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Department of Computer Applications(MCA)

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Technical Newsletter

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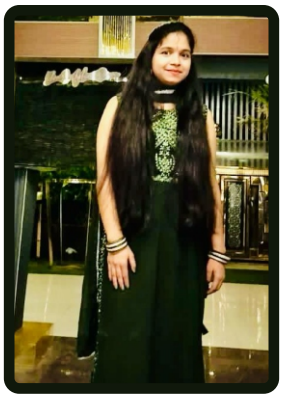


Systems Applications & Products in Data Processing(SAP)
Advanced Business Application Programming(ABAP)

ABAP is a programming language that runs in the SAP ABAP runtime environment, created, and used by SAP for the development of application programs. It is the solid longtime foundation for SAP's solution portfolio.

ABAP is the underlying technology of SAP's traditional Business Suite, SAP's flagship solution SAP S/4HANA, and other forthcoming innovative solutions such as next-generation data warehouse SAP BW/4HANA. ABAP technology is continuously extended to serve new business scenarios and innovative application development.

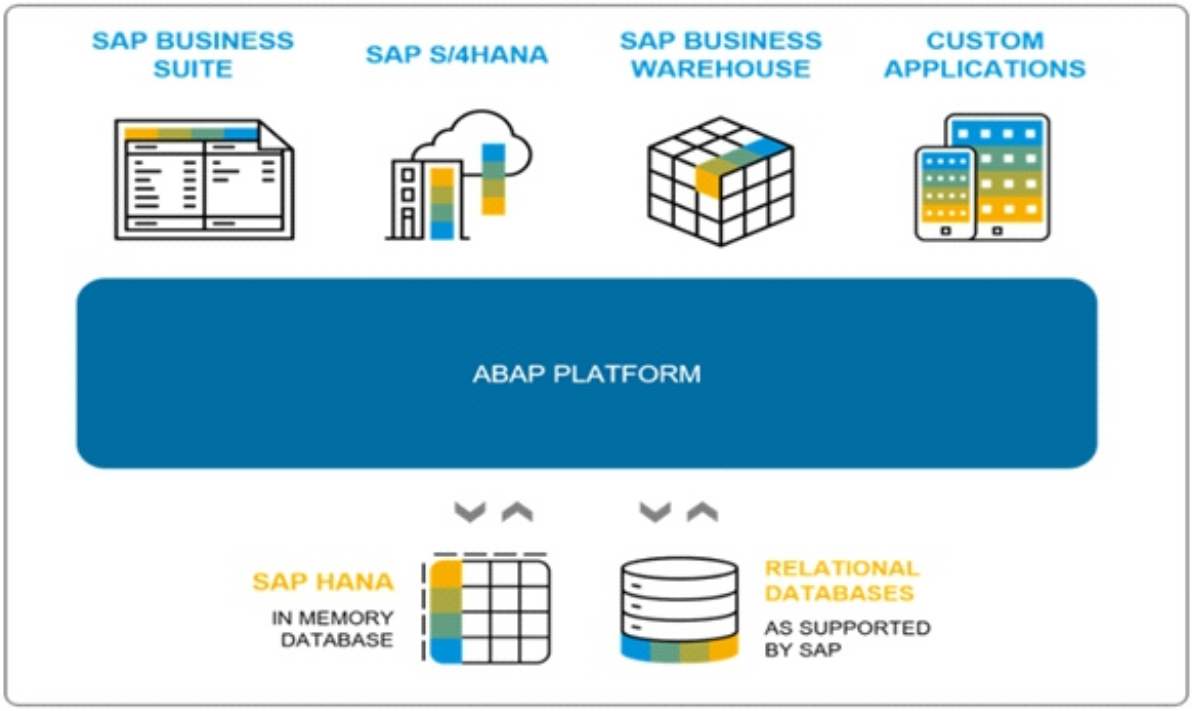
Why Learn ABAP?

Personally, I think it is important to learn ABAP because of its proven reliability and robustness. This makes it the platform of choice for running mission-critical business processes. SAP customers and partners also have a long tradition of building custom code and add-ons that run on the ABAP technology platform.

One of the advantages that I found with ABAP is the ability to have all the tools for the whole development lifecycle integrated into one place and part of the server. There is no need for a separate system.

