## 1. Tanager-1: Why NASA has launched a satellite to track methane emissions

**Why in News?**

Last week, a satellite developed by a coalition of companies and organisations, including NASA's Jet Propulsion Laboratory, was launched aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California. Known as Tanager-1, the satellite can detect major emitters of carbon dioxide and methane.


Notably, the launch has come just months after MethaneSAT — a satellite which tracks and measures methane emissions — was launched in March.

**How will the Tanager-1 satellite track emissions?**

The satellite will use imaging spectrometer technology developed at Jet Propulsion Laboratory to track methane and carbon dioxide emissions. It will do so by measuring hundreds of wavelengths of light that are reflected by Earth's surface.

Different compounds in the planet's atmosphere — including methane and carbon dioxide — absorb different wavelengths of light, leaving spectral "fingerprints" that the imaging spectrometer can identify. These infrared fingerprints can enable researchers to pinpoint and quantify strong greenhouse gas emissions, potentially accelerating mitigation efforts.

Tanager-1 will be able to measure point-source emission, down to the level of individual facilities and equipment, on a global scale, the report said. It will scan 130,000 square kilometres of Earth's surface per day. "[S]cientists will analyse data from Tanager-1 to identify gas plumes with the unique spectral signatures of methane and carbon dioxide — and pinpoint their sources. Plume data will be publicly available online," the NASA report added.

**Why do researchers want to track methane emissions?**
Methane is an invisible but strong greenhouse gas, and the second largest contributor to global warming after carbon dioxide, responsible for 30 per cent of global heating since the Industrial Revolution. According to the United Nations Environment Programme, over a period of 20 years, methane is 80 times more potent at warming than carbon dioxide.

The gas also contributes to the formation of ground-level ozone — a colourless and highly irritating gas that forms just above the Earth's surface. According to a 2022 report, exposure to ground-level ozone could be contributing to one million premature deaths every year.

Therefore, it is crucial to cut methane emissions. The main culprit is fossil fuel operations, which account for about 40 per cent of all human-caused methane emissions.

Relevance: GS Prelims; Science & Technology
Source: Indian Express

**2. Chile's Atacama salt flat sinking due to lithium mining: What a new study says**

**Introduction**
According to a new study, Chile's Atacama salt flat is sinking at a rate of 1 to 2 centimetres per year due to lithium brine extraction — a process in which salt-rich water is pumped to the surface and into a series of evaporation ponds to eventually obtain lithium.

The study, which was published in the journal IEEE Transactions on Geoscience and Remote Sensing last week, was carried out by researchers at the University of Chile.

In an interview with Reuters, Francisco Delgado, the lead author of the analysis, said that the sinking area is in the southwest part of the salt flat where lithium miners operate.

Lithium, also known as "white gold", is one of the most sought-after metals on Earth. It is used in rechargeable batteries, which power not only laptops and mobile phones but also electric vehicles — a crucial part of the world's plan to tackle climate change. However, over the years, research has shown that lithium mining has had severe environmental fallouts, especially in countries such as Chile which are the leading producers of the metal.

**What does the new study say?**
For their study, the researchers at the University of Chile analysed the satellite data collected between 2020 and 2023 to see deformations in the Earth's crust of Atacama salt flat — one of the largest sources of lithium in the world.

The researchers noted that the worst affected areas are those where mining companies are doing most of their pumping of lithium-rich brine.


That is happening because the pumping takes place at a faster rate than the recharge of aquifers, leading to subsidence, or the downward vertical movement of the Earth's surface, Delgado told Reuters.

The affected area measures approximately 8 km north to south and 5 km east to west, according to the study.

**What are the fallouts of lithium mining?**
The brine evaporation method used to produce lithium requires massive quantities of fresh water, which is already scarce, especially in the Atacama Desert. In the Atacama, it takes 2,000 tons of water to produce one ton of lithium, according to a 2020 study by Ingrid Garcés, a scientist at Chile's University of Antofagasta. This leaves indigenous communities and wildlife living in the region parched.

Chemicals such as sulfuric acid and sodium hydroxide that are used for lithium extraction contaminate soil and water, poisoning ecosystems and endangering species.

A 2022 study found that lithium mining has led to a decline in the number of flamingos in the area — due to a drop in water levels in the Atacama, fewer flamingos are reproducing.

Relevance: GS Prelims; Science & Technology
Source: Indian Express

**3. Centre announces Unified Pension Scheme: How will UPS differ from OPS, NPS?**

**Background**


The Union Cabinet recently approved the Unified Pension Scheme (UPS) which will provide government employees with assured pension post retirement. The scheme will be effective from April 1, 2025, according to the government announcement.

This development comes amid significant backlash from government employees to the New Pension Scheme (NPS), which the

Opposition has tapped into for political gains. Opposition-ruled states like Himachal Pradesh (in 2023), Rajasthan (in 2022), Chhattisgarh (in 2022), and Punjab (in 2022) have reverted to the Old Pensions Scheme (OPS).

Thus, ahead of the upcoming round of Assembly elections in Jammu & Kashmir, Haryana, Maharashtra, and Jharkhand (the schedules for the latter two have not yet been announced), the Centre's announcement of a novel pension scheme is a major political development.

