one of the most trying periods of the flight as MOM was on its own. MOM completed its 100th orbit around Mars on 22nd June. It successfully came out of the blackout it had entered in first week of June, ISRO has said. The payloads on the spacecraft were started after a few weeks gap. They were last operated on May 27 to put the spacecraft in an autonomous mode.MOM remained healthy and all its payloads performed satisfactorily, during black out. Fortunately, everything remained stable onboard the craft and MOM continued to operate in a propellant-efficient way.

(**Source:** http://www.spaceflight101.com/mars-orbiter-mission-updates.html)

*****NASA Mars Spacecraft Entered Communications Blackout and came out successfully**

An alignment of Mars, Earth and the sun has forced NASA's fleet of Red Planet spacecraft to fend for themselves for two weeks beginning on Sunday (June 7).From June 7 through June 21; Mars was behind the sun from Earth's perspective. This celestial geometry, known as a Mars solar conjunction, made radio communications between the two planets difficult — and potentially dangerous, as choppy or garbled instructions could actually harm spacecraft or hamper their missions, NASA officials said. As a result, engineers did not send commands to NASA's three active Mars orbiters, or to the agency's two rovers, Opportunity and Curiosity, during this two-week stretch. Commanding was also reduced on the days leading up to and following conjunction.] But that doesn't mean Opportunity, Curiosity, Mars Odyssey, the Mars Reconnaissance Orbiter (MRO) and the Maven spacecraft got a two-week vacation."Spacecraft will continue making some science observations during the conjunction period, though rovers will not do any driving or arm movements," NASA officials wrote in a statement (June 3).Mars solar conjunctions occur every 26 months, so NASA has dealt with them before. In fact, this was the seventh conjunction that Mars Odyssey has experienced (the sixth for Opportunity and the fifth for MRO). (Odyssey arrived at the Red Planet in 2001, while Opportunity and MRO got there in 2004 and 2006, respectively.) The Curiosity rover touched down in August 2012 and is therefore a conjunction veteran as well.

Curiosity and Opportunity sent some data up to the orbiters during the conjunction period. MRO and Mars Odyssey continued to relay information to Earth from June 7 through June 21, but they also stored the data on board for re-transmission after conjunction. Maven (whose name is short for Mars Atmosphere and Volatile Evolution) did not transmit any information back home until conjunction was over. Curiosity stored its own information on board as well. But Opportunity, which has been experiencing memory problems lately, relied on the orbiters to safeguard the science data it gathered during conjunction.

(**Source:** http://www.space.com/29576-nasa-mars-spacecraft-radio-blackout.html)

*****Solar System and beyond is awash with water**

As NASA missions explore our solar system and search for new worlds, they are finding water in surprising places. Water is but one piece of our search for habitable planets and life beyond Earth, yet it links many seemingly unrelated worlds in surprising ways. The chemical elements in water, hydrogen and oxygen, are some of the most abundant elements in the universe. Astronomers see the signature of water in giant molecular clouds between the stars, in disks of material that represent newborn planetary systems, and in the atmospheres of giant planets orbiting other stars. There are several worlds thought to possess liquid water beneath their surfaces, and many more that have water in the form of ice or vapor. Water is found in primitive bodies like comets and asteroids, and dwarf planets like Ceres. The atmospheres and interiors of the four giant planets -- Jupiter, Saturn, Uranus and Neptune -- are thought to contain enormous quantities of the wet stuff, and their moons and rings have substantial water ice. Perhaps the most surprising water worlds are the five icy moons of Jupiter and Saturn that show strong evidence of oceans beneath their surfaces: Ganymede, Europa and Callisto at Jupiter, and Enceladus and Titan at Saturn.

Scientists using NASA's Hubble Space Telescope recently provided powerful evidence that Ganymede has a saltwater, sub-surface ocean, likely sandwiched between two layers of ice. Europa and Enceladus are thought to have an ocean of liquid water beneath their surface in contact with mineral-rich rock, and may have the three ingredients needed for life as we know it: liquid water, essential chemical elements for biological processes, and sources of energy that could be used by living things. NASA's Cassini mission has revealed Enceladus as an active world of icy geysers. Recent research suggests it may have hydrothermal activity on its ocean floor, an environment potentially suitable for living organisms. NASA spacecraft have also found signs of water in permanently shadowed craters on Mercury and our moon, which hold a record of icy impacts across the ages like cryogenic keepsakes.

While our solar system may seem drenched in some places, others seem to have lost large amounts of water.

On Mars, NASA spacecraft have found clear evidence that the Red Planet had water on its surface for long periods in the distant past. NASA's Curiosity Mars Rover discovered an ancient streambed that existed amidst conditions favourable for life as we know it. More recently, NASA scientists using ground-based telescopes were able to estimate the amount of water Mars has lost over the eons. They concluded the planet once had enough liquid water to form an ocean occupying almost half of Mars' northern hemisphere, in some regions reaching depths greater than a mile (1.6 km). But where did the water go?

