

INTERNATIONAL

AI-enabled Flood Hub

Google has announced the extension of its Flood Hub platform to scores of additional countries, providing early flood warnings to hundreds of millions of people living in some of the regions exposed to the highest levels of flood risk. App provides flood data and forecasts up to seven days in advance to regions with more than 460 million people exposed to severe flood risk.

The AI-enabled app was first debuted in India in 2018 before being expanded to cover Bangladesh, one of the countries most exposed to worsening levels of flood risk as climate impacts intensify.

Google announced it was extending the service to 80 countries, with the addition of 60 new countries across Africa, Asia-Pacific, Central and South America, and Europe, including the U.K.

The company said the platform includes some of the territories with the highest percentages of the population exposed to flood risk and experiencing more extreme weather, covering 460 million people globally.

It also confirmed the functionality on the platform has been improved, with it providing locally relevant flood data and forecasts up to seven days in advance — an increase on the previous 48-hour window for new forecasts.

Flood Hub's AI draws on diverse, publicly available data sources, such as weather forecasts and satellite imagery. The technology then combines two models: the Hydrologic Model, which forecasts the amount of water flowing in a river, and the Inundation Model, which predicts what areas are going to be affected and how deep the water will be.

<https://www.greenbiz.com/>

ASIA-PACIFIC

AI brings real-time weather alerts

More companies are using artificial intelligence to help shield clients in Asian countries such as Thailand and Vietnam from the fallout of weather-related disasters.

Damage from a flash flood in 2021 prompted an electronics factory at Thailand's Bangpoo industrial park to sign up for a pilot forecast service from Weathernews, a leading Japanese weather company. The service, which debuted in February, lets the factory outside Bangkok track the likelihood of sudden weather changes nearby within three hours.

The Thai Meteorological Department normally provides only daily forecasts by region. Weathernews uses AI to collect and analyze data for real-time, hyperlocal forecasts. It warns clients of potential squalls and floods, letting them put up barriers or move equipment to prevent damage.

Weathernews also works with local authorities to install its radar, expected to bring the accuracy of its forecasts in Thailand on par with those in Japan.

Several startups are also exploring weather-related opportunities in Asia. California-based Atmo signed a deal with Indonesian authorities to build an early warning system for flash floods and cyclones and is in talks with authorities in neighboring countries as well.

Tokyo-based Spectee plans to use AI for the analysis of photos and comments on social media to map out natural disasters in the Philippines. The company began a feasibility study last year and will set up a local unit once it finds a partner. Spectee, founded in 2011, offers similar

services to 700 clients in Japan including companies and municipalities.

<https://asia.nikkei.com/Business>

AUSTRALIA

Digital Twin for mitigation of flood risk

Digital twin technology is used across many different industries. For power utilities, digital twins can now create a 3-D model of the network to optimize investments, identify and mitigate risk, and streamline operations. Endeavour Energy adopted digital twin technology from Neara. Whereas many digital twins provide a lot of detail at a small scale, or little detail at a large scale, Neara's engineering-grade model provides granular detail but on a large scale — enabling complex engineering-grade analysis automatically across the entirety of a whole network.

Leveraging the digital twin, the Neara team, in the past, implemented a floodwater simulator for Endeavour Energy using open-source government data to model the impact of rising floodwater and keep customers and workers safe. This simulation meant Endeavour Energy could more accurately isolate electricity supply ahead of areas being inundated or where floodwater brought people too close to live power lines.

Network-wide reports on flood activity were visible and editable in the utility's digital twin instance within 48 hours of the emergency commencing — when the floodwater was still rising. As the floodwater subsided, Endeavour Energy used flood mapping features to prioritize inspections to restore power to customers safely and quickly as well as understand potential

hazards before emergency crews were sent into flooded areas.

With so much time and money saved with the efficiencies introduced by the digital twin, Endeavour Energy can invest more time in strategizing for the future. The utility is committed to planning a modern grid where batteries, microgrids, and solar integrate seamlessly with the distribution network's traditional poles and wires. With its design capabilities, Neara's software and digital model are helping the utility's engineers to design and modify the infrastructure needed to allow for this integration. By first designing digitally and stress testing the 3-D model in a risk-free environment, Endeavour Energy can ensure the decisions it makes are right the first time with new construction projects.