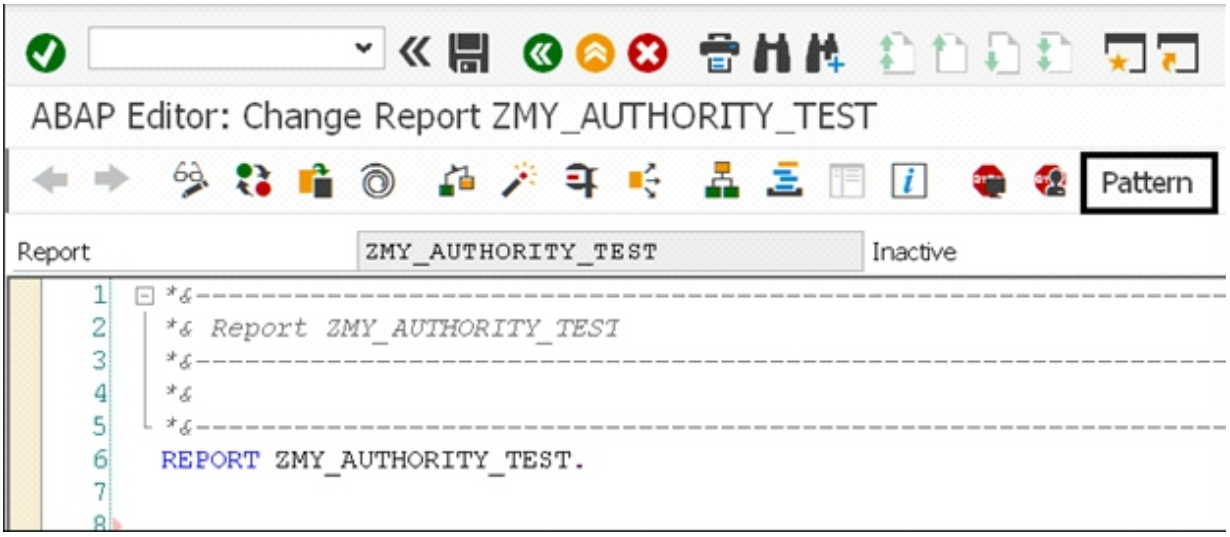
How to Develop in ABAP?

Before we begin the development process in ABAP, we need to install the tools that are needed. Below we will go over the software and tools to begin your ABAP journey.



ABAP Editor

ABAP coding can be done in a special tool called the ABAP Editor, which has three different modes to work within—two versions of the Front-End Editor, and the Back-End Editor. The three editors are fully compatible and interchangeable. The source code created in one editor can be viewed by all other modes.



You can access the ABAP Editor with t-code Se38.

Other Key ABAP Terms :-While we've laid out much of the important terminology you'll run into when working with ABAP, there are a handful more that will be helpful to you. Let's take a look at twelve such terms and concepts.

ABAP Debugger: A tool for performing functional troubleshooting in programs.

ABAP Development Guidelines: A set of general and ABAP-specific guidelines meant to help programmers creating applications with ABAP.

ABAP Development Tools: A set of downloadable plugins that allow programmers running Eclipse to develop ABAP. Formerly known as ABAP in Eclipse or ABAP Development Tools in Eclipse.

ABAP Managed Database Procedures: A way to execute complicated code inside a database via stored procedure. Specific to SAP HANA and its in-memory processing.

ABAP Objects: The official name for OOP in ABAP.

ABAP Unit: A testing tool used to check functions of code sections.

CDS Views: Core data service Views allow programmers to take full advantage of the SAP HANA database. They enhance information integration with cloud apps and other UIs via OData. These serve as the basis of SAP Fiori apps.

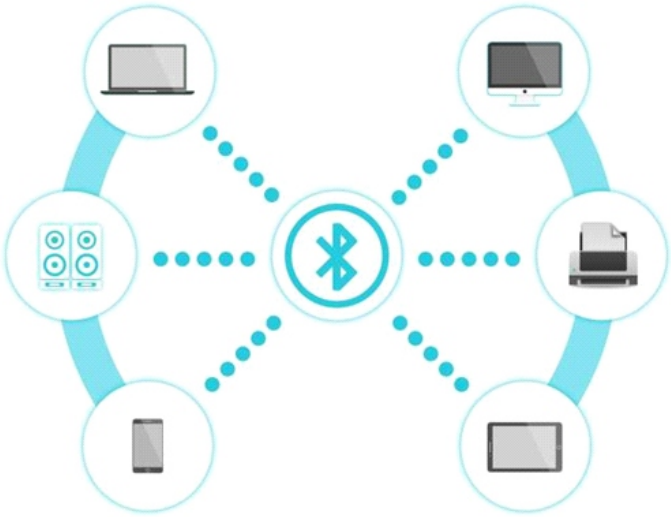
Design Patterns: Tried and true solutions to common software requirements that can be "recycled" and used as the basis of a new program.

Repository Information System: A source used to search repository objects; accessible via the Object Navigator or t-code SE15.

SAP GUI (SAP Graphical User Interface): The interface in the presentation layer of applications built with ABAP code that run on the desktop as opposed to in a browser.

SAP NetWeaver AS ABAP: Part of a client server which allows for creating ABAP programs and consists of at least three layers, including the presentation, application, and database layers. The AS stands for Application Server.

