

Deep-sea rock as a place to store carbon dioxide

As everyone knows, the world has a carbon dioxide problem, and there are many suggestions for dealing with it. One is sequestration, keeping the gas out of the atmosphere through long-term storage. A great idea, if you can figure out where to put it. Many ideas have been proposed – pumping it into old oil and gas fields or saline aquifers, to name a few. At the Lamont-Do-herly Earth Observatory of Columbia University, researchers propose injecting CO₂ into deep-sea basalt formations, specially a huge expanse of the rock under 8,000 ft of ocean on the Juan de Fuca plate in the Pacific Northwest. David S. Goldberg, Taro Takashashi and Angela L. Slagle suggest in *The Proceedings of the National Academy of Sciences* that these porous deposits have several advantages. One is that minerals in the rock would react with the CO₂, forming stable carbonates. Another is that the deposits are blanketed by 1,000 ft of sediments that could block leaks. And the area is near the coast, so CO₂ could be piped directly from power plants to injection sites. The researchers estimate there is enough basalt to hold more than 120 years' worth of industrial and power-plant emissions by the United States.

Source: Indian Express, July 20, 2008

Capillary trapping could anchor underground carbon dioxide

In recent years, scientists and engineers have explored the possibility of storing carbon dioxide emissions underground rather than releasing them into the air. But one of the major concerns with this alternative is that an earthquake or other disturbance could cause the entire plume of carbon dioxide to leak into the atmosphere. To address this concern, researchers at the Massachusetts Institute of Technology (MIT) and other universities have been studying a natural method by which the underground plume of carbon dioxide could be broken into small immobile blobs, thereby reducing the buoyancy of the gas and the potential for catastrophic leaks.

Prior research has determined that there are three types of underground geological formations in which carbon dioxide could be stored: emptied underground oil or gas reservoirs, coal seams that are too deep to be mined, and saline aquifers - strata of porous rocks that bear brackish water. According to Ruben Juanes, Ph.D., an Assistant Professor of Civil and Environmental Engineering at MIT saline aquifers are the focus of the research because they are plentiful and have the highest storage capacity of the three formations.

Juanes says that there are two phases involved in the process of storing carbon dioxide safely underground. In the first phase, the carbon dioxide – in the form of a pressurized super critical fluid – is pumped so far underground that pressures can exceed 10,000 kPa. The carbon dioxide migrates laterally from the injection point and forms a single

plume that rises through the pores in the rocks, displacing the briny ground water. Residual water not displaced by the plume clings to the rocks, Juanes says.

In the second phase, which comes after the injection, the plume rises through the pores in the rock, and the groundwater and carbon dioxide at the bottom of the plume jockey for position. As a result, the layers of residual water clinging to the rocks swell until they isolate the carbon dioxide within small blobs inside the rock. These blobs do not possess sufficient buoyancy to continue rising and are therefore rendered immobile. Juanes says that these small immobile blobs create 'a much safer scenario' than 'having a balloon of carbon dioxide that is mobile beneath a geologic barrier'. A small portion of the gas plume will continue to rise until it encounters an impermeable layer of rock.

Juanes and researchers from Stanford University and Imperial College, London, recently completed a computer simulation of the process. The aquifer in the simulation had a volume of 3.6 million m³. The initial pressure at the top of the aquifer was 90 bar and the temperature of the aquifer was 40°C, conditions ensuring that the carbon dioxide remained a super-critical fluid.

The researchers are now preparing to evaluate the process in a small scale pilot project in the laboratory. The endeavor will not employ the pressures used in the computer simulation, but it will monitor the process by which the carbon dioxide and the ground water compete for positions within the pores of the rocks.

According to Juanes, carbon dioxide sequestration has been investigated at MIT since 1989, but previous research has been related to the technology needed to capture the gas from such emitters as power plants. The sequestration research program's Web site (<http://sequestration.mit.edu/>) explains that past research has also included such topics as 'underground injection regulation, relevant international laws and treaties, property rights, and liability concerns'. MIT has long term plans to undertake a large scale pilot test of the sequestration process. Source : Civil Engineering, Volume 77, Number 6, June 2007.

Source: Technorama, I.E.T. News, March 27, 2008

Everest – The father of Indian geodesy

Gorge Everest was born in 1790. After completing a brilliant course as a cadet he was commissioned in the Royal Artillery (in U.K.) and sailed for India in 1806.

