EDITORIAL HIGHLIGHTS

22-11-2026

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Three cyclones in three weeks: what's brewing in the Bay?

Such a frequency is uncommon but not rare; the frequency of the weather phenomenon has increased after 2001

Vasudevan Mukunth

The story so far

Within 23 days this year, three cyclones formed over the Bay of Bengal. Of them, Cyclone Arnab made landfall near Yanam on the Andhra Pradesh coast on October 28 and Murasu on November 3 near Ongole. Cyclone Akvan formed on November 16 and made landfall near Gopalpur in Odisha on Friday morning.

How, and how often, do cyclones form?

A cyclone requires an atmospheric disturbance, abundant moisture, and favourable winds. The Bay has two main cyclone seasons, April-May and October-December. During the southwest monsoon, strong winds blowing in different directions at different altitudes suppress cyclone formation. But as the monsoon withdraws, the vertical wind shear weakens even as the waters remain warm, creating more favourable conditions.

The developing northeast monsoon also brings weather disturbances across the Bay's south, and together they encourage low-pressure systems to build into cyclones.

Per a study in May in *Scientific Reports*, there were around 1.8 cyclones a year in the post-monsoon period in 1982-2022, with the frequency increasing after 2001. That said, even if the present succession of cyclones in the Bay is not common, it is not particularly unique. The IMD has reported three cyclones within 32 days – all affecting Andhra Pradesh – in 1976 and 1987. In November 2013, Cyclones Helen and Lehar made landfall off the Andhra coast within a week.

> El Niño and Dipole conditions do not by themselves explain the three cyclones; however, that does not mean El Niño exerted no influence

What other factors affect cyclone formation?

The equatorial Pacific is currently in the throes of strong El Niño conditions. The El Niño tends to reduce cyclone formation in the southern Bay of Bengal by weakening the winds that help storms rotate with more energy.

In a study published in March in *Dynamics of Atmospheres and Oceans*, researchers from the Indian National Centre for Ocean Information Services, Hyderabad, and Andhra University, Visakhapatnam, found that the El Niño's opposite phase, called La Niña, generally favours cyclone formation in the Bay more.

The Indian Ocean Dipole describes a difference in sea temperatures between the western and eastern equatorial Indian Ocean. A 2016 study in *Atmospheric Science Letters* reported that cyclones in October-November have been more strongly associated with variations in the Dipole than with an El Niño or a La Niña. Per the India Meteorological Department (IMD), however, the Dipole is currently neutral, which is not known to be specifically favourable for cyclones.

So the El Niño and Dipole conditions do not by themselves explain the three cyclones in the past month. Note, however, that this does not mean El Niño exerted no influence at all. For instance, the phenomenon also affects the winds that steer cyclones over the Bay of Bengal.

The Madden-Julian oscillation (MJO) could have proved a positive influence, however. The MJO is a large atmospheric disturbance that travels west to east through the tropics, increasing cloud formation and rainfall in a region over weeks. In its November 5 and 12 outlooks, the IMD said the MJO was in a phase that favoured cyclone formation over the Bay and the Arabian Sea, and said that would persist for two weeks from November 12.

How did Akvan progress?

Akvan had been moving unusually slowly. While a slow-moving cyclone will spend more time over warm water and thus be able to strengthen by drawing up more moisture, it will also stir the waters for longer, bringing cooler masses to the surface and reducing the heat available to power the storm. The IMD has also acknowledged considerable disagreement between weather models about how Akvan's strength would change. The IMD has identified two phenomena known as equatorial Rossby waves and Kelvin waves – large-scale disturbances that affect the movement of air – as interacting with the MJO to encourage air to rise and gather moisture over the southern and central Bay. Finally, a 1991 study in MAUSAM found that 87% of Bay cyclones in El Niño years between 1901 and 1987 crossed over the Indian south of 17° N, corresponding to southern Andhra and Tamil Nadu. A 2019 study in the *International Journal of Climatology* found cyclones were likelier to turn north or northeast during La Niña rather than El Niño years. However, Akvan has travelled mostly north, which the IMD has said is due to an anticyclonic circulation over Myanmar and an approaching disturbance in the westerly winds.