<https://www.tdworld.com>

Satellite data mapping of extreme climate

To harness the full potential of using satellites, algorithms are required that can process this complex and diverse mix of big data from different satellites—en masse and quickly.

A research team has combined the best satellite precipitation data sources together with rain gauge measurements to deliver a comprehensive rainfall map of Australia.

The Precipitation Profiler-Observation Fusion and Estimation tool—known as PProFUSE—is a first-of-its-kind tool that blends data from multi-satellite global remote sensing, taking full advantage of the Bureau of Meteorology's (BoM) national rain gauge network to build our map.

The tool brings together this precipitation information to generate one unified data set that is more consistent, more accurate, and more useful than any other available data source in Australia.

PProFUSE aims to optimally fuse the advantages of different data sources to come up with the best estimate of precipitation across all of Australia.

In locations that do have gauges, PProFUSE returns a precipitation estimate that's exactly equal to the direct and trusted gauge measurements from BoM. In ungauged locations, PProFUSE delivers an optimal estimate of precipitation.

<https://phys.org>

CHINA 5G for natural disaster management

Ericsson has signed a partnership with China Mobile Zhejiang and other partners to deploy 5G technology for public safety-focused natural disaster management in China.

In a release, the Swedish vendor said that this move follows the successful testing of a 5G mission-critical solution in ten cities across the Lishui region of China.

"Spanning early-warning analysis, natural disaster monitoring, command and dispatch, and post-disaster assessment, the solution has now been included in China's Ministry of Science and Technology's monitoring, early warning, and prevention of major natural disasters demonstration projects. As a result, the partners expect nationwide deployment to get underway in the coming weeks," Ericsson said.

"Ericsson and China Mobile provided key insights and support for the development and validation of core applications by combining respective emergency communication practices, digital twin use cases, and network slicing technologies while jointly building 5G network connectivity," the vendor added.

The solution was developed and tested in Lishui due to the region's vulnerability to large-scale natural disasters and flash floods during the wet season.

Ericsson also noted that several criteria were identified for the solution to address, including accurate disaster prediction; visible disaster occurrence; shared data silos; coordinated emergency command, and timely evacuation.

"The solution combines the coverage, high bandwidth, low latency, and reliability benefits of advanced 5G network connectivity, edge computing, digital twins, and 5G private network slicing," the European vendor said.

According to Ericsson, the solution includes:

- An integrated 5G sky-land monitoring network, which solves challenges in data integration and sharing, deployment, coverage, and construction and operational costs by ensuring rapid network deployment.
- An intelligent 5G multi-hazard early-warning model, which accelerates data processing and improves accuracy for rapid data transmission, consolidated processing, and multi-hazard identification.
- A decision-making assistant based on digital map models.
- Portable 5G sites and communication vehicles for on-site communication.
- Simulated model assessment based on remote-sensing images.

<https://www.rcrwireless.com>

INDIA New drought monitoring tool

A new satellite-based drought-monitoring tool will be able to indicate the presence of drought and its level of severity, providing authorities with the maximum possible lead time to put mitigation strategies into place in India and across South Asia.

In India, the South Asia Drought Monitoring System (SADMS) was developed by the International Water Management Institute (IWMI) and the Indian Council of Agricultural Research (ICAR), the country's premier agricultural research institution.

It has been tested in India, Pakistan, Bangladesh, Sri Lanka, Nepal, Maldives, Afghanistan, and Bhutan.

The system will not just monitor the drought conditions but also incorporate this information of real-time weather

updates and open-access satellite data, and provide extension workers as well as agriculture and water resources authorities with all the information needed to forecast, monitor, and manage drought every week.

The data from the drought-monitoring system is available at the grid level and can be visualized up to the *taluk* level, Amarnath said. "We wanted the data to reach the appropriate users so that they could make informed decisions on how best to mitigate the drought risk."

"We are working closely with ICAR-Central Research Institute for Dryland Agriculture and at the taluk level, the district officials can see the value and visualize if there is a surplus or rain deficit," he explained.

If there is a deficit, ICAR, which works with Krishi Vigyan Kendras (agriculture resource centers), can take this information to them and also at the state government level and interpret what action needs to be taken, he added.

