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News & Views

Deep underground tunnels could hold the key to habitability on Mars

Deep beneath the surface of North Yorkshire, subterranean tunnels are offering a unique opportunity to study how humans might be able to live and operate on the Moon or on Mars.

Researchers at the University of Birmingham have launched the Bio-SPHERE project in a unique research environment, located 1.1 km underground in one of the UK's deepest mining sites. This project aims to explore how scientific and medical activities could be conducted amidst the demanding conditions found on Mars and the Moon.

It is the first of a series of new laboratory facilities planned to study how humans might work – and stay healthy – during long space missions, a key requirement for ensuring mission continuity on other planets.

The team is working in partnership with the Boulby Underground Laboratory, a 4,000m^3 deep underground facility focused on particle physics, Earth sciences, and astrobiology research, run by the Science and Technology Facilities Council (part of UK Research and Innovation) with the support of the Boulby Mine operators, ICL-UK.

The Bio-SPHERE project is based in a 3,000m^3 tunnel network adjacent to the Boulby Laboratory, which go through 250-million-year-old rock salt deposits, consisting of Permian evaporite layers left over from the Zechstein Sea. This geological environment, together with the deep subsurface location, has enabled researchers to recreate the operational conditions humans would experience working in similar caverns on the Moon and Mars. This includes remoteness, limited access to new materials, and challenges in moving heavy equipment around.

At the same time, thanks to the ultra-low radiation environment provided by that depth, the location will enable scientists to investigate how effective underground habitats might be in protecting space crews from deep-space radiation, which is a significant risk in space exploration, as well as other hazards, such as falling debris from meteorites, which risks damaging the life-support infrastructure. The first facility to be opened as part of Bio-SPHERE (Biomedical Sub-surface Pod for Habitability and Extreme-environments Research in Expeditions), is based on a 3-meter-wide simulation module and is designed specifically to test biomedical procedures needed to prepare materials for treating tissue damage. These include complex fluids, polymers, and hydrogels for regenerative medicine that could be used, for example, in wound dressings, or fillers for damage mitigation.

Bio-SPHERE, which includes a range of capabilities for sterile work and material processing, combines these simulation facilities and useful geological environments with access to the adjacent physics and chemistry laboratory facilities.

This environment provides the opportunity to simulate various mission scenarios and to conduct cutting-edge, interdisciplinary science, ranging from the effects of extreme environments on biological and physicochemical parameters and on medical infrastructure, all the way to investigating

how available ‘in-situ’ resources such as ambient pressure, temperature and geology can be used for habitat construction.

Lead researcher Dr. Alexandra Iordachescu, in the University of Birmingham’s School of Chemical Engineering, said: “We are excited to be partnering with the fantastic science team at the Boulby Underground Laboratory. This new capability will help to gather information that can advise on the life support systems, devices, and biomaterials that could be used in medical emergencies and tissue repair following damage in deep-space missions.

“These types of metrics can guide system design and help to assess the scientific needs and acceptable timeframes in bioengineering operations under the constraints of isolated environments, such as space habitats. The data is likely to bring numerous benefits for Earth-based applications as well, such as delivering biomedical interventions in remote areas or in hazardous environments and more generally, understanding biomedical workflows in these non-ideal environments.”

Professor Sean Paling, Director and Senior Scientist at the Boulby Underground laboratory said: “We are very pleased to be working with Dr Iordachescu and the team from the University of Birmingham on this exciting work. The challenges ahead for humankind in exploring habitats beyond Earth are clearly many and significant. The Bio-SPHERE project promises to help answer some key logistical questions in establishing sustainable living conditions in remote, subterranean environments and in doing so will significantly contribute to the essential preparations for our collective long, difficult, and exciting journey ahead. It is also a great example of the diverse range of science studies that can be carried out in a deep underground science facility, and we are very happy to be hosting it.”

Source: SciTechDaily, 29.7.2023

Underground tunnels offer an escape from the heat

What used to be basements for buildings are now tunnels that connect more than 90 downtown city blocks.