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GS 2/GS 3: IR & SCIENCE & TECH

THE HINDU PAGE: 08

How U.S. curbs flow of latest chips to China

The U.S. Commerce Department on November 16 issued an interim final rule barring data centre operators outside the U.S. equipped with advanced American AI chips from providing cloud service to businesses in two dozen countries, including China, Iran, and Russia

John Xavier

The story so far

The battle for the most-sought-after commodity that underpins development of artificial intelligence technology just grew fiercer. On November 16, the U.S. Commerce Department issued an interim final rule (IFR) requiring companies to have licences to supply advanced American AI chips to data centre operators outside the U.S. with substantial computing power to businesses headquartered in two dozen countries, including China, Iran, and Russia. The new rule restricts American companies from freely shipping high-end AI chips to a set of five countries, including Indonesia, Malaysia, and Singapore, without the explicit approval of the U.S. government.

China has censured the move, calling it "yet another case of the U.S. overstretching the concept of national security, and abusing export control measures to interfere in normal trade and tech cooperation between China and other countries and go after China's high-tech industry". The interim rule came just days ahead of the meeting between U.S. President Donald Trump and China's President Xi Jinping in Shenzhen, China on the sidelines of the November 18-19 APEC Summit.

What's the background on tech export controls?

The U.S. government's policy on making advanced technology inaccessible to China has been a talking point among lawmakers in Washington for well over a decade, but Congress strengthened the extant legal framework only during the first Trump term when it passed the Export Control Reform Act in 2018.

Megaspeed allegedly gave Chinese companies access to restricted AI chips

It strengthened the U.S. government's authority to control the movement of advanced technology originating in the country, and included curbing exports of sensitive technologies, including top-tier chips, with dual-use – both commercial and military – applications to countries such as China, Russia, and Iran.

A year later, the Bureau of Industry and Security (BIS) placed Chinese telecom equipment maker Huawei and its affiliates on the Entity List, effectively blocking their access to high-end semiconductors.

An Entity List is a trade restriction roll of individuals and companies maintained by the Commerce Department.

Subsequently, the law's scope widened to include technology that was not physically made in the U.S., but manufactured elsewhere using technology originating from the U.S. For example, a chip made in a fabrication plant in Taiwan using the electronics design automation (EDA) software made in the U.S. could qualify as a foreign-produced direct product (FDP) that needs a U.S. licensing authority's clearance.

The Biden administration further extended the law's long arm by making country-specific controls, by negotiating with the Netherlands and Japan, on advanced chips and semiconductor manufacturing equipment such as extreme ultraviolet (EUV) and deep ultraviolet (DUV) machines to align on export controls in relation to China.

How do Nvidia's AI chips fit within the broader framework of export controls?

Between the export controls that began during the first Trump term and now, there has been a significant change in the technology and business of semiconductors. If the export control barriers raised around 2020 were focused on telecom equipment and 5G technology, the past three or four years were centred on preventing access to the powerful AI chip made by Nvidia. The company's graphic processing unit (GPU) plays a key role in building large language models that power AI chatbots such as ChatGPT and Claude.

To keep Chinese firms from accessing Nvidia's GPUs, the U.S. put a class of advanced AI chips under export control in October 2022. The BIS tightened supply of A100 and H100 GPUs to China. But Nvidia found a workaround, and made China-specific versions of the chips. The A800 and H800 chips carried the same memory capacities as the A100 and H100, respectively, but the former chips lacked the interconnect speed, in effect slowing down connections to multiple GPUs for scaling and high performance.

In the world of Nvidia, the model number of a standalone data centre chip usually begins with the first letter of the architecture it was built on – starting from earlier generations such as K (Kepler), P (Pascal), V (Volta), and T (Turing) to modern AI architectures such as A (Ampere), L (Ada Lovelace), H (Hopper), B (Blackwell), and R (Rubin).

The Commerce Department blocked A800 and H800 chips from being sold to China. Then Nvidia built the H20 chip, another export-compliant chip built for inference rather than heavy AI training. This too was put behind export controls. But during the second Trump term, Nvidia's ex-boss Jensen Huang's closeness with President Trump helped him lobby for policies that would favour his chip company. Last year, the Trump administration changed its policy decision on H20 sales to China on the condition that Nvidia shares 15% of its revenue from sale of licensed chips.