Two-Track Method Development: The simultaneous development of two versions of a method. An example of which might be implementing a method using both ABAP and ABAP-Managed Database Procedures(AMDP).



Long in the Bluetooth: Scientists develop a more efficient way to transmit data between our devices

Highlights

- *Sussex Researchers Develop Low-Cost Wireless Tech for Longer Device Battery Life*
- *Electric Waves Could Replace Bluetooth in Wearables, Smart Homes*
- *Handshakes Could Exchange Numbers with Sussex's New Wireless Technology*
- *Battery Boost: Sussex Professors Introduce Electric Waves in Tech Connectivity*

University of Sussex researchers have developed a more energy-efficient alternative to transmit data that could potentially replace Bluetooth in mobile phones and other tech devices. With more and more of us owning smartphones and wearable tech, researchers at the University of Sussex have found a more efficient way of connecting our devices and improving battery life. Applied to wearable devices, it could even see us unlocking doors by touch or exchanging phone numbers by shaking hands.

Professor Robert Prance and Professor Daniel Roggen of the University of Sussex have developed the use of electric waves, rather than electromagnetic waves, for a low-power way to transmit data at close range while maintaining the high throughput needed for multimedia applications.

Bluetooth, Wifi, and 5G currently rely on electromagnetic modulation, a form of wireless technology that was developed over 125 years ago. In the late 19th Century, the focus was on transmitting data over long distances using electromagnetic waves. By contrast, electric field modulation uses short-range electric waves, which consume much less power than Bluetooth.

As we tend to be in close proximity to our devices, electric field modulation offers a proven, more efficient method of connecting our devices, enabling longer-lasting battery life when streaming music to headphones, taking calls, using fitness trackers, or interacting with smart home tech.

The development could advance how we use tech in our day-to-day lives and evolve a wide range of futuristic applications, too. For example, a bracelet using this technology could enable phone numbers to be exchanged simply by shaking hands, or a door could be unlocked just by touching the handle.

Daniel Roggen, Professor of Engineering and Design at the University of Sussex, explains, "We no longer need to rely on electromagnetic modulation, which is inherently battery hungry. We can improve the battery life of wearable technology and home assistants, for example, by using electric field modulation instead of Bluetooth. This solution will not only make our lives much more efficient, but it also opens novel opportunities to interact with devices in smart homes."

"The technology is also low cost, meaning it could be rolled out to society quickly and easily. If this were mass-produced, the solution can be miniaturized to a single chip and cost just a few pence per device, meaning that it could be used in all devices in the not too distant future."

AI noise-canceling headphone technology lets wearers pick which sounds they hear

Highlights

- *University of Washington Unveils Real-Time Sound Selection for Noise-Canceling Headphones*
- *Choose Your Sounds: New Semantic Hearing Tech Lets Users Customize Headphone Audio*
- *Future of Noise Cancellation: UW Researchers Develop Algorithm for Instant Sound Filtering*

Most anyone who's used noise-canceling headphones knows that hearing the right noise at the right time can be vital. Someone might want to erase car horns when working indoors, but not when walking along busy streets. Yet people can't choose what sounds their headphones cancel.

Now, a team led by researchers at the University of Washington has developed deep-learning algorithms that let users pick which sounds filter through their headphones in real time. The team is calling the system "semantic hearing." Headphones stream captured audio to a connected smartphone, which cancels all environmental sounds.

Either through voice commands or a smartphone app, headphone wearers can select which sounds they want to include from 20 classes, such as sirens, baby cries, speech, vacuum cleaners and bird chirps. Only the selected sounds will be played through the headphones.

The team presented its findings on Nov. 1 at UIST'23 in San Francisco. In the future, the researchers plan to release a commercial version of the system.

"Understanding what a bird sounds like and extracting it from all other sounds in an environment requires real-time intelligence that today's noise canceling headphones haven't achieved," said senior author Shyam Gollakota, a UW professor in the Paul G. Allen School of Computer Science & Engineering.

"The challenge is that the sounds headphone wearers hear need to sync with their visual senses. You can't be hearing someone's voice two seconds after they talk to you. This means the neural algorithms must process sounds in under a hundredth of a second."

Because of this time crunch, the semantic hearing system must process sounds on a device such as a connected smartphone, instead of on more robust cloud servers. Additionally, because sounds from different directions arrive in people's ears at different times, the system must preserve these delays and other spatial cues so people can still meaningfully perceive sounds in their environment.

Tested in environments such as offices, streets and parks, the system was able to extract sirens, bird chirps, alarms and other target sounds, while removing all other real-world noise. When 22 participants rated the system's audio output for the target sound, they said that on average, the quality improved compared to the original recording.