Through this, the authorities can implement district-wise contingency plans, including measures like changing the crop or switching to drought-tolerant varieties.

IWMI has been testing SADMS by validating it at the district level. The platform is already in operation in the state of Telangana. They use the system to know when to initiate their strategy for mitigating drought.

From 2017, ICAR used SADMS to implement real-time contingency measures. It helped farmers in three districts of Andhra Pradesh and Maharashtra to obtain drought-tolerant seeds, develop supplementary irrigation, and apply potassium nitrate (which helps seedlings cope better with dry conditions).

The institute will be organizing state-level workshops in India early next year to impart training on how to interpret the information at the sub-granular level by end users.

<https://www.downtoearth.org.in>

INDONESIA

SAS partners r-app JAKI and Flood Control System

1 September 2022

Initiative toward Smart City status using AI and IoT

Leading multinational analytics software company SAS Institute has established a partnership with the Jakarta City Government to boost the deployment of Digital Transformation initiatives such as the Digital Government Plan and the Flood Control System.

In 2019, the Jakarta Smart City developed Jakarta Kini (JAKI), a one-stop digital platform and super-app for multiple government services to help address the needs of its citizens. JAKI processes and analyzes diverse data from various reliable sources to gain a better understanding of the citizen needs and the services they require in the capital city through the application of advanced analytics, Artificial Intelligence (AI), and Machine Learning.

SAS Institute is among the main technology providers in the implementation of the Digital Transformation Plan. With its advanced analytics solutions, SAS ensures that JAKI is a reliable platform that provides accurate real-time information and data-driven insights that help improve the lives of Jakarta citizens.

For instance, through JAKI, residents can access health services like calling an ambulance or checking out the services at various public health facilities, in just a few easy steps.

In addition to healthcare, JAKI also integrates other government services such as education, health, trade, disaster, and licensing services. It is equipped with mobile-based public complaint management to incorporate systemic improvements into the platform.

SAS Institute is also fortifying its partnership with Jakarta City Government by assisting with the city's Flood Control System. By leveraging SAS Analytics for

IoT, the JAKI platform predicts and monitors at-risk areas in real time to reduce potential damage or harm, and increase public awareness of disaster situations.

With these predictive capabilities and analysis, Jakarta City Government can mark when to activate water pumps, which will help accelerate disaster responses and improve preparedness for flood emergencies.

The system utilizes sensors and weather data that assess real-time situations of stream levels and predict where and when flooding may occur.

By using AI and Machine Learning, the SAS solution quickly and accurately gathers and acts upon large sets of data in real-time, thus leading to an accelerated time or speed to execute the critical actions that reduce or eliminate damage to life, property, and businesses in the city.

By using the SAS solution, the city has reduced data-gathering time from an hour to just five minutes.

In addition to quick and accurate data analysis, Jakarta's Flood Control System also delivers real-time decision-making, data management, analytical data management, and asset management.

Jakarta's Knowledge Management for Flood Control System was recognized in the IDC Smart City Asia Pacific Awards (SCAPA) 2022. It also won the 2022 WSIS Prizes in the ICT Applications: e-Science category.

Jakarta Smart City's initiatives in Digital Transformation and disaster management are supported by the SAS analytics platform, which standardizes data into a single data management system built into the super-app JAKI.

<https://www.intelligentcio.com>

ISRAEL

Tool to predict extreme rainfall

The Hebrew University of Jerusalem researchers have identified factors influencing the likelihood of extreme rain

events and have developed a tool that can improve the forecasting of such events.

Extreme rain events, particularly those that cause flash floods in the south and east of Israel in spring and fall are particularly difficult to forecast even a short while in advance. In April 2018, a flash flood killed 10 students from an army preparatory program who were hiking in Nahal Tzafit, a riverbed in the Judean Desert near the Dead Sea. The research led by Dr. Assaf Hochman and by doctoral student Tair Plotnik at the Institute of Earth Sciences at the Hebrew University determined the factors that impact scientists' ability to predict extreme rain events, which are linked to what is known as an "active" Red Sea Trough.

The research team used an extensive database belonging to the European Center for Medium-Range Weather Forecasts to examine all extreme rain events since 1979 and to sort them into hard-to-forecast and easy-to-forecast categories.

