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Daily News Feed

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How Ba'ath Party's six-decade-long rule in Syria came to a crashing end

NEWS ANALYSIS

Stanly Johny

The Hayat Tahrir al-Sham (HTS), the Syrian Islamist militant group, had been preparing for months for a large-scale offensive against the forces of Bashar al-Assad. The HTS, formerly called al-Nusra Front, the Syrian arm of al-Qaeda, had built a statelet in northwestern Syria's Idlib under the leadership of its 'emir', Abu Muhammed al-Jolani. The HTS and its ally Syrian National Army (SNA) had informed Turkiye, their patron, at least six months ago about the offensive plan, according to a *Reuters* report.

Mr. Assad's troops were in a bad shape. Soldiers were poorly paid and lacked motivation. Under crippling American sanctions, its finances were in shambles. During the peak of the civil war, in 2015-16, Mr. Assad had heavily relied on his external allies for security – Russia, Iran and Hezbollah. Now, the situation was different. The Russians were focused on Ukraine. Iran lost a host of its Syria commanders to Israeli strikes. Hezbollah had been weakened in a year-long war with Israel.

The HTS launched its offensive on November 27, the day Israel and Lebanon signed a ceasefire. On the 12th day, the Assad regime fell.

Offensive begins

When they launched the offensive, the militants' initial target was the western suburbs of Aleppo, Syria's second largest city. When HTS and SNA militants advanced towards Aleppo, they faced little resistance from government forces. Within four days, they reached Aleppo's city centre.

No challenge: HTS and SNA militants faced little resistance from the Army when they advanced towards Aleppo. AFP

The rapid collapse of government forces in Aleppo stunned both the militants and the regime alike. The HTS's victory triggered rebellion elsewhere in the country. In the south, local militias, who were backed by Jordan, started attacking government positions. In the northeast, the Syrian Democratic Forces (SDF), a Kurdish militia, started advancing towards the eastern city of Deir Ezzour. The HTS, the main militant group, marched south from Aleppo towards Hama. On December 5, they entered Hama.

Mr. Assad turned to Iran and Russia for help. But Syrian and other Arab officials say both Russia and Iran told the Syrian President that they could not help him much this time.

Mr. Assad's circle was shrinking. His troops were not fighting back. He was not getting any external help. The militants were on a march from multiple fronts. From Hama, the HTS advanced towards Homs, a strategically important city that sits at an intersection between Syria's Mediterranean coast and Damascus, the seat of power. On December 7, HTS-linked militants entered Homs. The next day, the Southern Front, militants from the south who had already taken Daara, entered Damascus first, followed by the HTS. Syria's Prime Minister Muhammad al-Jalali said he would ensure a peaceful transition of power, bringing the 60-year rule of the Socialist Ba'ath Party in Syria to a dramatic end.

Different rebel groups

The fall of the regime leaves a huge vacuum in Syria. Today, there are four major rebel coalitions in the country. First, the HTS, led by Jolani.HTS telegram channels already call him 'President' Shara, referring to his real name, Ahmed Hussein al-Shara. The HTS has built a government in Idlib and has some 25,000 soldiers under its command. But that may not be enough to run a vast country like Syria. The HTS certainly wants to play a key role in the new Syria, and has sent reconciliatory messages to the country's different sects and militias. The SNA is an ally of the HTS and a proxy of Turkiye.

Second, the local militias in the south. That they entered Damascus first was a clear message to Jolani that he was not the only 'rebel' in the game. Third, is the SDF, the Kurdish militia. In the northeast, the Kurds have enjoyed relative autonomy since the beginning of the civil war. But Turkiye was alarmed by the Kurds's growing strength and had launched incursions into Syria in the past, grabbing territories on the border. .

And finally, there are the Alawites, Mr. Assad's sect who live mostly in the mountainous coastal regions of Latakia and Tartus, and has enjoyed power for nearly 50 years. The Alawites were the backbone of the Syrian Army. They are unlikely to immediately trust Jolani, a committed Salafi Islamist militant, whose group in the past had carried out targeted attacks against Alawites.

Syria is a diverse country. It now has a diverse set of militias, without a central authority. And then there are external players. Turkiye, as the main supporter of northern militias (HTS and SNA), would seek to extend its influence in the government formation.

Jordan would like to see the southern militias getting their due. The Gulf Arabs, who are wary of both Islamists and Turkiye, would be alarmed by the developments. Iran risks losing its territorial link with Hezbollah. Russia's primary objective would be to safeguard its Tartus naval base and Khmeimim air base. And Israel has already sent troops to capture land in Syria's Golan Heights and is carrying out massive air strikes aimed at destroying Syria's military capabilities.