In some cases, the system struggled to distinguish between sounds that share many properties, such as vocal music and human speech. The researchers note that training the models on more real-world data might improve these outcomes.

Additional co-authors on the paper were Bandhav Veluri and Malek Itani, both UW doctoral students in the Allen School; Justin Chan, who completed this research as a doctoral student in the Allen School.

Lunar snapshots: Testing NASA's incredible Next-Gen Moon camera

Highlights
·NASA and European Partners Collaborate on Advanced Lunar Camera for Future Moon Missions.
·Testing Lunar Photography: NASA's Handheld Universal Lunar Camera Goes Through PANGAEA Training in Spain
·Beyond Earth: European Astronauts and Scientists Assist NASA in Developing State-of-the-Art Lunar Camera

NASA and European partners develop and test a state-of-the-art lunar camera, with ongoing refinements for future international missions.

When astronauts return to the Moon, they will take more pictures of the lunar surface than any humans before. To develop the best camera for the job, European astronauts and scientists are lending a helping hand to NASA's Artemis imagery team.

The engineers behind the Handheld Universal Lunar Camera (HULC) worked with the European Space Agency (ESA) in the lunar-like landscapes of Lanzarote, Spain, to put the new camera through its paces during the PANGAEA training program.

PANGAEA prepares astronauts to become effective field scientists for future missions to the Moon. The program saw an international crew testing the capabilities of the camera in realistic scenarios for geological exploration.

The new lunar camera is built from professional off-the-shelf cameras with great sensitivity to light and state-of-the-art lenses. To prepare it for space, the NASA team made several modifications, including adding a blanket for dust and thermal protection – temperatures range from minus 200 to 120 degrees Celsius on the Moon – as well as a new set of ergonomic buttons for astronauts wearing gloves in bulky spacesuits.

Thomas Pesquet, NASA astronaut candidate Jessica Wittner, and Takuya Onishi from the Japanese space agency used the camera in broad daylight, but also in the darkness of volcanic caves to simulate extreme conditions for lunar photography.

“The lunar camera will be one of many tools they will need to handle on the Moon, so it should be easy to use. The human factor is a big deal for us, because you want the camera to be intuitive and not taxing on the crew,” explains Jeremy Myers, NASA's lead for the HULC camera.

Together with some of Europe's best planetary scientists, Jeremy reviewed the quality of the images. “It was very useful to have the geologists' point of view to make sure the photos had the right resolution, depth of field, and exposure to maximize the science results,” he adds.

The future moonwalkers will take a variety of shots on the lunar surface, from close-up to panoramic images and videos. Jeremy spent a week with the PANGAEA crew closely following the camera's performance in the hands of the astronauts.

“We are trying to choose the best lenses for the Moon shots and optimize the settings in a smart way. We want astronauts to be able to take a detailed image of a crystalline structure in a rock and to capture landscapes, all with the right exposure,” explains Jeremy.

Future Testing

While the core of the camera remains the same, the interface and housing keep evolving. One version will fly to the International Space Station for additional testing in the near future.

NASA teams have done extensive testing for the three major challenges of space: thermal, vacuum, and radiation effects. On the Moon, one added challenge will be the abrasive nature of lunar dust. Last year, the camera was part of simulated moonwalk with the JETT 3 mission in Arizona, USA.

Some European astronaut candidates recently had the opportunity to handle the camera during an imagery meeting in the Netherlands, and ESA astronauts Matthias Maurer and Alexander Gerst tested its features at the European Astronaut Centre in Germany.

“We will continue modifying the camera as we move towards the Artemis III lunar landing,” says Jeremy. “I am positive that we will end up with the best product – a camera that will capture Moon pictures for humankind, used by crews from many countries and for many years to come,” he concludes.

IBM and AWS launched an innovation lab in Bengaluru

Highlights

·IBM and Amazon Web Services (AWS) have announced the launch of an Innovation Lab situated at the IBM Client Experience Center in Bengaluru, India

·IBM and AWS to facilitate experimentation with cutting-edge cloud-enabled technologies, including generative AI

·This lab not only serves as a space for innovation but also fosters knowledge-sharing among clients

This marks a significant expansion of their collaborative services, with a focus on empowering mutual clients through the capabilities of generative artificial intelligence (AI). Open to clients worldwide, the lab encourages exploration of joint solutions, testing prototypes, and validating proofs of value with the aim of accelerating innovation across various industries.

Target Industries for Transformation

IBM and AWS have identified key industries for targeted collaboration, including Banking and Financial Services, Automotive, Manufacturing, Energy and Utilities, Travel and Transportation, and Healthcare.

The intention is to leverage the power of generative AI to drive transformative changes within these sectors.