It's clear some of it is in the Martian polar ice caps and below the surface. Scientists also think much of Mars' early atmosphere was stripped away by the wind of charged particles that streams from the sun, causing the planet to dry out. NASA's MAVEN mission is hard at work following this lead from its orbit around Mars.

Understanding the distribution of water in our solar system tells us a great deal about how the planets, moons, comets and other bodies formed 4.5 billion years ago from the disk of gas and dust

that surrounded our sun. The space closer to the sun was hotter and drier than the space farther from the sun, which was cold enough for water to condense. The dividing line, called the "frost line," sat around Jupiter's present-day orbit. Even today, this is the approximate distance from the sun at which the ice on most comets begins to melt and become "active." Their brilliant spray releases water ice, vapour, dust and other chemicals, which are thought to form the bedrock of most worlds of the frigid outer solar system.

Looking further afield, observing other planetary systems as they form is like getting a glimpse of our own solar system's baby pictures, and water is a big part of that story. For example, NASA's Spitzer Space Telescope has observed signs of a hail of water-rich comets raining down on a young solar system, much like the bombardment planets in our solar system endured in their youth.

With the study of exoplanets -- planets that orbit other stars -- we are closer than ever to finding out if other water-rich worlds like ours exist. In fact, our basic concept of what makes planets suitable for life is closely tied to water: Every star has a habitable zone, or a range of distances around it in which temperatures are neither too hot nor too cold for liquid water to exist. NASA's planet-hunting Kepler mission was designed with this in mind. Kepler looks for planets in the habitable zone around many types of stars.

It's easy to forget that the story of Earth's water, from gentle rains to raging rivers, is intimately connected to the larger story of our solar system and beyond. But our water came from somewhere -- every world in our solar system got its water from the same shared source. So it's worth considering that the next glass of water you drink could easily have been part of a comet, or an ocean moon, or a long-vanished sea on the surface of Mars. And note that the night sky may be full of exoplanets formed by similar processes to our home world, where gentle waves wash against the shores of alien seas.

(**Source:** http://www.nasa.gov)

LIVING LEGENDS-KNOW YOUR PEERS

Prof.R.K.Verma born on 16th May 1928, completed post graduation in physics in the year 1950, and went to Harvard University, USA where he obtained a doctorate in Geophysics in 1957. After returning to India, he served Oil and Natural Gas Commission for two years and then joined the National Geophysical Research Institute in 1961 and served the organization with distinction up to 1969. During his tenure at NGRI he carried out significant studies in Heat Flow and Palaeomagnetics. He joined Indian School of Mines same year and taught several generations of students, many of whom have shown their mettle in the field of academics and research in India and abroad. His research endeavours spanning over six decades yielded significant results, in understanding the structure and dynamics of Indian crust and sub crustal lithosphere. He produced number of crustal structure models by synthesizing seismic and gravity inputs. He has more than 150 peer reviewed research articles and number of technical reports, covering all branches of solid earth geophysics. More than 25 researchers / scientists from NGRI and ISM received Ph.D degree, under his guidance. He is respected for his amenable, easily approachable positive traits and unassuming attitude. He received number of awards and recognitions as a research scientist of eminence and teacher of excellence. He received IGU Krishnan Medal in 1975 and Decennial award in 1992.Apart from many other awards he received ISM Alumni " Basant Sammaan Award" in 2005.Even at 86 he has enthusiasm to share his expertise with young researchers. As Emeritus Professor, University of Delhi he is involved in many developmental initiatives to strengthen earth science education in India. Many of those scientists from NGRI, who were associated with him during his tenure at NGRI still remember his positive traits and helpful attitude.

Dr BM Reddy (Borra Madhava Reddy) born in 1934 is an internationally reputed scientist in Atmospheric Sciences and Radio Communications B Madhava Reddy received his BSc (Physics) in 1954 obtaining first rank from the Madras University; MSc (Applied Physics) in 1958 and DSc (Atmospheric Sciences) in 1963 both from the Andhra University. He did postdoctoral research at NASA Goddard Space Flight Centre (1964-67), and worked in various capacities at the National Physical Laboratory (NPL), New Delhi (1967-95) from where he retired as Head of the Radio Science Division. He has been a Visiting Professor at the Institute of Space and Astronautical Sciences of Japan, and also at the Kyoto and Nagoya universities. He also worked as CSIR Emeritus Scientist (1995-2000) and INSA (Honorary) Scientist (2000 onwards), both at NGRI, Hyderabad.