Rival LNG supplies, depleting fields give Japan an exit from Russian gas

Since Russia's 2022 invasion of Ukraine triggered fresh sanctions, Japanese buyers have increased reliance on allies such as the U.S. and Australia; new supplies from Alaska and Canada, only a few days further away than Sakhalin and with much lesser geopolitical risk, can benefit from this trend

NEWS ANALYSIS

Reuters
TOKYO

As Japan's long-term contracts to secure liquefied natural gas (LNG) from Russia's Sakhalin-2 project near expiration, rival producers see an opportunity to fill the supply gap, even as Tokyo looks to switch to cleaner energy, industry insiders say.

The country's declining demand for gas plus geopolitical pressure on Tokyo to curb its reliance on fuels from Russia mean Japanese buyers may not want to renew all of their contracts with a supplier long favoured for its proximity and reliability.

Japan, the world's second biggest liquefied natural gas (LNG) buyer, depends on Russia for 9% of its LNG, or 6 million metric tons per year, 5 million of which come from the long-term contracts at Sakhalin-2 run by the Kremlin-controlled Gazprom .

The project also has strong ties with Japanese industry, with trading giants Mitsui and Mitsubishi owning a combined 22.5% in the project.

Sakhalin-2's big advantage over rivals is that it is located just a few days away from Japan by sea. By comparison, shipments from Australia, Canada and the U.S. are more than a week away.

Fragile supply: Japan depends on Russia for 9% of its LNG, or 6 million metric tons per year. REUTERS

But with Japan's western allies seeking to isolate Moscow over its war on Ukraine, Sakhalin-2 is out of favour, though the project is exempt from U.S. sanctions.

"Maintaining the same level of supply from Russia may prove challenging due to the agreement among G7 members to reduce reliance on Russian energy," an official at Japan's industry ministry said, adding that final decisions rest with buyers.

At the same time, with Japan's sluggish power demand and its push towards cleaner energy, the need for LNG is all set to fall. Tokyo wants gas to make up 20% of the country's power generation by 2030, down from 33% last year, and renewables to grow to 38% from 26% over the same period.

> Maintaining same level of supply from Russia may prove to be challenging due to the G7 pact to cut reliance on Russian energy
> Official at Japan's industry ministry

"There is a lot of renewable energy produced in our region, so the question of whether to renew the contract or not will depend on future renewable energy capacity," an executive at one of the Sakhalin-2 buyers from Japan told Reuters.

Japan's long-term pacts for Sakhalin-2 will expire between 2026 and 2033, starting with top power generator JERA's 0.5 million ton annual supply agreement.

Rival supply

Since Russia's 2022 invasion of Ukraine triggered fresh sanctions, Japanese buyers have increased reliance on allies such as the United States and Australia, as well as Malaysia and Oman, securing equity in LNG projects and long-term supply.

Rivals to Russian LNG are looking to build on that trend. Supplies from new projects in Alaska and western Canada are well-positioned, only a few days further away than Sakhalin and with much lesser geopolitical risk.

U.S. Senator Dan Sullivan of Alaska has visited Japan and South Korea four times in the last two years to pitch the yet-to-be-developed Alaska LNG project to Asian buyers, meeting in August with Japanese government officials including then-Prime Minister Fumio Kishida.

"This remarkable resource is a strategic asset, not just for the U.S. and Alaska, but for our allies in Asia. It will help us immensely in fending off an aggressive CCP (Chinese Communist Party) and get our allies in Japan and Korea off of Russian gas," he told Reuters by email.

President-elect Donald Trump, meanwhile, is preparing to approve export permits for new LNG projects that had been halted under the current Biden administration, sources told Reuters.

In May, the Business Council of Canada, an advocacy group, opened a new office in Japan.

"One of the top markets we are looking at is LNG," said special adviser Heather Exner-Pirot, citing the opportunity to displace Russian supplies as Canada prepares to start LNG exports, including to Japan, next year through the Shell-led LNG Canada project.

Two smaller LNG projects are due to start operating in 2027 and 2028.

Canadian gas companies are in talks with Japanese firms to supply more LNG, with production set to begin not far behind the expiration of the Sakhalin-2 contracts, an industry source said.

While those LNG developers court Japan, there is uncertainty over new Russian contracts as Sakhalin-2's main gas field, Lunskoye, nears depletion. Stable production is expected only until 2033, Russian news agency Interfax reported in June, citing Gazprom.

Gazprom has bet on developing the Yuzhno-Kirinshoe offshore field nearby, but the U.S. imposed sanctions on it in 2015. The field was initially expected to start producing in 2021 but Gazprom secured a drilling platform for its first well only in July.

Japan has locked in LNG supply to meet demand through 2030, said Daisuke Harada, a research director at the state-owned Japan Organization for Metals and Energy Security.

"However, there is a possibility that in the early 2030s there could be an LNG shortage ... so some companies don't necessarily need to renew their contracts (with Sakhalin-2), while some may have no choice but to do so," Mr. Harada said.

Has the government clarified its stance on ONOS?

Why did the 'One Nation, One Subscription' plan invoke criticism after it was unveiled last month?