The company announced in a release that the lab is a first of its kind for the IBM-AWS collaboration and is open to clients from around the world to explore joint solutions, test prototypes and proofs of value that aim to help accelerate innovation across industries. The target industries for this collaboration are Banking and Financial Services, Automotive, Manufacturing, Energy and Utilities, Travel and Transportation, and Healthcare, among others.

The lab is divided into experience zones that focus on different technology areas underpinned by generative AI and machine learning. These areas demonstrate cloud modernization, SAP transformation, industry innovation, data and technology transformation, and cybersecurity. Customers will also have the opportunity to learn best practices from their peers globally through the sharing of case studies.

Anuj Malhotra, Vice President and Senior Partner, Growth Platforms, IBM India Client Innovation Centre for IBM Consulting said, "With the IBM Innovation Lab being launched in collaboration with AWS in India, our objective is to showcase the full potential of the joint value proposition that IBM and AWS offer to our clients from across the world. Clients can now experiment with the latest cloud-enabled technologies including generative AI in our lab, before actually implementing and scaling solutions on AWS. Our teams at the lab, consisting of technology and industry experts from IBM and AWS, will help build rapid prototypes that address client business and technology challenges. IBM and AWS have a history of driving client innovation leveraging the latest technology such as AI in India. We look forward to deepening our partnership with AWS and support even more clients across industries and across geographies to unlock the full potential of cloud and generative AI."

Deepfake technology :-Understanding ,implication and need of regulation

Highlights

·The government will come out with new rules and regulations to control the spread of deep-fake content electronics and information technology

·The use of social media is ensuring that defects can spread significantly more rapidly without any checks, and they are getting viral within a few minutes of their uploading. That's why we need to take very urgent steps to strengthen trust in the society to protect our democracy

The minister met with representatives from the technology industry, including from Meta, Google and Amazon, for their inputs on handling deepfake content. Vaishnaw insisted that social media platforms need to be more proactive considering that the damage caused by deepfake content can be immediate, and even a slightly delayed response may not be effective.

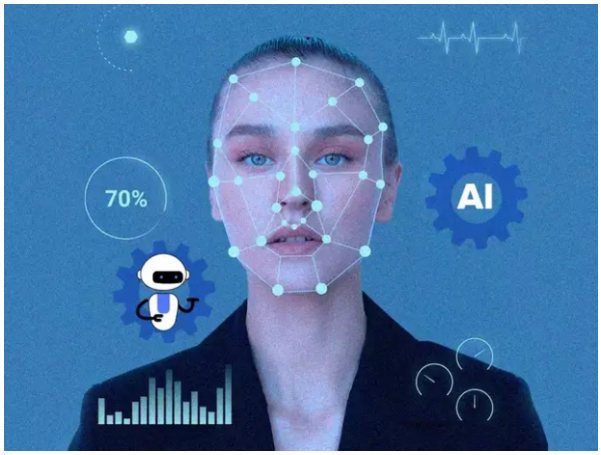
Deepfakes refer to synthetic or doctored media that is digitally manipulated and altered to convincingly misrepresent or impersonate someone using a form of artificial intelligence, or AI.

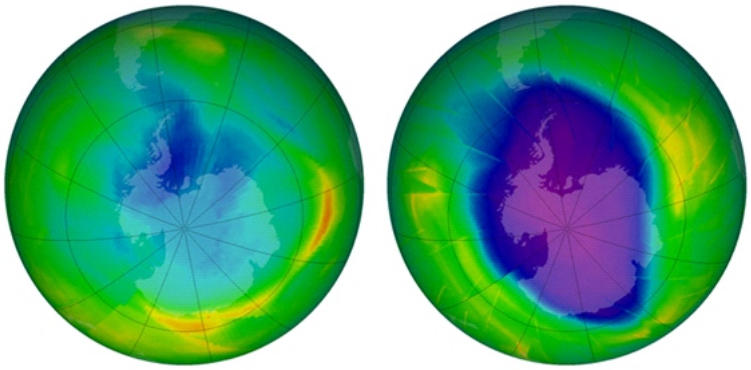
The new regulation can be introduced either as an amendment of India's IT rules or as a new law altogether.

“We may regulate this space through a new standalone law, or amendments to existing rules, or a new set of rules under existing laws. The next meeting is set for the first week of December, which is when we will discuss a draft regulation of deepfakes, following which the latter will be opened for public consultation," Vaishnaw said.

The minister added that 'safe harbour immunity' that platforms enjoy under the Information Technology (IT) Act will not be applicable unless they move swiftly to take firm action. Concerns around deepfake videos have escalated after multiple high-profile public figures, including Prime Minister Narendra Modi and actor Katrina Kaif, were targeted.

The Prime Minister raised the issue of deepfakes also in his address to the Leaders of G20 at the virtual summit.