They found that one of the factors preventing optimal forecasting is the simultaneous entry into Israel of air masses from the south and the north, due to the significantly different characteristics of each.

A mathematical tool developed by the research team can improve forecasting even in difficult cases, so that in the near future it will be possible to predict the extremity of rain events in Israel with a high degree of accuracy, and subsequently also in other parts of the world.

This capability will enable decision-makers to prepare for such events, thus saving lives as well as significantly reducing associated damages.

<https://argusenglish.in>

JAPAN

AI technology to predict tsunami impacts

New research out of the RIKEN Prediction Science Laboratory has used machine learning to accurately predict tsunami impacts in less than one second.

"The main advantage of our method is the speed of predictions, which is crucial for

early warning," explained Iyan Mulia, the work's lead, and a scientist at RIKEN.

"Conventional tsunami modeling provides predictions after 30 minutes, which is too late. But our model can make predictions within seconds."

To achieve this, the coast now boasts the world's largest network of sensors for monitoring the movement of the ocean floor. About 150 offshore stations make up this network and work together in order to provide early warnings of tsunamis.

To function effectively, however, the data generated by the sensors need to be converted into tsunami heights and extents along the coastline.

This normally requires solving difficult nonlinear equations, which can take about 30 minutes on a standard computer. Needless to say, this does not give people enough time to evacuate.

That's why the RIKEN AI model is so crucial to saving lives. It allows people to get at least half an hour's head start from where the tsunami will strike.

The RIKEN team trained their machine-learning system using more than 3,000 computer-generated tsunami events and tested it with 480 other tsunami scenarios and three actual tsunamis.

They found that their machine-learning-based model could achieve comparable accuracy at only one percent of the computational effort of conventional approaches. Now, they claim their model could work for any time-sensitive natural disaster.

<https://interestingengineering.com>

TÜRKIYE

Earthquake early warning systems developed

Researchers at Dokuz Eylül University (DEÜ) have developed earthquake early warning systems that will issue alerts before a quake hits.

The Earthquake Early Warning Systems (DEUSİS), developed as a result of studies carried out at Dokuz Eylül University's Earthquake Research and

Application Center (DAUM), are still in the testing phase, but «the system will issue notifications from the shifting fault before the earthquake is felt,» DAUM Director Hasan Sözbilir said. The warning will arrive 10, 15, or 20 seconds before the tremor's force reaches the surface, depending on the distance from the seismic source.

Noting that they are trying to both develop a system and create its software, Sözbilir said: "There are various instruments developed by different countries around the world, but we aim to develop a domestic system. We are using three devices that measure the movement of the earthquake together. The device that detects an earthquake under the ground gives us information with a signal, converted into a numerical parameter with software. After that, we will start the operation of the system. We will set up the system at 12 different points during the six-month trial period and the system will provide us with instant data. In other words, we will listen to the ground 24 hours a day for six months," he said.

"For example, if there is an earthquake with a magnitude of 5 and above, the system will warn us. After receiving the signal, we will cut the electricity in the subway and gas. Thus, when the earthquake shakes us, both the damage during the earthquake will be reduced and the fires that will occur after the earthquake will be prevented. We developed the mechanism and signed a protocol with the Disaster and Emergency Management Authority (AFAD) to distribute it to public institutions. The warning messages will be sent to phones as soon as the earthquake is 10 kilometers below the ground."

Right now, the system will only work in Izmir, but it can be used for any province with high seismic value, Sözbilir explained.

<https://www.dailysabah.com> VIETNAM

Artificial Intelligence for weather forecasting

The Vietnam Meteorological and Hydrological Administration has applied Artificial Intelligence (AI) in hydrometeorology monitoring and forecasting, making typhoon and torrential rain prediction more accurate.

The Vietnam Meteorological and Hydrological Administration (VNMHA) has built a shared digital platform for the Ministry of Natural Resources and Environment, including a data integration system based on big data, especially the AI application in identification to solve specific problems for hydrometeorological monitoring and forecasting.

The department is researching AI applications in storm forecasting, heavy rain quantification, and flood surge prediction.