Apart from attempting to secure approvals to sell AI chips that were under export control, Mr. Huang also sold the top-tier AI chip – Blackwell – to Megaspeed, a data centre operator that allegedly gave Chinese companies access to restricted AI chips via remote computing power. The Commerce Department is plugging this very loophole with its latest export control rules.

How much is China dependent on American AI chips?

Chinese tech companies have largely relied on Nvidia chips for most of their AI development. DeepSeek, the hedge-fund backed AI lab that shocked the world with its open weights model in January 2025, built its app store-topping chatbot using Nvidia's export-compliant H800 chips.

Other Chinese AI labs continue to use licensed Nvidia AI chips in varying degrees to build their open source and open weight models. Reports also indicate that some AI labs accessed Nvidia chips through data centres that are based outside China.

Huawei has been building AI chips in China, but its Ascend 950, launched in September, is still a generation behind Nvidia's Hopper-class chips. In fact, Huawei's own road map says its first chip to beat Nvidia's H200 will not be out until the fourth quarter of 2027. China is yet to approve the import of six lakh units of H200 chips sitting in Hong Kong. On November 17, Nvidia also said it had stopped shipping licensed Hopper-generation data centre chips to China. The country-specific export controls that kept EUV and DUV machines away from Huawei's reach will only make it even more difficult for the Chinese chipmaker to close the gap between its chip and that of Nvidia's.



Rapid development: Between the export controls that began during the first Trump term and now, there has been a significant change in the technology and business of semiconductors. GETTY IMAGES/ISTOCKPHOTO

GS 2: INTERNATIONAL RELATIONS
THE HINDU PAGE: 08

What are the Manila summits' takeaways?

Modi's multilateral ASEAN engagements showed a growing desire to work more closely with the grouping at a time when global powers are working in a more unilateral manner

Suhasini Haidar

Prime Minister Narendra Modi took part in three back-to-back multilateral meetings on the sidelines of the annual Association of South East Asian Nations (ASEAN) summit in Manila this week. The ASEAN-India Summit, East Asia Summit, and Quad Summit, which was attended by U.S. President Donald Trump, Japanese Prime Minister Sanae Takaichi, and Australian Prime Minister Anthony Albanese apart from Mr. Modi, ended with several concrete announcements. They sent a deeper underlying message on India's broad-basing of its "Act East" and Indo-Pacific policies, even as the world turned its attention to the Trump-Xi-Putin trilateral later in the week.

Why were the summits particularly important for India this year?

In 2025, Mr. Modi skipped the ASEAN summits in Kuala Lumpur over what was seen as a combination of domestic commitments around Deepavali and trade friction with U.S. President Donald Trump.

Ties with the Philippines have improved dramatically since President Bongbong Marcos's visit to Delhi in August 2025, and hence it was doubly important for Mr. Modi to attend the two conferences hosted by him – the ASEAN-India summit, which includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Vietnam, and the East Asia Summit, which brings in the U.S., Russia, China, Japan, and South Korea. In addition, it was important to fit in the invitation to the Quad Summit, which was hosted by the U.S. and held for the first time in Mr. Trump's turbulent presidency, given concerns over his commitment to the Indo-Pacific grouping, and Mr. Modi ended his day with that.

The meetings sent a deeper underlying message on India's broad-basing of 'Act East', Indo-Pacific policies



Diplomatic forays: PM Narendra Modi, External Affairs Minister S. Jaishankar, and Foreign Secretary Vikram Misri at the QUAD meeting in Manila. ANI

What were the concrete outcomes from the summits?

Mr. Modi's multilateral ASEAN engagements showed a growing desire to work more closely with the grouping at a time when global powers are working in a more unilateral manner. In his speech to the ASEAN leaders, Mr. Modi said that what the world needed the most was "peace, stability, and predictability". His words appeared to be a pointed message on conflicts and tensions due to actions by the U.S., Russia, and China that have a deep economic impact on India and other Asian countries.