The tunnels are not a secret to people who work downtown, but for some Houstonians the tunnels are a mystery. Keith Rosen is a Houston historian and offers tours of the tunnels.

"People are often disappointed because they are expecting to see the ancient lost city of Houston destroyed by some hurricane," Rosen said. "They find out these are beautiful, air conditioned tunnels with food courts and hundreds of businesses and thousands of people working."

The tunnels are home to a variety of businesses from doctor offices to salons, offering downtown employees and the public a chance to escape the outdoor elements.

Understory, located at the base of the Bank of America tower, is one of the newest community spaces with a food hall.

"There's different activities, it's family friendly, it's office-worker friendly," Kelly Wheeler with Transwestern said. "It's really just a place that we want everyone to feel comfortable and come in and use this space in a way that really creates a community."

Source: https://abc7news.com, 14.7.2023

Bengaluru Metro: Pink line likely to be operationalised by March 2025

Bangalore Metro Rail Corporation Limited (BMRCL) has set a deadline of March 2025 for the commencement of commercial operations on the Pink Line, which spans from Kalena Agrahara to Nagawara, covering a distance of 21.3km. The BMRCL is also constructing a 13.8km tunnel network from Dairy Circle to Nagawara as part of the Pink Line project.

Mr. Anjum Parwez, Managing Director of BMRCL, said that 80% of the tunnel construction had already been finished. To construct the twin tunnels and stations, the agency undertook underground Metro work in four packages. Nine tunnel-boring machines were deployed; four are still working, and five have finished their assignment.

The tunnelling work for a stretch of over 4.5km from Vellara Junction to Pottery Town is nearing completion. Additionally, 80% of the work from Dairy Circle to Vellara Junction and 54% of the work between Tannery Road and Nagawara has been finished. BMRCL MD, Mr. Anjum Parwez, stated that the remaining works are progressing well, and their goal is to open the entire Pink Line at once.

Source: https://www.metrorailnews.in, 17.7.2023

Chandrayaan-3: India makes historic landing near Moon's south pole

India has made history as its Moon mission becomes the first to land in the lunar south pole region.

With this, India joins an elite club of countries to achieve a soft landing on the Moon, after the US, the former Soviet Union and China.

The Vikram lander from Chandrayaan-3 successfully touched down as planned at 18:04 local time (12:34 GMT) on Wednesday, 23rd August 2023.

Celebrations have broken out across the country, with Prime Minister Narendra Modi saying "India is now on the Moon".

"We have reached where no other country could. It's a joyous occasion," he added. Mr Modi was watching the event live from South Africa where he is attending the BRICS summit.

Indian Space Research Organisation (ISRO) chief Sreedhara Panicker Somanath said the successful landing " is not our work alone, this is the work of a generation of ISRO scientists".

India's achievement comes just days after Russia's Luna-25 spacecraft spun out of control and crashed into the Moon. The crash also put the spotlight on how difficult it is to land in the south pole region where the surface is "very uneven" and "full of craters and boulders".

India's second lunar mission, which also attempted to soft-land there in 2019, was unsuccessful - its lander and rover were destroyed, though its orbiter survived.

On 23rd August 2023, tense moments preceded the touchdown as the lander - called Vikram after ISRO founder Vikram Sarabhai - began its precarious descent, carrying within its belly the 26kg rover named Pragyaan (the Sanskrit word for wisdom).

The lander's speed was gradually reduced from 1.68km per second to almost zero, enabling it to make a soft landing on the lunar surface.

In a few hours - scientists say once the dust has settled - the six-wheeled rover will crawl out of the lander's belly and roam around the rocks and craters on the Moon's surface, gathering crucial data and images to be sent to Earth.

One of the mission's major goals is to hunt for water-based ice which, scientists say, could support human habitation on the Moon in future. It could also be used for supplying propellant for spacecraft headed to Mars and other distant destinations. Scientists say the surface area that remains in permanent shadow there is huge and could hold reserves of water ice.