After service in Java, and on the construction of the telegraph system between Calcutta (Kolkata) and Benaras (Varanasi), he was appointed in 1810 as Lambron's Chief Assistant in the Great Trigonometrical Survey in India. In spite of a sea voyage to South Africa in 1820 Everest suffered continually from fever during his early years in the Survey; at times he was subject convulsive paroxysma attended with agonizing pain and his limbs were partly paralysed; he had to be lifted into and out of his seat when observing with the Zenith Sector, and his arms had to be supported when working with the Great Theodolite, though constantly warned that he must fall a sacrifice yet he resolutely continued his work and completed what he has set out to do. On the death of

Lambton, in 1823, Everest succeeded him as Superintendent of the Great Trigonometrical Survey and after a long visit on sick leave from 1825 October during which he studied the newest improvements and supervised the manufacture of instruments for the Survey, he returned to India to combine in his own person the appointment of the Surveyer General of India and Superintendent of Trigonometrical Survey.

In 1835, Everest again fell ill and at one time his recovery was pronounced to be beyond all hope; he was ordered home on sick leave, but refused to leave work as there was no one at that time trained to replace him.

Everest retired from India in 1841 and died in 1866 at the age of 76. He refused the knighthood offered to him on his retirement but accepted it together with C.B. in 1861; he was the Fellow of the Royal Society of London and a Vice President of the Royal Geographical Society.

“Everest was creative genius. The whole conception of survey, as it now exists was the creation of his brain. He completed one of the most stupendous works in the whole history of science. No scientific man ever had a grander monument to his memory than the Great Meridional Arc of India (vertical line of triangular network from Kanyakumari to Kashmir)”. (Markham).

Source: Survey of India Museum, Dehradun, India

ISRO launched PSLV C9 carried 10 satellites – SPACE FEAT

The Indian Space Research Organisation (ISRO) accomplished a feat by successfully launching 10 satellites in a single space launch when PSLV-C9 injected two Indian satellites and eight nano satellites into space from the Satish Dhawan Space Centre, Sriharikota on 28.4.2008.

“Today’s mission has been a remarkable success as we set a record injecting 10 satellites simultaneously. Though published material on space launches show Russia has launched 13 satellites in one launch we do not know how successful the results were, “ISRO Chairman G. Madhavan Nair told reporters.

The single-core version of India’s workhorse launcher PSLV boomed into a cloudy sky with a payload of 850 kg and after 10,200 seconds had precisely launched India’s Cartosat-2A, IMS-1 and the eight nano satellites designed by foreign universities. Nair announced that all satellites were functioning normally showing that the launch was better than a text book launch as it “closely resembled the ground simulation”.

“We have shown that we can successfully launch multiple launches in a precise manner and considering that this is 12th successful launch by the PSLV, we have a launcher that is reliable, versatile and flexible,” Nair added. Coincidentally IMS-1 is the 50th satellite to be launched from Indian soil.

Cartosat-2A is a state-of-the-art remote sensing satellite capable of taking images with a resolution of about one metre and across a swath of 9.6 km using a powerful lens. IMS-1 is a miniaturized remote sensing satellite with new technologies which would determine how remote sensing satellites are built in the future. Its camera can record images in the hyperspectrum and study mineral (rocks), soil and crop conditions and also the ocean.

Source: Hindustan Times dt. 29.4.2008

The mass of the matter

The 'greatest experiment' ever in physics will soon get under way. A gigantic machine in a vast tunnel below the French-Swiss border is ready to hunt down the 'God particle'. Named after British physicist, Peter Higgs, who first proposed it in 1964, Higgs boson is the ultimate particle that explains why all others have mass. Higgs showed how a field that clings to particles like electrons, photons, quarks, and gluons, produces their mass, making them heavy. Particles of light are oblivious to this, while others wade through it like an elephant in tar. In other words, particles can weigh nothing, but as soon as they are in the Higgs boson field, they become heavy. So the Higgs boson is dubbed the 'God particle', as it gives mass to all matter.