The Hindu Bureau

The story so far:

On November 25, the Indian government announced the launch of its 'One Nation, One Subscription' (ONOS) plan to improve access to research journals for the country's public education and research institutes. The announcement was accompanied with scant details and broached widespread criticism from the research community, especially over what was perceived to be its disproportionate expense and lack of support for open-access publishing. On December 11, government officials conducted a press conference in New Delhi that addressed many of these concerns.

What is ONOS's purpose?

When scientists conclude an experiment, they write up their methods and findings and publish it as a paper in a journal. The journal collects, reviews, edits, publishes, and archives these papers as a service to other scholars and the people at large. In exchange, journals levy a fee. Subscription-based journals charge readers a fee to read papers. Some forms of Open-Access (OA) journals, called 'gold' OA, charge researchers to publish their paper. Institutes in India had subscribed to subscription journals through 10 or so consortia within the country. ONOS will replace these consortia as a single window through which all government-funded institutes in the country will be able to access more than 13,000 journals published by 30 major international publishers.

Why did ONOS provoke criticism?

At the time of announcement, a Ministry of Education press release didn't specify which journals would be part of ONOS, how ONOS would be implemented, how its allocation of ₹6,000 crore (for three calendar years) would be spent, and how ONOS would support efforts to make research OA. Experts on the topic also asked whether the allocation for foreign journals could have been used to support domestic publishing efforts instead.

Also it wasn't clear whether ONOS would help scientists pay to publish in gold OA journals or whether these payments – called article processing charges (APCs) – could be discounted.

What was revealed on December 11?

The press conference was attended by officials from the office of the Principal Scientific Advisor (PSA), the Department of Science & Technology, and the Department of Higher Education.

The package: Students and staff at all public institutes will be able to access all papers in the journals participating in ONOS irrespective of their discipline. Negotiations are underway to bring in more journals.

Phases: Remya Haridasan, a scientist at the PSA's office, said the government would implement ONOS in three phases: (i) merge all the consortia and work to facilitate journal access in all public institutes; (ii) expand to include private institutions; (iii) create "universal access" to all citizens "through designated access points at public libraries".

Open access: In a pilot, ONOS would set aside ₹150 crore a year to pay for APCs. The government has also negotiated APC discounts for researchers to publish in certain OA journals. The officials said they are aware of transformative OA models and that ONOS would encompass them as it progressed. As of today, they said, around 65% of papers published by Indian scientists were in subscription-based journals.

Domestic efforts: Officials at the press conference acknowledged the need to support domestic publishers. They said there were five repositories in the country – servers where researchers could deposit digital copies of their papers and where others could freely access them – but that scientists were using them to a less-than-ideal degree. They added that other efforts need to take place, such as "enhancement, promotion, and support of Indian journals" and changes in how institutes evaluate the work of researchers, especially to reduce dependence on journal titles and increase focus on the merit of each person's work.

THE GIST

- On November 25, the Indian government announced the launch of its 'One Nation, One Subscription' (ONOS) plan to improve access to research journals for the country's public education and research institutes.
- At the time of announcement, a Ministry of Education press release didn't specify which journals would be part of ONOS, how ONOS would be implemented, how its allocation of ₹6,000 crore (for three calendar years) would be spent, and how ONOS would support efforts to make research OA.
- On December 11, government officials conducted a press conference that addressed many of these concerns.

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'Excessive heat' among most searched terms in 2024 in India

The top searches were otherwise dominated, as usual, by sporting events and elections

DATA POINT

The Hindu Data Team

In 2024, cricket and elections dominated Google searches in India. The Indian Premier League was the most searched term, followed by the T20 World Cup, Bharatiya Janata Party (BJP), and election results 2024. The Olympics 2024 was the fifth most searched keyword. Excessive heat ranked as the sixth most searched term, highlighting concerns about extreme weather events. Industrialist Ratan Tata, who passed away in October, was the seventh most searched keyword. The Congress secured the eighth spot, while the Pro Kabaddi League and the Indian Super League secured the ninth and tenth spot.

Chart 1 shows the most searched terms in 2024 in India and the week these terms trended. The darkest shade points to the week when interest peaked in a particular news term, while the lighter shades point to the other weeks when the term was searched but there was relatively less interest in it.

Wrestler Vinesh Phogat was the most searched personality this year. *Heeramandi*, *Mirzapur*, and *The Last of Us* were the most searched shows. *Stree 2*, *Kalki 2898 AD*, and *12th Fail* were the most searched movies. The terms 'All eyes on Rafah', 'Aakay', and 'cervical cancer' were the most searched for their meanings by Indians. Aakay is the name of Virat Kohli and Anushka Sharma's son.

'AQI near me' was searched the most in the 'near me' category, followed by 'Onam Sadhya near me', and 'Ram Mandir near me'.

Chart 2 shows the same information for searches across the world. Copa America and the UEFA European Championship were the top two searches. Singer Liam Payne, U.S. President-elect Donald Trump, and Princess of Wales Kate Middleton were among the top 10.