The lander and the rover are carrying five scientific instruments which will help discover the physical characteristics of the surface of the Moon, the atmosphere close to the surface and the tectonic activity to study what goes on below the surface.

The rover is carrying an Indian flag and its wheels also have Isro's logo and emblem embossed on them so that they leave imprints on the lunar soil during the Moon walk, an official told the BBC.

Chandrayaan-3, India's third lunar mission, will work to build on the success of the earlier Moon missions and Isro officials say it will help make some "very substantial" scientific discovery.

It comes 15 years after Chandrayaan-1, the country's first Moon mission in 2008, which discovered the presence of water molecules on the parched lunar surface and established that the Moon has an atmosphere during daytime.

And despite failing the soft landing, Chandrayaan-2 was not a complete write-off - its orbiter continues to circle the Moon even today and will help the Vikram lander send images and data to Earth for analysis.

India is not the only country with an eye on the Moon - there's a growing global interest in it, with many other missions headed to the lunar surface in the near future. And scientists say there is still much to understand about the Moon that's often described as a gateway to deep space.

Source: https://www.bbc.com/news, 23.8.2023

Self-driving pods could transport freight in tunnels beneath Switzerland

In Switzerland, an ambitious proposal could see the construction of an expansive underground network through which self-driving pods would transport freight across the country.

The project, called Cargo Sous Terrain (“Underground Cargo” in English), is intended to reduce the reliance on trucks for moving cargo. Global demand for freight transportation is growing, just as much of the world is seeing a shortage of truck drivers. At the same time, high fuel prices have made road transportation more expensive, while transporting freight by road accounts for around 6% of global carbon dioxide emissions.

Cargo Sous Terrain (CST) claims the project will reduce heavy traffic from Swiss roads by up to 40%, and because it will use only renewable energy, it will emit 80% less carbon dioxide per ton of cargo than transporting freight by road today.

"From the very beginning of CST, it was clear that the aim was really a zero-emission system, because sustainability is an absolute necessity," said Patrik Aellig, head of communications for CST. If built, the network, would stretch roughly 500 kilometers (310 miles) from Geneva in the west of Switzerland to St. Gallen in the northeast, and be completed around 2045.

The organization behind the initiative says it has raised 100 million Swiss Francs ($114 million) to move ahead with the planning process for the first 70-kilometer section, which it hopes will be in operation by 2032, connecting Härkingen-Niederbipp with Zurich.

Source: CNN Travel, https://edition.cnn.com, 7.8.2023

Sela tunnel nears completion, BRO to create another history

The Border Roads Organisation (BRO) will soon create another history by completing construction works of strategic Sela tunnel, world's longest twin-lane tunnel above 13,000 feet, in border state of Arunachal Pradesh.

The BRO had created Guinness record for building road at 19,024 feet in Ladakh. BRO Director General Lieutenant General Rajeev Chaudhry had received the Guinness World Records certificate on 17.11.21 for the achievement of constructing and black topping world's highest motorable road at 19,024 feet.

"It's almost complete," and likely to be ready for inauguration by September end, reports said.

The Sela tunnel along Balipara-Charduar-Tawang (BCT) road of the state is a twin-tube tunnel with one running for 980 metres and the other 1555 metres. It will ensure all weather road during winters and also cut travel time by at least an hour. Thus, commissioning of Sela tunnel will enable faster deployment of weapons and soldiers to forward areas in Tawang sector along China border, BRO sources said.

Prime Minister Narendra Modi, who had laid its foundation stone in February 2019 to be built at an estimated cost of ₹700 crore, is likely to inaugurate the tunnel after completion, sources said.

Amidst indo-China tension since April-May 2020, completion of Sela Tunnel would undoubtedly put it on China radar, a defence expert said.

Meanwhile, Indian Air Force (IAF) on Monday began a 10-day exercise along its northern borders with China and Pakistan. The exercise, named Trishul or trident in Hindi, will run until September 14 in the regions of Ladakh, Himachal Pradesh, Jammu and Kashmir and Punjab. The drills will include fighter aircraft, transport planes and helicopters, media report said.