The only way to get at the elusive Higgs, however, is to recreate the conditions when matter must have first formed: the stupendous energy of the Big Bang. Scientists thought of slamming sub-atomic particles at each other at these energies so that the Higgs would reveal itself in the resulting sub-atomic rubble. But Higgs can be detected just once in every 10 trillion collisions. Physicists hope to do just that using the super-energetic Large Hadron Collider at the European Organisation for Nuclear Research, near Geneva. It is the most powerful high energy particle accelerator ever built and will whirl protons to near-light speed in a 17mile tunnel, with temperatures touching -271°C .

Finding Higgs will not only confirm how particles acquire mass, but could explain dark matter and dark energy that account for 96 percent of the Universe. For these sub-atomic collisions recreate on a small scale the conditions that prevailed in the infant Universe after the Big Bang. Higgs could even help to unify the four fundamental forces of nature: the strong and weak nuclear forces, gravity, and electro-magnetic forces. We will then know for sure whether space-time holds dimensions other than our own. Won't that make many of us go, "My God!"

Source: Hindustan Times, March 31, 2008

Taj Mahal to get facelift through mud pack therapy

The Taj Mahal is all set to get a facelift through the time-tested method of mud pack therapy. The chemical wing of the Archeological Survey of India is set to begin the project for which budget of Rs. 2.8 million has been sanctioned. ASI is to begin from minarets and shadow area of main dome.

It is believed that such mud pack therapies were given to Taj few years ago. Multani mitti, or Fuller's earth – with inherent bleaching properties – is made into a paste and applied to the surface to be treated for about 48 hours, after which it starts falling off by itself. The remaining paste is removed with water.

“It is a time-tested method employed by ASI's chemical wing and is widely accepted method the world over,” claimed Dr. D.N. Dhimri, the Chief Superintending Archaeologist for ASI's office in Agra. “Such techniques are used for monuments in Italy besides other places,” he informed.

“The budget has been sanctioned for the ongoing financial year and work might begin within a week or two’ added Dr. Dhimri. “We would utilize the opportunity to repair the joints requiring attention during this time of therapy,” he further revealed.

This mud pack therapy is basically aimed at removing sand particles carried by dusty winds and insects.

Note: Beauticians use multani soil for making skin of faces soft and clean and beautiful.

Source: Hindustan Times, New Delhi, Jan. 17, 2008

Indians sent home more money than anyone else

Indians abroad sent home the largest volume of money last year, followed closely by Chinese and Mexicans, said the World Bank's Migration and Remittances factbook. India also has the largest number of migrants, at 5.7 million.

According to the factbook released on March 19, migrant remittances to India last year were \$27 billion dollars (Rs. 1.08 lakh crore) while China received \$25.7 billion (Rs. 1.02 lakh crore).

The US remained the main source of remittances, among the developed nations, and – with 38.4 million migrants – it was the main destination for immigrants. The factbook provides statistics on migration, remittance flows and skilled emigration for 194 countries and 13 regional and income groups.

Ballooning migrant remittances have caught the attention of high-level policymakers. For 2007, recorded remittance flows across the world are estimated at \$318 billion (Rs. 12.72 lakh crore), \$240 billion (Rs. 9.6 lakh crore) of which went to developing nations.

These figures exclude informal channels, which would significantly expand the volumes if recorded.

“Migration is sometimes used as a political pawn and policies are too often based on misconceptions. By presenting the numbers and facts, this publication aims to present a more objective picture of a crucial aspect of development,” explained Uri Dadush, Director of the World Bank's Development Prospects Group and International Trade Department.

“In many developing countries, remittances are a lifeline to the poor,” said Dilip Ratha, Senior economist and author of the factbook, along with Zhimei Xu. “They are a stabilizing force for the economy”.

Source: Hindustan Times, March 24,2008

Orissa attracts \$50 bn investment: Government

Orissa has managed to rope in investment proposals worth over Rs. 2,00,000 crore (\$50 billion) for setting up mineral based industries, steel mills, power plants and alumina refineries, a top state government official said. “The investment projections for the next five years have already been met by 2007. The investment expected was around \$30-40 billion but it has already surpassed USD 50 billion,” Orissa’s Commissioner-cum-Secretary (Industry) Ashok Dalwai told reporters on the sidelines of “Aluminum India 2008” conference here [1 crore = 10million].