Chart 1 The chart shows the most searched terms in India in 2024 and the week these search terms trended. The darkest shade points to the week when interest peaked in a particular news term. The lighter shades point to interest on other weeks

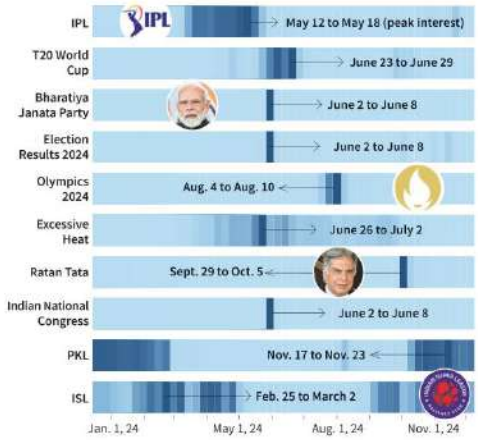

Chart 2 The chart shows the most searched terms globally in 2024 and the week these search terms trended. The darkest shade points to the week when interest peaked in a particular news term. The lighter shades point to interest on other weeks

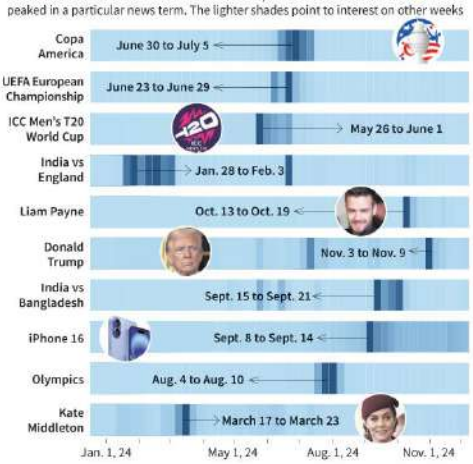

Table 3 The top 10 most searched phrases in India across various categories throughout 2024

MOVIES:	SHOWS:	HUM TO SEARCH: TOP SONGS	PEOPLE: 1. Vinesh Phogat | 2. Nitish Kumar	MEANING:	NEAR ME: 1. AQI
1. Stree 2 | 2. Kalki 2898 AD | 3. 12th Fail	1. Heeramandi	1. Naadaniyan	3. Chirag Paswan	1. All Eyes on Rafah	2. Onam Sadhya
4. Laapataa Ladies	2. Mirzapur | 3. The Last of Us | 4. Big Boss 17	2. Husn | 3. Illuminati	4. Hardik Pandya	2. Aakay	3. Ram Mandir
5. Hanu-Man	5. Panchayat	4. Katchi Sera | 5. Ye Tune Kya Kiya | 6. Aaj Ki Raat	5. Pawan Kalyan	3. Cervical Cancer	4. Sports Bars
6. Maharaja	6. Queen of Tears	7. Jo Tum Mere Ho	6. Shashank Singh	4. Tawaif | 5. Demure	5. Best Bakery
7. Manjummel Boys	7. Marry My Husband	8. Yeh Raatein Yeh Mausam - Lofi | 9. Aasa Kooda	7. Poonam Pandey	6. Pookie	6. Trendy Cafes
8. The Greatest of All Time | 9. Salaar	8. Kota Factory	10. MASHA ULTRAFUNK	8. Radhika Merchant	7. Stampede	7. Polio Drops
10. Aavesham	9. Big Boss 18		9. Abhishek Sharma	8. Moye Moye	8. Shiva Temple
	10. 3 Body Problem		10. Lakshya Sen	9. Consecration	9. Best Coffee
				10. Good Friday	10. Hanuman movie

Chief Justices need longer tenures

N.L. Rajah

Senior Advocate, Madras High Court

In September, Chief Justices were appointed to eight High Courts across India. While a good move, the fact that all of them, with the exception of one, will have very short tenures is unfortunate. This is a persistent problem that calls for urgent remedial action since it affects the institutional effectiveness of the judiciary.

Short tenures

In fact, one Chief Justice has already completed his tenure. Justice Rajiv Shakdher, who was Chief Justice of the Himachal Pradesh High Court, retired after just 24 days, on October 18. Just as he was settling into his role, he had to attend his farewell. Justice Manmohan, who had been serving as the Acting Chief Justice of the Delhi High Court, was sworn in as Chief Justice on September 29. On December 3, the Union government announced the appointment of Chief Justice Manmohan as a judge of the Supreme Court. Justice Tashi Rabstan will serve a tenure of about six months as Chief Justice of the High Court of Jammu and Kashmir and Ladakh. Justice Suresh Kumar Kait, who was appointed as the Chief Justice of the Madhya Pradesh High Court, has a tenure of about eight months. Justice K.R. Shriram, appointed as Chief Justice of the Madras High Court, will serve a one-year tenure. Justice Indra Prasanna Mukerji, the Chief Justice of the Meghalaya High Court, will also be retiring around the same time as Justice Shriram. Justice Nitin Madhukar Jamdar, Chief Justice of the Kerala High Court, has a tenure of about 15 months. The only judge who is will serve a relatively long tenure of about four years is Justice M.S. Ramachandra Rao, who has been appointed as Chief Justice in Jharkhand.