Mai Van Khiem, director of the National Centre for Hydro-meteorological Forecasting, said the center used big data systems and AI in identifying upcoming tropical cyclones similar to the ones in the past to map out impact scenarios. AI has also been applied in forecasting extreme short-term rain and flash flood warnings.

The VNMHA has studied AI applications in forecasting dangerous weather conditions and disasters. In the future, a hydro-meteorological virtual assistant system that can automatically provide weather information to users will be developed.

Deputy Director General Hoang Duc Cuong said the AI applications would bring significant value, save time in professional activities, and speed up automation and digitization of the hydrometeorological industry.

<https://vietnamnet.vn>

Application of AI in hydrometeorology

Head of the NCHMF's Weather Forecasting Department Tran Quang Nang said that the Vietnam Meteorological and Hydrological Administration has developed forecasting technology, including the application of AI to various fields such as monitoring, calculation, and forecasting technology. This application helps to improve the quality of hydro-meteorological forecasts and warnings, thus ensuring reliability and closeness to reality, contributing to reducing disaster risks, and boosting socio-economic development.

The Administration has established its Steering Committee for Digital

Transformation for the 2021 – 2025 period, and at the same time implemented different research and application of artificial intelligence in specific problems, including the application of AI in storm forecasting, heavy rainfall quantification, and forecasting of water level rise caused by storms.

In the coming time, the Vietnam Meteorological and Hydrological Administration continues to invest in and develop the application of artificial intelligence in data processing, hydrometeorological forecasting and warning, build a virtual assistant system to automatically provide weather information for users, and apply virtual reality and virtual interaction in the presentation of hydro-meteorological information.

<https://vietnamnet.vn>

EUROPE

NORWAY

AI and big data to predict flooding

Climate change-driven disasters are only going to get worse. And while there are varying opinions on what — if anything — we can do to avert such catastrophes in the future, some companies are looking at ways to plan for this new reality, and at least go some way toward mitigating the impact of flooding.

One of these companies is 7Analytics, a Norwegian startup founded back in 2020 by a team of data scientists and geologists to reduce the risks of flooding for construction and energy infrastructure companies. With its first product, FloodCube, 7Analytics serves customers with AI and advanced machine learning techniques to calculate current surface water and where it's flowing today (the "runoff"), then models how that will look in the future with increased rainfall.

So, in effect, FloodCube is more about predicting *how* a flood will unfold, showing exactly where water is likely to accumulate based on various environmental factors. While it's possible to achieve

this already today through combining multiple software programs and manual calculations, FloodCube brings everything together under one roof.

As with just about any AI and ML-infused software, large datasets are pivotal to 7Analytics' promise — it gathers data from openly available sources spanning digital elevation models (DEM) for terrain, satellite imaging, and climate data, then integrates these sources to make it easier for users to derive insights from. Its customers include the Municipality of Bergen, where 7Analytics is headquartered, multinational construction giant Skanska and engineering consultancy Multiconsult. And this gives a strong indication as to *who* 7Analytics is targeting, and *who* is most likely to care about predicting future flooding scenarios — protecting urban infrastructure is very much the name of the game here.

While its technology is mainly used by construction companies in Norway for now, 7Analytics is expanding into new areas such as energy infrastructure and is currently in talks with a handful of energy companies in the U.S. To help, 7Analytics' has partnered with StormGeo, a weather service and meteorological company that essentially tailors risk data for specific business use cases — such as disaster management in ship-routing, or energy production sites. In short, 7Analytics is helping StormGeo "enhance" its existing offering to its oil and gas customers, which includes companies in Houston, Texas.

<https://techcrunch.com>

PORTUGAL

A drone that douses wildfires

On a still, hot May afternoon in central Portugal, a car-sized pile of brush catches fire. As the flames leap higher, a torrent of water suddenly falls from the sky.

It's not rain, however. A large drone hovers about 15m (49ft) above, a fire-proof hose dangling from its belly. A pair of jets on either side of the hose pummel the flames with water as the drone operator controls the device from behind a fire truck, the

device's water source. In about two-and-a-half minutes, the fire is out.