Antarctic ozone hole at record size in recent Years, new study reveals

Highlights
·Antarctic ozone hole has reached its largest size in the past three years, according to a groundbreaking study
·The 2023 ozone hole has already surpassed the size of the previous three years, covering over 26 million square kilometers, nearly twice the area of Antarctica

Contrary to popular belief, the Antarctic ozone hole has reached its largest size in the past three years, according to a groundbreaking study. The findings challenge the notion that the ozone issue has been resolved and shed light on the complex factors contributing to this alarming phenomenon.

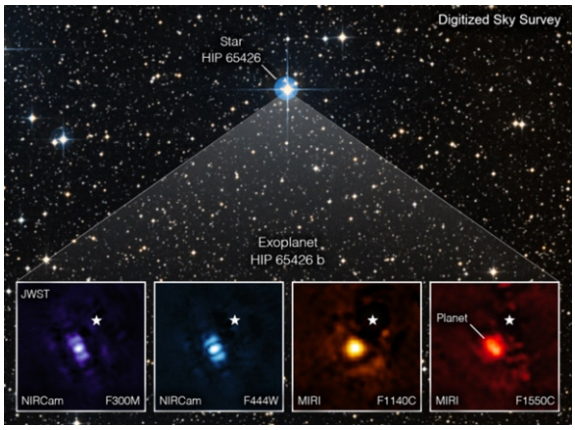
Published in the prestigious journal Nature Communications, the study dismisses the widely-held assumption that chlorofluorocarbons (CFCs) are solely responsible for ozone depletion. CFCs, which are greenhouse gases containing carbon, hydrogen, chlorine, and fluorine, have long been associated with the destruction of the protective ozone layer in Earth's atmosphere.

Lead author Hannah Kessenich, a PhD candidate at the University of Otago, New Zealand, reveals that the ozone hole above Antarctica has not only been exceptionally vast but has also persisted for an extended period over the past four years. The team discovered significantly lower levels of ozone in the hole's center compared to 19 years ago, indicating not only a larger area but also a deeper depletion of this crucial protective layer during most of the spring.

To unravel the complex dynamics at play, the researchers meticulously analyzed monthly and daily ozone changes at various altitudes and latitudes within the Antarctic ozone hole from 2004 to 2022. Surprisingly, they identified a correlation between the drop in ozone and changes in the air entering the polar vortex above Antarctica. This suggests that factors beyond CFCs may be contributing to the recent surge in ozone holes.

Despite the Montreal Protocol on Substances that Deplete the Ozone Layer, implemented in 1987 to regulate the production and consumption of ozone-depleting chemicals, the study raises concerns about the misperception that the ozone issue has been resolved. Kessenich emphasizes that while the protocol has undeniably improved the situation with CFCs, the ozone hole has reached one of its largest sizes on record in the past three years. In fact, the 2023 ozone hole has already surpassed the size of the previous three years, covering over 26 million square kilometres, nearly twice the area of Antarctica.

The researchers stress the significance of understanding ozone variability, particularly due to its profound impact on the climate of the Southern Hemisphere. They emphasize that the Antarctic ozone hole is intricately connected to wildfires, cyclones, and other extreme weather events in Australia, New Zealand, and beyond. Furthermore, the hole's existence not only leads to elevated levels of harmful ultraviolet radiation on the surface of Antarctica but also disrupts the distribution of heat within the atmosphere.



NASA detects methane on distant exoplanet for the first time

Highlights

- ***NASA's James Webb Telescope Discovers Methane:*** *The James Webb Space Telescope, in a groundbreaking achievement, has detected methane on the distant exoplanet WASP-80 b, a significant advancement in our understanding of planetary atmospheres*
- ***Challenging Observation Techniques:*** *Despite the challenges of directly observing WASP-80 b due to its distance and proximity to its star, scientists utilized the transit and eclipse methods. The resulting 6.1-sigma detection of methane, validated statistically, reinforces confidence in the findings*
- ***Broader Implications for Exoplanetary Comparison:*** *This discovery not only expands our knowledge of WASP-80 b's atmosphere but also offers a unique opportunity to compare exoplanets with those in our solar system. The ability to measure methane levels opens the door for a comprehensive study of other carbon-rich molecules, paving the way for a deeper understanding of diverse planetary conditions*

In a groundbreaking discovery, NASA's James Webb Space Telescope has unveiled the atmospheric secrets of the exoplanet WASP-80 b.

The telescope observed the distant planet as it passed both in front of and behind its host star, revealing a distinctive spectrum indicative of an atmosphere rich in methane gas and water vapor.

While water vapor has been previously detected in numerous exoplanets, methane has remained elusive until now, making this finding a significant leap in our understanding of distant planetary atmospheres.