India shares a nearly 4,000-km undemarcated border with China that crosses the Himalayas from Ladakh in the north to eastern Sikkim and Arunachal Pradesh, known as the Line of Actual Control (LAC).

It also shares a 3,300-km border with Pakistan including the LoC through the disputed Kashmir region, northern state of Punjab and western Rajasthan and Gujarat states.

The exercise coincides with New Delhi playing host to the G20 leaders on September 9 and 10 next. The group, which comprises 19 countries and the EU, addresses major issues related to the global economy, financial stability, climate change mitigation and sustainable development. New Delhi holds the presidency this year.

Source: https://arunachalobserver.org, 6.9.2023

Over 400 hours, multiple setbacks: A timeline of how the Uttarakhand tunnel rescue operation transpired

After a 17-day rescue operation that tested the grit of men on both sides of the 57 metres of debris, the 41 workers trapped in Uttarakhand's Silkyara-Barkot tunnel were evacuated on 28th November 2023.

Around 8 pm, the first worker was taken out and ferried to a medical centre in an ambulance. Officials said it took 3-5 minutes for each worker to be pulled out on stretchers fitted with wheels.

Here is a timeline of the 400-hour rescue operation:

November 12: 41 workers get trapped as the Silkyara-Dandalgaon under-construction tunnel on the Brahmkhal-Yamunotri highway partially collapsed. With the NDRF, SDRF, BRO, project executing agency NHIDCL and ITBP commencing rescue operations, arrangements are made to supply oxygen, electricity and food to the trapped men through air-compressed pipes.

November 13: The workers are reported to be safe after rescuers succeed in establishing contact with them through a pipe being used for oxygen supply. Efforts are made to prepare a safe passage to reach the men by removing debris and installing setting plates. However, fresh rubble falling from above results in debris accumulated in an area of around 30 metres spreading to 60 metres, hampering the process.

November 14: Resorting to the "trenchless" technique, auger machines used for horizontal drilling reach the site to insert steel pipes of 800- and 900-millimetre diameter through the rubble. About two metres of pipe is inserted among the debris, but the machine is not able to drill through the rubble. Two labourers sustain minor injuries as more rubble falls from the cavity created by the cave-in.

November 15: The rescuers bring in a state-of-the-art auger machine, which is airlifted from Delhi using two Hercules C-130 planes and brought to the spot in three parts, and later assembled.

November 16: The high-capacity machine is assembled and installed, as it starts drilling past midnight. It shows promise as it enters around 3 metres within half an hour. By 4.30 pm, it had drilled 9 metres.

November 17: The machine continues drilling and four MS pipes are inserted. However, it faces trouble at the 22-metre mark as it struggles to move forward and its bearings get damaged. A backup machine is airlifted from Indore, to arrive the next morning. It is confirmed that around 2.45 pm, during the positioning of the fifth pipe, a loud sound was heard by the team. It is later explained that the same symptoms were observed in previous occasions of the collapse, leading to the operation being suspended.

November 18: Drilling does not resume as experts feel the vibrations created by the American auger inside the tunnel might cause more debris to collapse. Meanwhile, a team of officials from the PMO and experts decide to work on five evacuation plans simultaneously, including drilling a vertical large diameter borehole from the top of the mountain.

November 19: Drilling remains suspended as Union minister Nitin Gadkari reviews the situation, confirming that drilling horizontally with the auger machine seemed to be the best solution. Five

agencies – Oil and Natural Gas Corporation, Satluj Jal Vidyut Nigam, Rail Vikas Nigam Limited, National Highways and Infrastructure Development Corporation Limited, and Tehri Hydro Development Corporation Limited – are assigned responsibilities.

November 20: A six-inch pipe to supply essential commodities passed through the debris and reached the workers. Meanwhile, PM Narendra Modi speaks to CM Pushkar Dhami over phone to take stock of the operations.

November 21: At 3.45 am, an endoscopic camera reaches the other end of the pipe, establishing the first visual contact with the trapped workers. The workers, wearing yellow and white helmets, can be seen receiving food items sent to them through a pipeline and talking to each other. The best bet remained drilling through the Silkyara side.