The 21kg (46lb) drone, called Sap (for "ported nozzle system" in Portuguese) is one of the newest tools in the battle to beat back extreme wildfires. The drone is lightweight, easy to operate, and nimble at low altitudes. With a wingspan of 2.14m (7ft) and made primarily of carbon fiber, can swoop into places that are too dangerous or too difficult for firefighters to enter, says Carlos Viegas, a mechanical engineer who heads the University of Coimbra's Field Tech Lab and co-led the project.

The firefighting drone test occurred as a slew of wildfires continued to erupt across east and west Canada, leading to the evacuation of thousands of people. Canada is projected to see its largest area on record burned by wildfires this year. Chile was also hit with hundreds of perilous wildfires earlier this year amidst a heatwave.

While the demonstration in Lousã took only minutes, the prototype took almost four years to develop. The first hose the team tried burned up. The nozzle had to be tweaked to create pressure strong enough to effectively douse the fire. But the strong pressure burst the PVC nozzle, so the team went with heavier but more durable stainless steel instead. And after several tests, they figured out that two symmetrical jet streams, one on either side of the nozzle, were needed to keep the craft steady and balanced while it hovered up to 50m (164ft) above the flames.

Even with a bigger motor and other improvements, the drone's best use will likely still be taming early or late-stage fires, he adds – it won't replace conventional aerial firefighting equipment such as manned helicopters and "water bomber" aircraft. "For [these], the drone won't be doing anything because the fire is so out of proportion already that this won't be useful." All big fires begin as small ones, though, and researchers have found that early suppression, which this type of drone could help with, is crucial when tinderbox conditions exist.

A combination of other hi-tech tools is in the works to help keep firefighters and communities around the world safe from wildfires. Another type of drone, already in use in Oregon and several other states in the US, uses sensors and cameras that can help detect and track fires, allowing firefighters to pinpoint where to focus resources. A prototype funded by the US Department of Agriculture and led by Georgia State University researchers employs thermal cameras that can detect wind speed and direction and make predictions about where the fire will spread. Yet another project, already commercially available, uses thermal vision cameras that can be attached to headgear to help firefighters see through smoke and flames.

Some of the most important advances are in the realm of satellite technologies. Satellite data, such as temperature, humidity, vegetation, and topography, feed digital maps that allow firefighters to monitor and assess a blaze before going in.

Firefighters on the ground need to know if shifts in the wind could hasten the fire's spread or drive the blaze in a certain direction. But with the help of AI, experts are working on ways to combine satellite data on vegetation conditions and other factors with drone observations and weather data.

<https://www.bbc.com>

UK Tool to assess the impact of sea-level rise

British scientists have developed a tool that can swiftly assess the impact of sea-level rises on the risks of areas flooding.

Researchers from the University of Cambridge used Hull in eastern England, one of Britain's most vulnerable cities to flooding, as a base to create the digital tool which can now be used around the world.

It will enable towns, cities, regions, and countries around the world to make better and earlier decisions to prepare for climate change.

The tool assesses the economic impact of tens of thousands of potential scenarios of rising seas and mitigation activities.

"It's vital that places like Hull make informed decisions on how best to reduce risk and increase resilience," said Mike Dobson, who works for Arup, global specialists in the sustainable environment.

"Hull is low lying — it's similar to New Orleans in many ways due to its low-lying nature on the coast — and there are 100,000 properties potentially at risk from the most extreme weather events.

Prof Spencer and his colleague Dr. Elizabeth Christie started with detailed sea-level rise prediction information from the UK Climate Projections data in 2018 to model the effects of climate change.

They then developed a framework that incorporates sea-level rise uncertainty into coastal flood-risk assessment by streamlining the process of modeling sea levels, wave overtopping, and flood spreading on land.

By the end of their research, the team had 10 million data points relating to 21,300 scenarios with 122 increments of sea-level rise and seven extreme water levels.

<https://www.thenationalnews.com>

NORTH AMERICA USA Tsunami warning system using AI

Scientists are working on a new early warning system using artificial intelligence to provide coastal residents with more lead time ahead of a potentially deadly tsunami.

According to a new study published Tuesday in the journal *Physics of Fluids*, an early warning system is being developed that combines "state-of-the-art acoustic technology with AI to immediately classify earthquakes and determine potential tsunami risk," the study said.

The new research used sound recordings captured by underwater microphones, called "hydrophones," to measure the

acoustic radiation produced by 200 earthquakes that happened in the Pacific and Indian Oceans.