WASP-80 b, classified as a "warm Jupiter" due to its temperature of about 825 kelvins (1,025 degrees Fahrenheit), orbits a red dwarf star every three days, situated 163 light-years away in the constellation Aquila. Because of its proximity to its star and the vast distance from Earth, direct observation of the exoplanet is challenging.

Instead, scientists employed the transit and eclipse methods, observing the dimming of starlight as the planet moved in front of and behind its star, respectively.

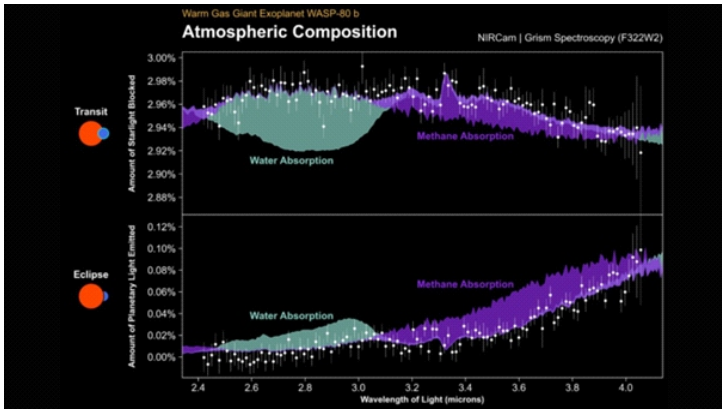
The transit method allowed scientists to study the planet's atmosphere by observing the dimming of starlight as the planet passed in front of its star. A thin ring of the planet's atmosphere illuminated by the star provided valuable information about the composition of the atmosphere.

The eclipse method, on the other hand, measured the infrared light emitted by the planet, offering insights into its thermal radiation and allowing the detection of molecules in its atmosphere.

The measured transit spectrum and eclipse spectrum of WASP-80 b from NIR Cam's slit less spectroscopy mode on NASA's James Webb Space Telescope.

Decoding the Spectrum

To analyze the observations, researchers transformed raw data into spectra, measuring how much light was either blocked or emitted by the planet's atmosphere at different wavelengths. Two distinct modeling approaches were employed to simulate the extreme conditions of the exoplanet's atmosphere, both converging on a definitive detection of methane.



The team then turned to statistical methods to validate this finding. “In our field, we regard the 'gold standard' to be something called a '5-sigma detection,' meaning the odds of a detection being caused by random noise are 1 in 1.7 million,” wrote the researchers in a blog.

“We detected methane at 6.1-sigma in both the transit and eclipse spectra, which sets the odds of a spurious detection in each observation at 1 in 942 million, surpassing the 5-sigma 'gold standard,' and reinforcing our confidence in both detections.”

Bridging Solar Systems

The discovery has broader implications, offering a unique opportunity to compare exoplanets with those in our solar system.

By measuring methane levels—a molecule abundant in the atmospheres of gas giants within our solar system—scientists can now perform an "apples-to-apples" comparison. This comparison could reveal similarities and differences between our familiar planets and those located in distant star systems.

Looking ahead, the team is confident of further probing the atmosphere of WASP-80 b at different wavelengths with additional observations using Webb's MIRI and NIR Cam instruments.

“Our findings lead us to think that we will be able to observe other carbon-rich molecules such as carbon monoxide and carbon dioxide, enabling us to paint a more comprehensive picture of the conditions in this planet's atmosphere,” they wrote.

“As we find methane and other gasses in the exoplanet, we will continue to expand our knowledge about how chemistry and physics works under conditions unlike what we have on Earth, and … other planets that remind us of what we have here at home.”

Study Abstract

The abundances of main carbon- and oxygen-bearing gases in the atmospheres of giant exoplanets provide insights into atmospheric chemistry and planet formation processes. Thermochemistry suggests that methane (CH_4) should be the dominant carbon-bearing species below about 1,000 K over a range of plausible atmospheric compositions; this is the case for the solar system planets and has been confirmed in the atmospheres of brown dwarfs and self-luminous, directly imaged exoplanets. However, CH_4 has not yet been definitively detected with space-based spectroscopy in the atmosphere of a transiting exoplanet, but a few detections have been made with ground-based, high-resolution transit spectroscopy including a tentative detection for WASP-80b. Here we report transmission and emission spectra spanning 2.4–4.0 μm of the 825 K warm Jupiter WASP-80b taken with the NIR Cam instrument of the JWST, both of which show strong evidence of CH_4 at greater than 6σ significance. The derived CH_4 abundances from both viewing geometries are consistent with each other and with solar to sub-solar C/O and around five times solar metallicity, which is consistent with theoretical predictions.