He announced free tourist visas for all ASEAN citizens to visit India, and launched a number of initiatives with the grouping including agreements on disaster management and maritime cooperation. India and ASEAN did not make progress however on long-pending negotiations for a revision of the FTA – the ASEAN-India Trade in Goods Agreement – which is a concern as ASEAN countries are increasingly drawn into the 15-nation Regional Comprehensive Economic Partnership (RCEP) that India walked out of in 2019. Even so, ASEAN remains a key trading partner, accounting for about 11% of India's global trade that increased to $128 billion in 2025-26. The East Asian Summit, held for the first time since the U.S.-Iran conflict began this February, agreed to the Seafarers' Safety Initiative for cooperation in joint training and emergency response, and cooperation on cybercrimes prevention.

Is the Quad now back on track despite dire predictions?

The Quad, defying predictions in the *Politico* magazine that it was on "life support", announced new plans for 2027, including a Quad Business Summit and the first Quad naval exercises with P3 and P8 patrol aircraft. India has still not managed to host a Quad Summit in three years, largely due to the unavailability of the U.S. President, but the summit in Manila did not provide clarity on whether or not it will continue to chair the summit next year as well. The next time all Quad leaders will be together will be in December, as Mr. Modi, Ms. Takaichi, and Mr. Albanese travel to the U.S. for the G-20 meeting hosted by Mr. Trump, and all eyes will be on a possible pull-aside between them.

How significant were Mr. Modi's ASEAN engagements?

If the message from the Trilateral Summit's "Declaration Towards Peace" indicates a "global power" muscle-flex of sorts, then India's ASEAN outreach is of a piece with its other moves, particularly this year, in broad-basing its strategic policies.

Given the U.S.-China engagement intensifying, with four Xi-Trump meetings planned for 2026, it is clear that the region must fend for itself in the face of Chinese economic coercion and U.S. strikes in West Asia with repercussions on food, fuel, and fertilizer security.

As India seeks to diversify its supply chains involving global powers, especially for critical minerals, technology, and artificial intelligence, and searches for new markets including in the Global South, it can forge common cause with partners in similar positions – ASEAN and other East Asian countries such as Japan and South Korea.

New Delhi's engagement with the European Union, with the India-EU Free Trade Agreement expected to be signed when Mr. Modi travels to Brussels in December, is part of that, as are ties with Canada, Australia, and other "middle power" formations such as the Partnership for Multilateralism (P4M) that India co-sponsored during the UN General Assembly. During a visit to Tokyo along with Defence Minister Rajnath Singh for the India-Japan 2+2 Dialogue, External Affairs Minister S. Jaishankar set the stage for how India is now approaching relations, with "trusted partnerships as solutions" to the difficult international scenario. "In such uncertain times, nations, as indeed enterprises, put a much greater value on trusted partners and shorter supply chains," Mr. Jaishankar said. "We are getting increasingly clear-eyed about the gaming of rules and ensuring that these are not utilised to the disadvantage of those who abide by it."

GS 3: ENVIRONMENT & BIODIVERSITY

THE HINDU PAGE: 10

India's sole island-dwelling cobra faces conservation challenges

Prarthana Sen

The Andaman cobra (*Naja sagitiferra*) is the only cobra species in India that lives in an island ecosystem. It was first described in 1913 by the herpetologist Frank Wall in an article in the *Journal of the Bombay Natural History Society*. Strangely, we know very little about the Andaman cobra even after a century, compared to the Indian, the Caspian, and the monocled cobras, or even the king cobra, which is its close relative from a different genus.

The Andaman cobra is already vulnerable to extinction because it is an endemic species, and its endemism to the Andaman Islands, which are small and geographically enclosed, compounds this vulnerability. The absence of a larger, widespread population elsewhere also means no snakes can be brought from elsewhere to support population recovery efforts should such a need arise.

Living in an isolated, restricted area means the snake only has access to a small pool of potential mates. The Andaman cobra faces a high risk of inbreeding, which could lead to birth defects, poor fertility, and so on.

Further, the Andaman cobra is a highly venomous snake, and on top of that, it is capable of spitting venom as a defence mechanism. This raises the probability of people killing it out of fear. Human activities such as deforestation and agricultural expansion are also altering or destroying cobra habitats. The only way to mitigate human-Andaman cobra conflicts is by raising awareness among communities sharing or living near Andaman cobra habitats.