“Our study demonstrates how to obtain fast and reliable information about the size and scale of tsunamis by monitoring acoustic-gravity waves, which travel through the water much faster than tsunami waves, enabling more time for evacuation of locations before landfall,” Kadri said.

The new machine-learning model can analyze the hydrophone (underwater microphone) data within a few seconds on a standard computer.

In addition, systems that rely on deep ocean wave buoys to measure water levels often leave insufficient evacuation time.

Designed to be used alongside existing warning systems, the new system triangulates the source of the earthquake from the hydrophones, and AI algorithms classify its slip type and magnitude. It then calculates important properties like effective length and width, uplift speed, and duration, which dictate the size of the tsunami.

This new research predicting tsunami risk is part of a long-running project to enhance natural hazard warning systems across the globe, according to a statement from Cardiff University.

Their latest development is featured in user-friendly software that is set to be hosted in national tsunami warning centers later this year.

<https://www.usatoday.com>

Mobile system for object detection, image analysis

A team of researchers from the Department of Energy’s Oak Ridge National Laboratory has created a prototype system for detecting and geolocating damaged utility poles in the aftermath of natural disasters such as hurricanes.

The system, which is detailed in the journal *Photogrammetric Engineering and Remote Sensing*, is designed to run on edge computing hardware mounted on

a quadcopter or other uncrewed aerial vehicle, allowing it to function when local infrastructure is damaged or destroyed.

The team from ORNL’s Geospatial Science and Human Security Division used machine learning algorithms and onboard imaging hardware to accurately detect and assess damage to utility poles while uploading location information to a central processing hub, called the Environment for Analysis of Geo-Located Energy Information, or EAGLE-I. This information can be relayed to utility companies, first responders, or other groups supporting energy infrastructure.

The edge computing platform is one of several projects designed for incorporation into the EAGLE-I system, a multi-faceted real-time situational awareness tool for the nation’s energy infrastructure. EAGLE-I allows its users to monitor energy infrastructure assets, report energy outages, display potential threats to energy infrastructure, and coordinate emergency response and recovery.

While the affordable hardware does have limited image resolution and rate capture, Hughes and his team have worked hard to optimize their machine learning analysis software to ensure these limitations are manageable.

When discussing AI on the edge, Hughes is not only referring to the cutting-edge methods he and his team are using to design their image analysis tools or the UAS platform upon which they will run. He’s also talking about a broader class of new AI computing projects in which AI applications are deployed in devices close to users rather than in a cloud computing facility or private data center. These so-called edge computing projects allow for improved security and efficiency, as well as increased uptime and decreased costs in many cases.

AI on the edge can be useful in a broad range of applications, and the interdisciplinary ORNL team is already considering several new research avenues enabled by their edge computing project.

The team’s new edge computing system will improve damage assessment and resource allocation in disaster response and promises a new generation of remote sensing technology for improved preparedness and response to a wide range of threats to national and human security.

<https://techxplore.com/news>

New Global Flood Early Warning Technology NASA Partnership Launches Groundbreaking New Global Flood Early Warning Technology

Floods are among the most deadly and destructive disasters worldwide, and climate change has only increased their severity. To make matters worse, many smaller communities lack the tools they need to detect and respond to floods, leaving them vulnerable to the full force of their impacts.

To help protect these communities, NASA’s Earth Applied Sciences Disasters program area has partnered with several leading scientific institutions to develop a new flood detection tool called «Model of Models» (MoM). This tool combines data from open-source hydrological models with Earth-observing satellite data to generate global flood risk severity updates several times a day. This is the first time that comprehensive global flood early warnings have been available at the sub-watershed level, giving communities the knowledge, they need to take early action to protect themselves.

But for this knowledge to be put into use, it must reach the hands of local decision-makers – that’s where the Pacific Disaster Center (PDC) comes in. NASA partnered with the PDC to integrate MoM into their global multi-hazard alerting platform DisasterAWARE. When the MoM detects a high likelihood of flooding in a region, DisasterAWARE sends a flood early warning notification to impacted communities, letting them quickly take the steps necessary to save lives and livelihoods.