November 22: Drilling restarts around 12.45 am, and by around 11 am, the machine drills through around 39 metres. By 4 pm, the machine is around the 45-metre mark with just around 10-12 metres of debris remaining. Ambulances are kept on standby.

November 23: Rescue operations to evacuate 41 trapped workers enters the final stretch early morning after a late-night hitch wherein the auger machine drilling the escape passage through the rubble hit a hard obstacle. All arrangements have been made to provide immediate medical care to the 41 trapped workers after they are evacuated, officials say. But boring through the rubble is halted again after cracks appear in the platform on which the drilling machine rests.

November 24: The National Disaster Management Authority (NDMA) say that about 15 metres are still to be covered to reach trapped workers. The 25-tonne machine is restarted and drilling is resumed. However, in a fresh hurdle, the drill hits a metal girder halting the operation again.

November 25: Rescuers face a significant setback with the auger joint of the drilling machine breaking inside the rescue pipes and blocking the passage. This forces officials to consider switching to options that could drag on the rescue by several days, even weeks. Mobile phones and board games are sent to the 41 trapped workers to alleviate their stress.

November 26: A plasma machine from Hyderabad begins work to cut and bring out the broken auger machine. After the drill blade is removed, rescuers plan to manually dig through the remaining debris to reach the trapped workers. Vertical drilling, considered to be the second-best option, also starts from the top of the tunnel, completing 19.2 metres of digging.

November 27: Rat-hole mining experts help the rescuers in digging horizontally around 10 metres of rubble. Meanwhile, the vertical drilling from above the tunnel continues, reaching 36 metres of depth.

November 28: Rescue workers break through the last stretch of the rubble at about 7 pm as miners dug through the last 12 metres. All 41 workers are successfully brought out and taken to a medical centre in ambulances which had been lined up at the mouth of the tunnel.

Source: www.indianexpress.com, 29.11.2023

HR functional vision

The CEO, John, appreciated the finalization of the Finance function vision in several meetings, which motivated finance employees and created a sense of urgency among others. Aryan become a highly sought-after expert to facilitate. He was already being approached by all functional Heads to

assistance. Victor, Aryan's boss, and Head of HR asked Aryan and HR coordinator Emma to organize a meeting for the HR function at the earliest.

Aryan suggested Emma to seek help from Finance coordinator Robin and organize the meeting logistics on similar lines as of the Finance function. She may invite all HR section heads with one or two subordinates each who had a positive outlook. Victor requested John to chair the meeting and invited all functional Heads and coordinators. The purpose of calling all functional Heads was to demonstrate that HR was everyone's responsibility and not just the HR function. This time meeting was kept for full day on forthcoming Thursday as per the convenience of CEO and also to complete the exercise in one go.

Inaugurating the meeting, John highlighted importance of HR in individual life as well as for an organisation to establish a sense of purpose for humanity, which would steer decision-making and facilitate actions for well-being of mankind. It may help to build a better work environment and enhance employee engagement. HR vision may encompass attracting, nurturing, and retaining the talent, promoting employee engagement, creating a learning culture, providing growth opportunities for employees, and enhancing productivity by utilizing technology and innovation to support both the employees and management. The group discussed the HR vision in detail for four hours and arrived at the following statement:

> *"To foster a dynamic and diverse workforce that embodies the company's values, dedicated to achieving excellence through continuous learning, innovation, collaboration, and communication. We strive to improve employee well-being and the quality of life in society."*

In the post-lunch session, a few functional Heads left to attend to some exigencies, while others continued. The group identified the following measurable parameters and annual targets to accomplish the HR vision statement:

1. **Diversity and inclusion**: Ideally, workforce diversity ratio to reflect the broader population demographics, reduce the gaps, if any, by 5% annually. Ensure equal opportunities for career growth for all employee

2. **Compliance and ethical standards**: To ensure that all HR policies and practices comply with legal and ethical standards.