The Chief Justice of a High Court plays a pivotal role in sustaining the all-round health of the institution. The Chief Justice administers the institution, tracks its financial health, plays an important role in recommending names for judgeship, constitutes various committees to administer the institution, attends to the welfare of the staff of the High Court, takes disciplinary action against erring trial court judges and staff when warranted, arranges for defence of such action before appropriate authorities when questioned, responds to innumerable mundane administrative requests, accepts invitations and participates in various symposia, seminars, and functions that are not necessarily restricted to law, participates in functions organised by the Bar Councils and various advocate associations across the State, and addresses problems related to legal education in the State apart from, of course, discharging the function as the top judicial authority of the State. Clearly, doing all of this in the time available is a daunting task.

> By the time Chief Justices have understood the functioning of the Court, it is time for them to retire

High Courts are not compact institutions. Further, the tasks that need the attention of a Chief Justice in a High Court situated in one part of the country could be vastly different from what is required of a Chief Justice in a High Court in another part of the country. To understand each of these institutions in their entirety or even substantially takes time and effort. Most Chief Justices barely understand the requirements of the institution by the time their terms cease.

A lot has been said about the short tenure of Chief Justices. During his farewell speech in 2022, Supreme Court judge Justice L. Nageswara Rao said those elevated as judges to the top court must get a "minimum seven to eight years" in office "if not 10 years". He said, "It takes them (Chief Justices) 1.5 to two years to understand how the Court functions here because it is completely different from the High Courts." He added that by the time they settle down, "they are looking at their retirement". Several Chief Justices who have retired after brief tenures have voiced similar sentiments. This is a similar lament among Chief Justices of the High Courts too. Yet, little attention has been paid to the problem.

A lesson from the British

It was not so during British rule. Back then, it was a norm for Chief Justices to have long tenures. The Madras High Court came into existence in 1862. When it completed 150 years in 2012, it had completed 85 years as a Court in British India and 65 years as a Court in independent India. The first Chief Justice was Sir Colley Harman Scotland. In 1947, when it had completed 85 years, the Madras High Court had had just 11 Chief Justices. Each of them had enjoyed an average tenure of a little less than eight years. During the Madras High Court's 150th year celebrations, Justice M.Y. Iqbal was the 35th Chief Justice. So, in 65 years, the Court had had 24 Chief Justices, which means the average tenure of those judges was hardly 2.75 years. The average term reduces further when we deduct the tenures of Chief Justice P.V. Rajamannar, who served a term of 13 years, and Chief Justice Veeraswami K., who had a tenure of about seven years. This means that there were 22 Chief Justices in 45 years, which brings down the average term of each to merely more than over two years.

While the tasks of Chief Justices are only increasing and becoming more complicated, the duration given to them to address these are becoming shorter and shorter. When the system provides such little time for the incumbents to even understand the system, what scope is there for innovation, reform, and improvement?

The attempt here is not to provide prescriptions to the malady. It is to emphasise that the problem needs to be addressed. It can only be resolved by a joint deliberation of stakeholders, including the Bar. It is important that they evolve a solution before the problem seriously affects the system.

A wide aisle

Parliament must remain the forum for airing the views of all representatives

In a move that is unprecedented in India's parliamentary history, 60 Members of the Rajya Sabha have expressed a loss of confidence in the Chairman, Jagdeep Dhankhar, who is also the Vice-President of India. These Members of Parliament, from the Opposition, have given notice for a resolution seeking his removal from office. The resolution is unlikely to face a vote, and will be defeated if it does. But that is beside the point. What is real and damaging for democracy is the trust deficit between the Chair and the Opposition members. Mr. Dhankhar's rulings and his public statements have been cited by the Opposition as proof of his partisanship. Mr. Dhankhar's decision to allow Bharatiya Janata Party (BJP) MPs to speak on the subject of an adjournment motion that he himself had rejected on December 9 was the final trigger for the extreme step by the Opposition. These members also see, among other things, a pattern of the Leader of the Opposition in the Rajya Sabha, Mallikarjun Kharge, being disallowed to speak, and Mr. Dhankhar publicly amplifying views of the government and berating those of the Opposition. Most often, it is career politicians who are elected, through a partisan contest, to supposedly apolitical positions such as President, Vice-President and Speaker of the Lok Sabha. Once in office, they largely stay above the fray. Hence, the notice for a no-confidence motion against the Rajya Sabha Chairman marks an unfortunate turn for democracy.