Dr Reddy was the first to describe the global thermal structure of the topside ionosphere from satellite in situ measurements. He proved conclusively from a variety of measurements that the topside plasma densities increase remarkably during magnetic storms and his thermal expansion theory was subsequently confirmed by several workers. His pioneering efforts characterized the Indian Radio Environment to improve radio communications. He was invited in 1983 to be a Team Member in the NASA-Space Shuttle investigations which continued up to 1996 as SUNDIAL programme. He worked to establish specific couplings between various levels of geospace environment to improve solar terrestrial predictions. He also guided 10 students for PhD and published 150 papers in reputed journals.

Dr Reddy was Chairman of the URSI Committee on Developing Countries (1990-96), and also Member of the international team for the Shuttle Imaging Radar of NASA. Presently, he is Chairman of the National Network of ST Radars in India. He is also the Chairman of the Programme advisory committee for atmospheric sciences and chairman of several National Committees.

Dr. Reddy won the Vikram Sarabhai Award (1975) for outstanding contributions in the area of Planetary and Space Sciences; Decennial Award by Indian Geophysical Union (1997); and KR Ramanathan Medal in Atmospheric Sciences (1999). He was Vice President of the Indian Geophysical Union for several years and Chairman of the Governing Council of Indian Institute of Geomagnetism for ten years. Dr. Reddy is remembered by one and all that came in contact with him for his generosity, positive support and helpful attitude. He never believed in criticising someone or exhibiting his superiority while interacting even with young researchers for the sake of projecting superiority; a rare quality. Even at 81, while delivering a talk with clarity, his metallic voice invigorates the spirits of the audience.

Prof.K.S.Valdiya born in 1937, did his BSc, MSc and PhD degrees from Lucknow University. He joined Lucknow University in 1957 and was Fulbright Fellow (1965-66) for postdoctoral studies at Johns Hopkins University, USA. He worked as Reader, Rajasthan University, Udaipur (1969-70), and was Senior Scientist (1970-73), Deputy Director (1973-76) and Additional Director (1980), Wadia Institute of Himalayan Geology. At Kumaun University he was Professor of Geology (1976-95), Dean of Science Faculty (1977-80) and Vice-Chancellor (1981).

Valdiya taught sedimentology, stratigraphy, tectonics, engineering and environmental geology at the Lucknow, Rajasthan, Delhi and Kumaun universities. He initiated and pursued research on natural hazards and landform changes in relation to neotectonism, geohydrology of mountain springs, palaeocurrent patterns and reconstruction of palaegoeography, and cyanobacterial-built stromatolites that led to assigning ages to the then undated rocks in the

Himalayan and Vindhyan domains. His work on the characterization and genesis of magnesite deposits led to profitable mining and economic development of eastern Kumaun in Uttarakhand. In Southern Indian Shield, embracing Sotheastern Kanataka and adjoining Tamil Nadu and the Kanada and Malabar coastal belts, his studies relate to active faults, landform development, landscape reshaping and deflection, deviation, disruption and blockages of rivers in response to renewal of tectonic movements on active faults. He has written 110 research papers, authored 14 books, edited 9 books and contributed 40 articles in Hindi towards popularization of science. Valdiya was intimately involved in the conceptualization, establishment and development of Wadia Institute of Himalayan Geology at Dehradun, Central Himalayan Environmental Association at Nainital, GB Pant Institute of Himalayan Environment and Development at Almora, and Geology Department, Kumaun University. He also served as Member, Science Advisory Committee of the Cabinet/Prime Minister (1983-88) and as INSA Council Member (1984-86).

Professor Valdiya was awarded Padmashri (2007), Padmabhushan (2014) Hindi Sevi Samman (Atma Ram Prize) (2007), National Mineral Award of Excellence (1997), DN Wadia Medal (1995), Jawarharlal Nehru Birth Centenary Lecture, 2003 The Darashaw Nosherwanji Wadia Medal, 1994, The Sisir Kumar Mitra Memorial Lecture, 1992, INSA Golden Jubilee Research Professorship, 2003-27/01/2015 National Mineral Award (1993), SK Mitra Award (1991), SS Bhatnagar Prize (1976) and Chancellors Medal (1954). Millennium Award of Indian Geophysical Union (1999). He is FNA, FASc, FNASc, FTWAS. He was Pitambar Pant Environment Fellow of Department of Environment and Forests (1982-84) and UGC National Lecturer (1977-78). He was elected Fellow of the Indian Academy of Sciences, Bangalore, National Academy of Sciences (India), Allahabad, the Academy of Sciences for the Developing World, Geological Society of India, Geological Society of America (Honorary Fellow) and Geological Society of Nepal. He is respected for his love for the Nature and his assiduous efforts to help the needy from fragile environment of Himalayas.

P.R.Reddy