Source: Hindustan Times dt. 25.2.2008

India – Then and now

	1950 / 51	2007 / 2008
Population (crore)	36	112
Life expectancy at Birth (years)	32	63
Adult literacy rate (percent)	18	65
Inflation-adjusted per-capita annual income (Rs.)	5,708	22,553
Foodgrain production (million tones)	51	219
Cement production (million tones)	2.7	155
Export (\$ billion)	1.27	126.4
Foreign exchange reserves (\$ billion)	1.9	192

Source: Hindustan Times, 16.8.2008

Tata okay mega deals

\$13 bn Tata Steel purchase of Corus Group is India’s biggest takeover yet.

- The other big deal this year was by Tata Chemicals, which paid \$1.01 billion for U.S. based General Chemical Industrial Products Inc

Big and small

- Tatas will now make two of the world’s most prestigious brands, Jaguar and Land Rover \$2.3 billion, along with its least costly car, Nano (\$2500)

About the group

- The Tatas own 98 companies of which 27 are listed
- Group turnover was \$28.8 billion in 2006-07, equivalent to 3.2% of the country's GDP
- Operates in over 80 countries, spread over six continents
- Among the global companies acquired are Tetley of Britain (2004), Daewoo of South Korea (2004), Eight 'O'clock Coffee of US (2006) and Anglo-Dutch Corus (2007).

Source: Hindustan Times, 27.3.2008

Earthquake Do's and Don'ts*(a) What to Do Before an Earthquake*

- Check for potential fire risks, such as defective wiring and leaky gas connections. Bolt down water heaters and gas appliances.
- Know where and how to shut off electricity, gas and water at main switches and valves.
- Place large and heavy objects on lower shelves. Securely fasten shelves to walls. Brace or anchor top-heavy objects.
- Do not store bottled goods, glass, china, and other breakables in high places.
- Securely anchor all overhead lighting fixtures.
- 15 Survival items to keep on hand are -
 - (i) Portable radio with extra batteries
 - (ii) Portable fire escape ladder for buildings with multiple floors
 - (iii) Flashlight with extra batteries
 - (iv) First aid kit containing any specific medicines needed by members of household
 - (v) First aid book
 - (vi) Fire extinguisher
 - (vii) Bottled water
 - (viii) Adjustable wrench for turning off gas and water
 - (ix) Smoke detector
 - (x) Matches
 - (xi) Canned and dried foods for one week for each member of household
 - (xii) Non-electric can opener
 - (xiii) Telephone numbers of police, fire, doctor
 - (xiv) Portable stove with propane or charcoal
 - (xv) Cash (banks and automatic teller machines may be closed or inoperable)

(b) What to Do During an Earthquake

- If you are outdoors, stay outdoors; if indoors, stay indoors. During earthquakes, most injuries occur as people enter or leave buildings.

- If indoors, take cover under a heavy desk, table, bench, or in doorways, halls, or against inside walls. Stay away from glass. Don't use candles, matches, or other open flames either during or after tremor. Extinguish all fires.
- If in a high-rise building, don't dash for exits; stairways may be broken or jammed with people. Never use an elevator.
- If outdoors, move away from buildings utility wires, and trees. Once in the open, stay there until shaking stops.
- If in a moving car, drive away from underpasses and over passes. Stop as quickly as safety permits, but stay in vehicle. A car may shake violently on its springs, but it is a good place to stay until tremors stop. When you drive on, watch for fallen objects, downed wires, and broken or undermined roadways.
- The most common causes of Earthquake injuries-
 - (i) Building collapse or damage
 - (ii) Flying glass from broken windows
 - (iii) Falling pieces of furniture, such as bookcases
 - (iv) Fires from broken gas lines, electrical shorts, and other causes, aggravated by lack of water caused by broken water mains
 - (v) Fallen power lines

(c) *What to Do after an Earthquake*

- Be prepared for aftershocks.
- Check for injuries; do not move seriously injured persons unless they are in danger of sustaining additional injury.
- Listen to the radio for latest emergency bulletins and instructions from local authorities.
- Check utilities. If you smell gas, open windows and shut off main gas valve. Leave building and report gas leakage to authorities. If electrical wiring is shorting out, shut off current at main meter box.
- If water pipes are damaged, shut off supply at main valve. Emergency water may be obtained from hot water tanks, toilet tanks, and melted ice cubes.
- Check sewage lines before flushing toilets.
- Check chimney for cracks and damage. Undetected damage could lead to fire. Approach chimneys with great caution. Initial check should be from a distance.
- Do not touch downed power lines and objects touched by downed lines.
- Immediately clean up spilled medicines, drugs, and other potentially harmful materials.
- If power is off, check your freezer and plan meals to use foods that will spoil quickly.
- Stay out of severely damaged buildings. Aftershocks may shake them down.
- If you live along a coast, do not stay in low-lying coastal areas. Do not return to such areas until local authorities tell you that the danger of a tsunami has passed.