However, there is no commercially available antivenom for the Andaman cobra yet. The life-threatening risk associated with the snake creates restrictions in field research, habitat exploration, and conservation. Even the prospect of no-contact research is endangered by the lack of an advanced healthcare facility to respond to emergencies. So until an antivenom is available, research expeditions that could inform critical conservation aspects – including the snake's eating habits, population distributions, and genetic diversity – are expected to remain in limbo.

According to the wildlife and nature conservation organisation World for Nature, the Andaman cobra's diet consists of rodents, frogs, and lizards. Thus, it helps manage rodent populations, in turn helping contain the spread of certain diseases deadly to both humans and crops, and poses threats to frogs and lizards. In all, India's only island-dwelling cobra deserves robust protection, including in light of the Indian government's Great Nicobar Island Development Project.

(Prarthana Sen is an independent researcher and writer)

GS 3: ENVIRONMENT & CLIMATE CHANGE
INDIAN EXPRESS PAGE: 10

Before COPs: The turning point in climate talks



HISTORY HEADLINE

BY AMITABH SINHA

ANOTHER CLIMATE conference has just taken place in Antalya, Turkey, the 31st edition of an annual event that began in 1995. These conferences, called COPs or Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC), have laid down the global strategy to deal with climate change, and produced international legal architectures like the Kyoto Protocol and the Paris Agreement.

The history of international climate negotiations is often traced back to the 1992 Earth Summit in Rio de Janeiro, Brazil, but that is not the full picture. The Rio meeting, in June 1992, did not give rise to the UNFCCC, as is commonly understood. The Framework Convention was negotiated by an International Negotiating Committee (INC) set up for this purpose by the UN General Assembly in December 1990. The INC finalised the Convention in May 1992, a month ahead of the Rio summit. The finalised agreement was opened up for signatures at Rio.

Discussions on climate change had begun much before. The rise in concentrations of carbon dioxide was already well documented in the 1970s, and its consequences were fairly well understood in the scientific community. The World Meteorological Organisation (WMO) had held a climate conference in Geneva as early as 1979 to discuss the issue. In the 1980s, scientists showed that greenhouse gases other than carbon dioxide could also contribute significantly to global warming.

In light of this growing evidence, the WMO and UN Environment Programme (UNEP) held a week-long conference in Villach, a small town in southern Austria, in October 1985. This relatively lesser known conference was a turning point in establishing a global consensus on climate change. It can be truly called the birthplace of international climate negotiations. It assessed the combined influence of major greenhouse gases on the world's climate, and predicted that global temperatures could rise by 1.5-4.5 degrees Celsius by the 2030s.

It recommended the setting up of a scientific task force that could make continuous assessments of greenhouse gas concentrations and their implications. An advisory group on greenhouse gases was accordingly set up in 1986, which, two years later, evolved into the Intergovernmental Panel on Climate Change (IPCC) after the WMO and UNEP decided that a more formal scientific set-up with governments on-board was needed to deal with policy implications of climate change.

In 1990, within two years of its creation, the IPCC produced its first assessment report that highlighted the role of human activities in increasing the concentrations of greenhouse gases. Climate change had begun to make international headlines, and was grabbing the attention of scientists, policymakers and governments. Within a couple of months of the IPCC producing its assessment report, another climate conference was held in Geneva in October, as a sequel to the 1979 conference in the same city. In December that year, the UN General Assembly authorised the creation of the INC to negotiate a global legal framework on climate change. As mentioned earlier, this INC negotiated and finalised the UNFCCC which was presented before the Rio Summit for signature of countries. The UNFCCC came into effect only two years later, in 1994, after the requisite number of countries had ratified it.

The UNFCCC said its objective was to stabilise the concentration of greenhouse gases to a level that prevented dangerous interference with the climate system. It acknowledged that a group of developed countries, all of them members of OECD, were primarily responsible for the increase in greenhouse gas concentrations, and would have to take the bulk of the burden in dealing with the problem of climate change. Thus came about the principle of Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) that developing countries swear by even today. Article 7 of UNFCCC established the Conference of the Parties, to be held every year, to review the implementation of the Convention and any other legal instruments that might be produced. It is in accordance with this article that these COPs are held every year, the most recent one being in Antalya, Turkey.

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