It is no coincidence that all this comes against the backdrop of a constant campaign by the BJP to shrink the Opposition space. Criticism of the government is portrayed as an anti-national act, and institutions and individuals are often targeted through insinuations. There is little engagement between the BJP and the Opposition. If Parliament merely becomes yet another platform for political diatribe, it will erode rather than reinforce democracy. The message from parliamentary proceedings to the citizenry should be that the government is sensitive to their voices. The government's defence of Mr. Dhankhar included a reference to his caste, and condemnation of the principal Opposition party, with the insinuation that it was anti-India. While the government gets its way by virtue of its majority, the Opposition must have its say. When Parliament is held hostage to hostility between the government and the Opposition, the Chair is expected to mediate and find a way forward. This role of the Chair is possible only when its occupant is neutral and seen as such. Regardless of the merit of the grievances, the Chairman could take a proactive approach to reassure his critics that he is above the political fray for the sake of institutional integrity.

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Spiral galaxy NGC 628, located 32 million light-years away, in an image taken by the James Webb Space Telescope. REUTERS

Webb confirms the cosmos is expanding at unexpected rate

Reuters

Fresh corroboration of the perplexing observation that the universe is expanding more rapidly than expected has scientists pondering the cause – perhaps some unknown factor involving the mysterious cosmic components – dark energy and dark matter.

Two years of data from NASA's James Webb Space Telescope have now validated the Hubble Space Telescope's earlier finding that the rate of the universe's expansion is faster – by about 8% – than would be expected based on what astrophysicists know of the initial conditions in the cosmos and its evolution over billions of years. The discrepancy is called the Hubble Tension.

The observations by Webb, the most capable space telescope ever deployed, appear to rule out the notion that the data from its forerunner Hubble was somehow flawed due to instrument error.

"This is the largest sample of Webb Telescope data – its first two years in space– and it confirms the puzzling finding from the Hubble Space Telescope that we have been wrestling with for a decade – the universe is now expanding faster than our best theories can explain," said astrophysicist Adam Riess of Johns Hopkins University in Maryland, lead author of the study published on Monday (December 9, 2024) in the Astrophysical Journal.

"Yes, it appears there is something missing in our understanding of the

The observations by Webb, the most capable space telescope ever deployed, appear to rule out the notion that the data from its forerunner Hubble was somehow flawed due to instrument error

universe," added Riess, a 2011 Nobel laureate in physics for the co-discovery of the universe's accelerating expansion. "Our understanding of the universe contains a lot of ignorance about two elements – dark matter and dark energy – and these make up 96% of the universe, so this is no small matter."

"The Webb results can be interpreted to suggest there may be a need to revise our model of the universe, although it is very difficult to pinpoint what this is at the moment," said Siyang Li, a Johns Hopkins doctoral student in astronomy and astrophysics and a study co-author.

Dark matter, thought to comprise about 27% of the universe, is a hypothesised form of matter that is invisible but is inferred to exist based on its gravitational effects on ordinary matter - stars, planets, moons, all the stuff on Earth - which accounts for roughly 5% of the universe.

Dark energy, believed to comprise approximately 69% of the universe, is a hypothesised form of energy permeating vast swathes of space that counteracts gravity and drives the universe's accelerating expansion.

What might explain the anomalous expansion rate? "There are many hypotheses that involve dark matter, dark energy, dark radiation – for example, neutrinos (a type of ghostly subatomic particle) – or gravity itself having some exotic properties as possible explanations," Riess said.

The researchers employed three different methods to measure a specific telltale metric – distances from the earth to galaxies where a type of pulsating star called Cepheids has been documented. The Webb and Hubble measurements

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Climate impact of exploring space passing below the radar

Making satellites is an energy-intensive process. Every launch also releases carbon dioxide, black carbon, and water vapour. Rocket propellants deplete the ozone layer and disrupt atmospheric circulation. Satellites burning up in the air release ash into the atmosphere's middle layers

Shrawani Shagun

As the world becomes more reliant on space technology for vital functions like climate monitoring, the environmental consequences of space activities also become increasingly urgent and in need of more attention. The rapid growth of the number of satellites in orbit has led to concerns about interference with climate monitoring systems and the accumulation of orbital debris. With no specific international regulations addressing these challenges, it is crucial the world's governments act quickly to ensure space exploration doesn't drift into unsustainability.

A SpaceX Falcon 9 rocket lifts off from Cape Canaveral Space Force Station, Florida. The rocket carried 23 Starlink satellites. AP

How rockets affect the environment

Every rocket launch releases carbon dioxide, black carbon, and water vapour into the atmosphere. Black carbon is of particular concern because it absorbs sunlight 500 times more effectively than carbon dioxide does, amplifying global warming. As commercial space ventures become more common, the cumulative impact of these emissions will worsen.

Rocket propellants, especially those using chlorine-based chemicals, deplete the ozone layer at high altitudes, increasing exposure to ultraviolet radiation on the ground as well as disrupting atmospheric circulation – both of which affect the global climate. According to a December 9 article in *MIT Tech Review*, when satellites "burn up in the atmosphere" once their missions end, they release "satellite ash in the middle layers of the earth's atmosphere. This metallic ash can harm the atmosphere and potentially alter the climate."