3. **Talent management and succession planning**: Identify 20% of employees having a high-potential based on a transparent 360-degree evaluation. Groom them to acquire 80% of leadership positions.

4. **Performance management effectiveness**: Achieve at least 90% completion of the individual /group annual performance targets that align with the company's strategic objectives and values.

5. **Learning culture**: To ensure at least 80% of employees participate in annual training programs and achieve average 40-hour training per employee.

6. **Employee-driven Innovations**: To implement at least 3 kaizens/ suggestions/improvements per employee annually.

7. **Collaboration**: Each employee to participate in at least 2 cross-functional teams annually.

8. **Communication**: 5% increase in the number of employees reporting ‘high satisfaction’ in employee surveys on internal communication parameter.

9. **Employee engagement**: Achieve a minimum score of 80% in employee engagement surveys and maintain the employee attrition rate below 10% annually.
10. **Work-life balance**: Flexible time working, Working from Home, etc. that allow employees to balance their work and personal life effectively and 80% satisfaction score on the work-life balance parameter in employee surveys.
11. **Quality of life for society**: Spend at least 2% of profit annually on corporate social responsibility. Undertake at least two environmental sustainability initiatives annually and encourage employees to volunteer their services for community outreach initiatives.

To conclude the discussion, Aryan said that important point is that chosen parameters align with the HR vision statement and set ambitious but achievable targets to drive progress toward the vision accomplishment.

Quality Head, Felix, was feeling the pressure being the only Apex Thinktank member left whose functional vision and targets not yet finalized. He congratulated HR function for a wonderful exercise and requested all functional Heads to participate in the meeting of Quality function next week. Like HR, Quality is also everyone's responsibility.

In the end, while thanking everyone, Victor requested all Heads to facilitate the active involvement of all leaders and that without their support these parameters can't be achieved. The HR function is a mere custodian, enabler, and facilitator of the HR processes.

- Dr. Balvir Talwar
Former Executive Director (HR&CC), BHEL

You are just one thought away from Happiness

Whom can we call the wisest? Is it the one who is the happiest, the one who is knowledgeable, or the one who is learned and holds many degrees?

Lord Krishna says in the Bhagwad Gita that the wise is the one who laments neither about the dead nor the living, neither about the past nor the future.

This ancient saying is relevant even today. We need to become wise and stop worrying about uncertainties of life.

Life is a journey from B to D, which stands for birth to death. Between B and D comes C, which stands for choice. Our choices make our life between the birth and death. Some choose to see the positive dimensions in everything, and others habitually look only at the negative side of every situation and thing. We need to train our minds to see the positives in everything.

There is a sub-conscious exercise that can develop in us the ability to see the beauty around. Write 10 positive things that happened to you through the day on a piece of paper, before going to sleep. This should be the last activity you do before sleep. It could be anything, like you enjoyed your snacks, you saw a beautiful bird, or you were calm in a particular conflict. By writing the positives that you felt that day, soon you will realise that the world is filled with amazing beauties and wonders. Life is beautiful. You will soon feel that you have everything in life to be happy, peaceful, and healthy. All complexities of life will break and life will seem so much simpler.

It is a powerful exercise the world needs today to change the way we look at present things. A small change in attitude can change the colours of your life to the brighter side.

In Yoga Sutra, Patanjali recommends a powerful attitude-based technique named Pratipaksh Bhavna, where you need to consciously think of a positive emotion every time you go through a negative state of mind. When you feel upset, think of events that filled you with joy, or do something that gives you happiness. Instantly do something contrary to your negative feelings. You will soon learn to execute the choice of being in a positive frame of mind.

The remote control of our mind is in our hands. We are the director of our own state of mind. Let's not make it more tragic and sentimental. Make it a happy ending and fill it with joy and fun. We are just one positive thought away from happiness and contentment.

Wise man is not the one who is learned or knowledgeable, he is the one who worries neither about the past nor about the future. Difficult times are just passing phases. Never allow them to define the happiness of life. When the summer ends, monsoon will arrive, acknowledge the changing nature of the world. Learn to adapt and be with the flow of uncertainties. Our attitude is in our hands.