New York installs first offshore wind-turbine to power 70,000 homes

Highlights

- ***Historic Offshore Wind Milestone:*** *New York State achieves a historic milestone in clean energy by installing the first turbine at its inaugural offshore wind farm, South Fork Wind, a 130-megawatt project located 35 miles off Montauk*
- ***Clean Energy Impact:*** *Once completed, the wind farm is expected to generate enough renewable energy to power 70,000 homes in Long Island, reducing carbon emissions by up to 6 million tons over 25 years—an equivalent of removing 60,000 cars from the road annually*
- ***Supporting Renewable Goals:*** *South Fork Wind is part of New York's broader goal to develop 9 GW of offshore wind by 2035, contributing to the state's target of achieving 100% clean electricity by 2040. The project has also created jobs and supported local ports, fostering the growth of a domestic supply chain for offshore wind*

A 130-megawatt project

The 130-megawatt (MW) project, located 35 miles off Montauk, will be the first utility-scale wind farm in the federal waters of the US when completed. It will generate enough renewable energy to power 70,000 homes in Long Island, and reduce carbon emissions by up to 6 million tons over 25 years - equivalent to taking 60,000 cars off the road annually.

The project is jointly developed by Danish energy giant Ørsted and Boston-based Eversource and uses 12 SG 11-200 DD Siemens Gamesa wind turbines. The installation of the turbines is carried out by Van Oord's offshore vessel, the Aeolus, which lifts and places the components on the foundations. The first foundation was installed in June, and the first US-built offshore substation was completed in July.

The project will deliver clean energy directly to the electric grid in East Hampton via a single transmission line that was installed in March. The energy produced will be sold to the Long Island Power Authority under a 20-year agreement.

The project has also created hundreds of local jobs and supported three ports in the Northeast, contributing to the development of a new domestic supply chain for offshore wind. The New York State Energy Research and Development Authority (NYSERDA) said that it expects all 12 turbines to be installed by the end of 2023 or early 2024.

South Fork Wind is part of New York's ambitious goal to develop 9 GW of offshore wind by 2035, which will support the state's target of 100% clean electricity by 2040. The state has four other offshore wind projects in progress, namely Beacon Wind, Empire Wind 1, Empire Wind 2, and Sunrise Wind, with a combined capacity of over 4 GW.

However, the state's offshore wind plans have faced some challenges, such as the recent veto by Governor Kathy Hochul of a bill that would have facilitated the transmission planning for offshore wind projects. The bill was opposed by some environmental groups and residents who objected to the use of parkland in Long Beach for the transmission of Empire Wind 2.

AI unlocks the formula for predicting monster waves at sea

Highlights

*·**AI Predicts Rogue Waves:** Scientists at the University of Copenhagen have developed an artificial intelligence (AI) system trained on 700 years' worth of ocean wave data to predict the formation of rogue waves, known for their dangerous size and power*

*·**Causal Analysis Approach:** Combining AI and causal analysis, the researchers fed vast amounts of ocean wave data into the system collected by buoys globally. The resulting mathematical equation allows for the calculation of the probability of rogue wave formation by considering various causal variables*

*·**Navigational Impact and Risk Assessment:** The AI equation has practical applications, potentially aiding the navigation of 50,000 cargo ships. Shipping companies can use the algorithm to assess the risk of encountering dangerous rogue waves, enabling them to plan alternative routes for safer journeys*

A team of scientists at the University of Copenhagen have discovered a mathematical equation to predict rogue waves in the ocean. Rogue waves are unusually large and powerful waves that can be dangerous. They have the power to overturn or even break a ship.

The researchers used a combination of artificial intelligence (AI) and causal analysis (cause and effect) to represent these rogue waves.

The scientists began by feeding much information about ocean waves into the AI system. They collected this information using floating devices called buoys in 158 different places globally. These buoys worked non-stop, 24 hours a day, and gathered 700 years' worth of data. In total, they recorded information about more than a billion waves.

Rogue waves can come out of nowhere

"Basically, it is just very bad luck when one of these giant waves hits," explained Dion Hafner, a former PhD student at the Niels Bohr Institute and first author of the study , in a press release. "They are caused by a combination of many factors that, until now, have not been combined into a single risk estimate.

"In the study, we mapped the causal variables that create rogue waves and used artificial intelligence to gather them in a model which can calculate the probability of rogue wave formation," he added.

Some of these waves reach a whopping height of 20 meters. Is it because of the wind? Underwater currents? A mysterious wave conspiracy? The scientists embarked on a mission to crack the case.

"Our analysis demonstrates that abnormal waves occur all the time," explained Johannes Gem rich, the study's second author. "In fact, we registered 100,000 waves in our dataset that can be defined as rogue waves. This is equivalent to around 1 monster wave occurring every day at any random location in the ocean. However, they aren't all monster waves of extreme size."

The scientists looked at over a billion waves

Their AI learned how things cause waves to go rogue and shared this information with the researchers as an equation. Scientists can use this equation to study and use it in their future work to understand better and predict rogue waves.