Next, like many other forms of manufacturing, the production of satellites demands energy-intensive processes involving metals and composite materials, whose extraction and preparation have large carbon footprints of their own. Satellites also use propulsion systems to adjust their location and orientation in orbit, and their emissions add to the overall count. Equally, the rise of space mining – e.g. extracting valuable (on the earth) minerals from asteroids – could lead to increased industrial activity both in space and on the ground. Such mining activities haven't begun yet, but they are sure to be part of the future.

While space technology supports essential climate monitoring and disaster management, the environmental costs for the earth's atmosphere and space are escalating, requiring urgent redressal.

Dangers of orbital debris

Orbital debris, or space junk, refers to defunct satellites, spent rocket stages, and pieces of satellites produced when they break apart in low earth orbit (LEO). According to the European Space Agency, as of September 2024, there had been around 6,740 rocket launches since 1957 that placed 19,590 satellites in orbit. Around 13,230 are still in space, and of them 10,200 are still functional.

Since the space in earth's orbit is a resource just like water bodies and land masses on the ground, the occupation of orbits by non-functional objects constitutes a form of pollution as well – with the added threat of risk magnification.

For example, space surveillance networks have catalogued around 36,860 space objects thus far, including those produced in the 650+ fragmentation events (break-ups, explosions, and collisions). The total mass of all space objects in orbit exceeds 13,000 tonnes. As this mass continues to increase, the collision risks to satellites increase as well. Most space junk can reach speeds of up to 29 km/hr. When moving so fast, even a minuscule piece of metal can smash through a satellite like a bullet, damaging critical components, including those used for communication, navigation, and to monitor climate parameters of merit.

Orbital debris also poses an indirect threat by interfering with scientists' ability to collect data about the earth – from tracking disasters to monitoring weather – from space, such as by interfering with radio waves. Such threats also obligate satellite operators to invest in shielding satellites and actively perform costly manoeuvres to avoid collisions; both requirements drive up mission cost.

The risks are even more significant for human-crewed missions. For example, the International Space Station frequently adjusts its orbit to avoid debris.

The mass of objects in orbit exceeds 13,000 tonnes. As this increases, the collision risks increase as well. Most space junk can reach speeds of up to 29 km/hr. Even a minuscule piece can smash through a satellite

Barriers to space sustainability

Regulation is key to ensuring space remains accessible and space activities remain environmentally sustainable. Without clear guidelines, the unchecked growth of emissions and debris will harm the earth's climate and increase the barriers to future space exploration.

Space activities currently fall outside international sustainability instruments like the Paris Agreement, so governments need to establish standards for emissions from rockets and satellites to prevent them from becoming overlooked contributors to global warming.

Without regulations, the increasing number of satellites and debris will overcrowd LEO, rendering future missions more expensive, which in turn would subtract from space's identity as a shared global resource that needs to be equally accessible to everyone. International cooperation through bodies like the Committee on the Peaceful Use of Outer Space (COPUOS) is necessary to create enforceable standards in this context.

Governments can also ensure such frameworks align with the Outer Space Treaty's principles of responsible use of space while addressing the treaty's current lack of binding provisions. This unity is particularly crucial if countries are to address the environmental impacts of space activities.

Achieving sustainability

Achieving sustainability in space exploration requires innovative solutions, which also present challenges of their own. For example, reusable rockets like those developed by SpaceX and Blue Origin reduce manufacturing waste and lower costs by allowing engineers to reuse rocket components in multiple missions. But the reusable parts are often heavier, which increases fuel consumption. These also have limited applicability for high-orbit missions, and their wear and tear invokes costly refurbishments. Thus scaling this technology while maintaining efficiency remains a hurdle.

Second, transitioning to cleaner fuels like liquid hydrogen and/or biofuels can minimise harmful emissions during liftoffs. However, hydrogen is currently produced with non-renewable energy, negating its environmental benefits. Cryogenic fuels – which provide more thrust for the same mass – are more expensive and more complex to handle, keeping them out of reach of smaller operators. Electric propulsion is another option, but its low thrust restricts its use to specific missions like in-orbit manoeuvres.

Third, designing satellites with biodegradable materials that naturally disintegrate during re-entry can prevent long-term debris accumulation. On the flip side, these materials currently lack the durability required for the extreme conditions of space. High development costs and limited adoption further slow progress. Autonomous debris removal (ADR) technologies such as robotic arms and laser systems also offer hope for cleaning up orbital debris, but again, they are currently expensive as well as need more legal clarity before they can begin to operate safely.

A global traffic system to monitor satellites and debris in real time could reduce collisions and optimise orbit use. Resistance to data sharing, including due to security and commercial concerns, and the lack of a unified international authority hinder its development, however.

None of these hurdles are permanent, of course. Moreover, whereas individual solutions face significant challenges, a combined approach may be more feasible.