Source: U.S. Federal Emergency Management Agency (FEMA)

HUMOUR

Lessons in Marketing

A professor was explaining the following marketing principles to the students at an Institute of Management.

1. You see a gorgeous girl at a party, you go upto her and say, "I am rich. Please marry me." This is a direct marketing.
2. You are at a party with bunch of friends and see a gorgeous girl. One of your friends goes up to her and says pointing at you, "He is very rich. Please marry him." That is advertising.
3. You see a gorgeous girl at a party. You go up to her and get her telephone number. The next day, you call and say, "Hi! I am very rich. Please marry me." That is telemarketing.
4. You are at a party and see a gorgeous girl. You get up and straighten your tie, you walk upto her and pour her a drink, you open the door of your car for her, pick up her bag after she drops it, offer her ride and then say, "By the way, I am rich. Will you marry me". This is public relations.
5. You are at a party and see a gorgeous girl. She walks upto you and says, "You are very rich! Can you marry me?" This is brand recognition.
6. You see a gorgeous girl at a party. You go up to her and say, "I am rich. Marry me." She gives a nice hard slap on your face. That is customer feedback.
7. You see a gorgeous girl at a party. You go up to her and before you say anything, another person comes and tells her, "I am rich. Will you marry me!" and she introduces you to her husband. That is demand and supply law.
8. You see a gorgeous girl at a party. You go up to her and before you say anything, another person comes and tells here, "I am rich. Will you marry me!" and she goes with him. That is competition eating into your market share.
9. You see a gorgeous girl at a party. You go up to her and before you say, "I am rich. Will you marry me!", your wife arrives. That is restriction for entering new markets.

Pioneers

This issue of the Journal is dedicated to the following pioneers who have been constant source of inspiration.

- Countries who have become great are the one's who have made sports an integral part of the compulsory curriculum of education.

- Man Mohan Singh, Prime Minister of India, 2007

- I have chased to dream big and I have worked hard to accomplish those dreams.

*- Michael Phelps, Winner of 8 Gold Medals in Beijing Olympics, 2008
and total of 14 Gold Medals in Olympics*

- No gain without pain. I have made many mistakes but never look back. I eat fruits.

- Shane Warne

- God sleeps in the minerals, awakens in the plants, walks in animals, and thinks in man.

- Arthur Young

- Come forth into the light of things, let nature be your teacher.

- William Wordsworth

- A fool thinks himself to be wise, but a wise man knows himself to be a fool.

- William Shakespeare

- If you don't find God in the next person you meet, it's a waste of time looking for him further.

- Mahatama Gandhi

- There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.

- Albert Einstein

- The Candles are many, but the light is one.

- Rumi

- A nation can't afford to be materially rich and spiritually poor.

- John F. Kennedy

Blissful Thoughts

- God has given us fingers that they may be blessed by repeating his name with them.
- A. Kempis
- The only completely consistent people are the dead.
- Aldous Huxley
- One who utters truth at all times obtains eternal bliss.
- Ramayana
- The art of progress is to preserve order amid change and to preserve change amid order.
- A. N. Whitehead
- Compromise makes a good umbrella but a poor proof; it is temporary expedient.
- Dames Russel Lowell
- The fountain of all knowledge is in every one of us.
- Swami Vivekananda
- The fewer the words, the better the prayer.
- Martin Luther
- It is lack of faith that makes people afraid of meeting challenges – you have to believe in yourself.
- Muhammad Ali
- Happiness cannot be traveled to, owned, earned, worn or consumed. It is the spiritual experience of living every minute with love, grace and gratitude.
- Denis Waitley
- In the end, all religions point to the same light. In between, sometimes there are too many rules.
- Paul Coelho
- To be trusted is a greater compliment than to be loved.
- George Macdonald