Always choose to be happy, content and in learning state. Be wise. Be the lotus in the middle of the dirty mud.

- Hansaji Yogendra
Source: Times of India, 18.06.2023

Experience the blissfulness of being

The word's greatest mistake is to assume that bliss is a consequence of activity. In fact, the reverse is true. Most people divide activities into two kinds; pleasant and unpleasant. Once you label an activity pleasant, you hanker after it. Once you label an activity unpleasant, you try to avoid it. This is the beginning of human compulsiveness.

Once human beings are conscious, what would they choose; bliss or misery? The answer is self-evident. Once they are blissful, every activity becomes blissful. Whether it is praying or peeing, every activity can become a joyful process.

How then do we bring consciousness into our daily lives? There are many ways. Start with something as simple as sleep. Every night presents us with a tremendous possibility; of becoming aware of the dimension beyond death. Sleep is nothing but temporary death.

Make an attempt to be aware of the moment you transit from wakefulness to sleep. If that is difficult, try to become aware of the moment you transit from sleep to wakefulness. Try substituting an alarm with a sound, tune, or chant that reminds you to become aware-either of your breath, or your body. Once you achieve waking and sleeping with awareness, you have become deathless: when it comes to shedding your body, you will do so with absolute ease and awareness.

Another simple way is to bring love into your heart. Love is never between two people. It is what happens within you. Your interiority need not be enslaved to anyone else. Go sit with something that means nothing to you right now, may be a plant, pebble, or a chair. Do this for 15 minutes a day for a few days. After a while, you will find you can look upon it with as much love as you do your beloved spouse, parent, or child. Once you look at everything lovingly, the whole world becomes beautiful in your experience. This simple practice can become hugely transformative.

Yet another way to sharpen attention to the simplest activity is to set your kitchen tap so that only five or ten drops fall per minute. For 20 minutes a day, observe each drop – how it forms, falls,

splashes to the ground. You are actually exploring a limb of yog, called dharana, that which flows. This is an exercise in attention: turning what is intermittent and sporadic into a flow. Once your attention and awareness are in full flow your sensitivity and clarity increase tremendously. You begin to see that you and the water are not separate. Your sense of separateness was only your idea.

Activity is always a consequence of how you are. Without fixing your interiority, if you try to fix activity, you will only become enslaved. This is responsible for the range of human compulsion, from substance addiction to sexually. With a simple change in direction, you realise that external activity may be a trigger, but human experience is 100% self-created. If you are aware, you can activate your system in such a way that simply breathing is an enormous pleasure.

As master of your own well-being, you see that life is not a pursuit of bliss but an expression of it. You can turn every daily chore, every routine act of seeming domestic drudgery, into joyous action.

- Sadhguru Jaggi Vasudev
Source: Times of India, 26.08.2023

INDOROCK-2023: 9th Indian Rock Conference

IndoRock-2023 was organized by Indian Society for Rock Mechanics and Tunnelling Technology (ISRMTT) in association with Central Soil and Materials Research Station (CSMRS) at CSMRS auditorium during 16-18th November, 2023. The conference was inaugurated by Prof. T.N. Singh, Director, IIT Patna. Honorable Minister Counsellor, Royal Norwegian Embassy, Madam Marthine Aamdal Botheim and Dr. R. Chitra, Director, CSMRS also graced the occasion.

Conference lecture was delivered by Dr. Gopal Dhawan, former CMD, MECL and former Executive Director (Geotech), NHPC on 'Tunnelling Preparedness: Ensuring Success through Comprehensive Investigations'. The conference included presentations of 11 keynote lectures by eminent speakers who shared their valuable experiences and knowledge with the young budding engineers, geologists and other professionals working in the areas of rock mechanics, rock engineering and tunneling. A total of 36 oral presentations of technical papers were also made during the conference. Two special sessions on day 2 and 3 were also dedicated to 'Norwegian Method of Tunneling (NMT)' and 'Pumped Storage and Hydropower Projects' respectively. The special technical session on Norwegian Method of Tunneling (NMT) was chaired by Her Excellency, Ms. May-Elin Stener, Ambassodor, Embassy of Norway, New Delhi.