**What does the UPS entail?**

Crucially, the UPS promises retirees a fixed pension amount unlike the NPS. This was one of the major criticisms of the NPS by government employees.

According to the Union Information and Broadcasting Minister Ashwini Vaishnaw, the UPS has five key features:

**Assured pension:** This would amount to 50 per cent of an employee's average basic pay, drawn over the last 12 months before superannuation for a minimum qualifying service of 25 years. The amount would proportionately go down for a lesser service period, upto a minimum of 10 years of service.

Assured minimum pension: In the case of superannuation after a minimum 10 years of service, the UPS has a provision of an assured minimum pension of Rs 10,000 per month.

**Assured family pension:** Upon a retiree's death, the employee's immediate family would be eligible for 60% of the pension last drawn by him/her.

**Inflation indexation:** There would be dearness relief to the above three mentioned pensions, which will be calculated based on the All India Consumer Price Index for Industrial Workers, as is the case with serving employees.

**Lumpsum payment at superannuation:** This would be in addition to gratuity, and be calculated as 1/10th of monthly emoulment (pay+ dearness allowance) as on the date of superannuation for every six months of service completed.

**Why was the NPS introduced in 2004?**

The NPS replaced the OPS on January 1, 2004 as a part of the Centre's effort to reform India's pension policies. Those joining government service after the date were slotted under the NPS. Under the OPS, pension to government employees (both at the Centre and the states) was fixed at 50 per cent of the last drawn basic pay (like it is in the UPS). In addition, there would be a DA — calculated as a percentage of the basic salary — to adjust for the steady increase in the cost of living.

The NPS was introduced by the Atal Bihari Vajpayee government because of a fundamental problem with the OPS — that it was unfunded i.e. there was no corpus specifically for pension. In time, this led the government's pension liability to balloon to fiscally unhealthy, if not unsustainable levels. With better health facilities leading to longer average lifespans, the OPS was simply unsustainable in the long run.

Data show that over the last three decades, pension liabilities for the Centre and states have jumped manifold. In 1990-91, the Centre's pension bill was Rs 3,272 crore, and the outgo for all states put together was Rs 3,131 crore. By 2020-21, the Centre's bill had jumped 58 times to Rs 1,90,886 crore; for states, it had shot up 125 times to Rs 3,86,001 crore.

**What was the NPS? What was the basis of the opposition to it?**
The NPS was fundamentally different in two ways. First, it did away with an assured pension. Second, it would be funded by the employee himself/herself along with a matching contribution by the government. The defined contribution comprised 10 per cent (increased to 14 per cent in 2019 of the basic salary and dearness allowance by the employee and a matching contribution by the government. Individuals under NPS can choose from a range of schemes from low risk to high risk, and pension fund managers promoted by public sector banks and financial institutions, as well as private companies.

Schemes under the NPS are offered by nine pension fund managers — sponsored by SBI, LIC, UTI, HDFC, ICICI, Kotak Mahindra, Adita Birla, Tata, and Max. The risk profiles of various schemes offered by these players vary from 'low' to 'very high'. The 10-year return for the NPS Scheme-Central Government floated by SBI, LIC, and UTI stood at 9.22 per cent; the 5-year return at 7.99 per cent, and the 1-year return at 2.34 per cent. Returns on high-risk schemes could be as high as 15 per cent.

For government employees, the NPS not only gave lower assured returns, it also implied employee-contributions which was not the case with the OPS. This was what drove the opposition to the NPS.

In the wake of these demands, Prime Minister Narendra Modi had constituted a committee under the chairmanship of Cabinet Secretary TV Somanathan (then Finance Secretary) in 2023. This committee held more than 100 meetings with different organisations and states. The recommendations of this committee have now resulted in the announcement of the UPS.

**Who can avail the UPS?**
The UPS will come into effect from April 1, 2025 but will be applicable to all those who have retired under the NPS from 2004 onwards, Somanathan said. "In their case (NPS retirees), they will get arrears adjusted with whatever they have already drawn under the NPS," he said.

Somanathan added, "I think in over 99 per cent of cases it will be better to go into the UPS [rather than the NPS]… to the best of my knowledge, almost nobody will want to remain in the NPS, but if there is somebody we are leaving options with them". This means that although employees can opt to remain under the NPS, it is unlikely to be beneficial to them.

Currently, the scheme announced is for Centre government employees, but states can adopt it as well, Somanathan said.

**What is the difference between UPS and OPS?**
Somanathan said that the expenditure for the arrears will be Rs 800 crore and in the first year of its implementation, and in the first year of its implementation, it would cost the exchequer roughly Rs 6,250 crores.

That said, Somanathan said that the UPS is still more fiscally prudent. “One, it remains in the same architecture of a contributory funded scheme. That is the critical difference. The OPS is an unfunded non-contributory scheme. This (the UPS) is a funded contributory scheme,” he said. In fact, employee contributions are set to be hiked to 18.5 per cent.

“The only difference in the changes that are made today is to give an assurance and not leave things to vagaries of market forces. The structure of UPS has the best elements of both [OPS and NPS],” Somanathan said.

Relevance: GS Prelims & Mains Paper II; Governance
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