For example, binding agreements through COPUOS can standardise emission limits, debris mitigation, and data-sharing practices; governments and private entities can prioritise funding for green technologies, ADR systems, and satellite biodegradability; and financial rewards, subsidies, or penalties can nudge private actors towards sustainable practices.

At the intersection of technological advancement and environmental responsibility, the choices we make today will define the future of space exploration.

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ILO report asks nations to uphold freedom of association at work

A.M. Jigeesh
NEW DELHI

The Social Dialogue Report of the International Labour Organisation (ILO), released in Geneva on Wednesday, has recommended the governments to uphold fundamental principles and rights at work, especially freedom of association and the effective recognition of the right to collective bargaining.

The report, focusing on 'peak-level social dialogue' (PLSD), also asked the member countries to equip labour administrations and social partners with the necessary resources and technical capacities for effective participation in PLSD.

It found that countries' compliance with freedom of association and the effective recognition of the right to collective bargaining had deteriorated by 7% between 2015 and 2022. "This decline was driven by an increase in violations of the fundamental civil liberties and bargaining rights of employers, workers, and their representative organisations," the report said.

Workers' rights: The ILO has said that governments must recognise the right to collective bargaining. FILE PHOTO

The report argues that social dialogue can enable countries to pursue economic development alongside social progress, while ensuring fair and inclusive low-carbon and digital transitions.

The report adds that PLSD involves processes that bring together representatives of governments, employers' and business membership organisations (EBMOs) and workers' organisations (the social partners) at the national and sectoral levels. "These processes are designed to facilitate negotiation, consultation and information exchange on issues relating to labour, economic and social policy. PLSD includes bipartite processes – where only the social partners engage, notably for reaching collective agreements – as well as tripartite processes, which also involve government representatives," the report said.

"This edition of the Social Dialogue Report is published amid economic and geopolitical instability," said ILO's Assistant Director-General for Governance, Rights and Dialogue Manuela Tomei. "In a context where technological advances, climate change and demographic shifts are deeply transforming labour markets, social dialogue remains a credible governance model for navigating complexity and identifying fair solutions." .

Indian scientists develop novel gene therapy for haemophilia

Jacob Koshy
NEW DELHI

Scientists in India have reported success with using gene therapy to treat severe haemophilia A, a rare hereditary condition resulting from a faulty gene which triggers severe, spontaneous, and potentially fatal bleeding episodes.

Though only tested on five patients in Tamil Nadu so far, none of them have reported bleeding episodes over an average follow-up period of 14 months. It is not unusual for those with haemophilia to have weekly bleeding episodes, requiring frequent treatment. The results of the study were reported in the peer-reviewed *New England Journal of Medicine* (NEJM) earlier this week.

The trial was led by Alok Srivastava of the Centre for Stem Cell Research (CSCR) at the Christian Medical College in Vellore, and financially supported by the Union Department of Biotechnology.

One-time solution

The typical treatment for the condition requires injections at frequent intervals, with infusions of a "clotting factor" to prevent bleeding. Gene therapy treatments, however, promise to be a one-time solution. A gene introduced into the body teaches it to create enough of the clotting factor that can prevent such haemorrhage.

Haemophilia can be classified as minor or severe depending on the percentage of clotting factor present in those afflicted. Haemophilia A, the more common version of the condition, is caused by the absence of a blood-clotting factor called Factor VIII. Even though haemophilia is a rare disorder, India has the world's second-largest patient pool, with an estimated 40,000 to 1,00,000 patients.

Costly affair: Per-patient cost of treating haemophilia in India is reported to be ₹2.54 crore over a 10-year period. GETTY IMAGES

Those with Severe Hemophilia A have less than 1% of the clotting factor, and manage the condition with repeated Factor VIII replacement, monoclonal antibodies, or injecting substances that mimic Factor VIII to stop or prevent bleeding.

Because of the nature of the condition and the relatively low numbers of patients, treatment can be expensive. A March 2024 research study in the journal *Heliyon* estimates the per-patient cost of treating a haemophilia patient in India to be $3,00,000 (or ₹2.54 crore) over a 10-year period.

There is only one gene therapy – Roctavian – which was approved by the U.S. Food and Drug Administration for commercial use in 2023. Its effectiveness was established based on results from a cohort of 112 patients followed up for at least three years after Roctavian treatment. Following the infusion, the average bleeding incidents decreased from 5.4 bleeds per year at baseline to 2.6 bleeds per year.

The majority of patients who received Roctavian also received corticosteroids to suppress their immune systems for the gene therapy to be effective and safe, according to the U.S. FDA.

Roctavian works by transporting the therapeutic gene into the body by using an adenovirus as a carrier or vector and involves the liver in producing Factor VIII.

The new approach, the authors say in their paper, is safer than using an adenovirus, and potentially opens up the gene therapy treatment to children.

An independent expert described the study as "ground-breaking".

"This ground-breaking study is notable for several reasons. First, it establishes that initiating and executing studies involving new gene therapy is possible even in resource-constrained settings such as India," said Johny Mahlangu, in an editorial in the NEJM.

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