The conference proceedings containing the conference lecture, keynote lectures and technical papers was published in e-proceedings with few print copies and the proceeding was released during the inaugural session.

On the recommendations of Awards Committee, ISRMTT awards (Lifetime Achievement Award, ISRMTT Fellowships, Outstanding Contribution to Rock Mechanics, Excellence Performance Awards) for meritorious services in the field of Rock Mechanics and Tunnelling were conferred on eminent experts. 'ISRMTT Best Paper Awards' were also presented to the technical papers selected from the Journal of Rock Mechanics and Tunnelling Technology (JRMTT) and Indorock conferences. The awards have been given away for four years from 2019 to 2022 during the IndoRock-2023.

Apart from the galaxy of participants from across the length and breadth of India, delegates from Norway, Iran and Turkey also attended the conference. Nearly, 150 delegates from different organizations viz; CSMRS, NGI (Norway), RVNL, NHPC, WAPCOS, NIRM, CIMFR CBRI, NIT Srinagar, NIT Warangal, IIT Roorkee, AECOM and many more Central/State

Governments/Public/Private sector companies attended the conference. The conference was also graced by senior members of ISRMTT. ISRMTT founder member and the stalwarts of Rock Mechanics, Dr. A.K. Dhawan and Sh. U.S. Rajvanshi, also graced the occasion.

The conference got overwhelmed response from the sponsors who not only helped in meeting the financial needs, but also made corporate presentations highlighting their sphere of activities and showcasing their products for the benefit of participants. M/s Herrenknecht India Pvt. Ltd. supported the conference with Gold sponsorship followed by M/s WAPCOS, Gauge Geotechniques, Bajaj Reinforcements, Jyoti Vinyl Pvt. Ltd., PARSAN Overseas Pvt. Ltd., MAPEI Construction Chemicals India Pvt. Ltd., Tumas India Pvt. Ltd. and M/s WTS Geophysical Services as silver sponsors. Apart from this, Indian Geotechnical Services (IGS), NHPC Ltd., Reliance Industries Ltd., Sandvik Rock, SISO Software's India Pvt. Ltd. also contributed as Bronze sponsors.

M/s Gauge Geotechniques, WTS Geophysical Solutions, SISO Software Solutions also participated in the Exhibition and displayed their products.

ISRMTT acknowledges the notable support and contributions by Organising Committee, Technical Committees and all other committees including all the esteemed members of Executive Body in making this event a grand success.

- Er. Haridev
President, ISRMTT

Some of the Important Photographs of Indorock-2023

Lighting of lamp by the dignitaries

Release of proceeding volume


Inaguration program


Stalls outside the CSMRS auditorium

Dr. Subhash Mitra
Lifetime Achievement Award for 2019 and ISRMTT Fellowship (Award Received Dr. R.D. Dwivedi on his behalf)

Dr. T.N. Singh
Lifetime Achievement Award for 2020 and ISRMTT Fellowship

Dr. R.K. Goel
Lifetime Achievement Award for 2021 and ISRMTT Fellowship

Dr. R.K. Gupta
Lifetime Achievement Award for 2022 and ISRMTT Fellowship

Dr. D.V. Sarwade
Outstanding Contribution to Rock Mechanics Award for 2021

Dr. Sanjay Rana
Outstanding Contribution to Rock Mechanics Award for 2022

Dr. R.D. Dwivedi
Excellence Performance Award for 2019

Sumit Jain
Excellence Performance Award for the year 2020

Mahabir Dixit
Excellence Performance Award 2020

Amitabh Tripath
Excellence Performance Award for 2021

C.S. Khokhar
Excellence Performance Award for 2022

P. Sumana
Excellence Performance Award for 2022

Dr. A.K. Dhawan
Being Felicitated

Anupam Mishra
Being Felicitated

Closing Ceremony