Local authorities may use this information to activate emergency response plans, order evacuations, or deploy response teams and humanitarian relief.

“This new technology covers the face of the globe, enabling us to observe flood risk and anticipate the likelihood of floods in ways never before possible,” said Dr. Shanna McClain, Disasters Program Manager for NASA’s Earth Science Applied Sciences Program. “The technology we’ve developed will be transformative, enabling early action by communities around the globe—especially small island communities and developing states that lack the necessary early warning information to protect themselves and their loved ones during flood events.”

“The ‘Model of Models’ approach makes use of already existing technologies and combines them in unique ways that give us a powerful understanding of flood risk,” said NASA’s Margaret Glasscoe, Research Associate at the University of Alabama in Huntsville, who leads the project team.

“The IFRC currently integrates all of PDC’s DisasterAWARE early warning and risk information into its Go Platform, which provides its 192 national societies and more than 15 million volunteers with critical emergency needs information and the tools they need to provide an adequate response.

PDC’s DisasterAWARE platform serves tens of thousands of disaster management and humanitarian assistance professionals worldwide and reaches millions more through PDC’s free mobile app Disaster Alert. The business community is also able to access this new flood hazard information for supply chain and continuity of operations planning through DisasterAWARE Enterprise. Through MoM and DisasterAWARE, community leaders and disaster response teams can accurately gauge flood severity through various data layers which include multi-hazard risk, exposure, vulnerability, coping capacity, and national profile assessments.

<https://appliedsciences.nasa.gov>

Collision-tolerant drone for search and rescue

When disasters happen, search and rescue teams use advanced technology to help them find people in need. Drones can be beneficial, but they often break when they bump into things in damaged areas.

Wenlong Zhang, a robotics expert at Arizona State University, says that’s a big problem, but thankfully, that’s about to change.

A team of robotics researchers from the Ira A. Fulton Schools of Engineering at Arizona State University has designed and tested a quadrotor drone with a unique feature: an inflatable frame that allows the drone to cope with collisions. Talk about designing for resilience.

The drone’s frame is soft, resilient, and tunable, which means it can be adjusted to absorb and recover from unexpected taps and thumps. This makes it possible for the drone to recover from collisions that would otherwise cause rigid-frame drones to crash. Its ability to withstand knocks and jolts is a game-changer in search and rescue operations, where it’s crucial to assess the damage from high up and navigate through inaccessible spaces.

Wenlong Zhang, an associate professor and robotics expert who led the research team, said that drones need to physically interact with their surroundings to accomplish a range of tasks. He added that a soft body absorbs impact forces to provide collision resilience and offers the material compliance necessary for dynamic maneuvers such as perching.

This innovation, dubbed ‘Built to Bounce Back’, holds the potential to transform industries that rely on the use of drones, from disaster relief to package delivery.

In addition to its practical applications, the development of this collision-tolerant drone also serves as a powerful reminder of the importance of embracing challenges and setbacks. The resilience exhibited by this drone is a prime example of how perseverance and innovative thinking

can lead to remarkable advancements in technology.

With this new technology, drones can now play a vital role in assessing damage and locating survivors in disaster situations, making the work of first responders much easier and more efficient.

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Flood Intelligence Platform to Improve Disaster Response

Worldwide, no line of insurance has a greater coverage gap than flood insurance.

To address this problem, climate adaptation technology company Cloud to Street (C2S) aims to create a scalable parametric flood insurance policy.

C2S is already helping more than two dozen countries and several insurers, reinsurers, and corporates to close the flood gap.

“Global flooding threatens billions of people and remains the most common and costly natural peril,” said Peter Lacovara, parametric insurance expert and head of commercial at C2S.

“Worsening climate change underscores the need to prioritize climate adaptation and financial solutions, to support those affected by natural disasters.”

Since its founding 10 years ago, C2S has pioneered the field of satellite flood tracking. Its flood intelligence platform has enabled the United Nations and national governments to improve flood disaster response.

The company is now powering a new type of flood insurance to help flood-vulnerable communities around the world access financial support and adapt in the face of increasing climate disasters.

C2S provides precise, near-real-time intelligence on flooding and flood risk.

The ability to do this requires three main elements: satellite technology, a 35-year database of flooding worldwide, and a huge amount of computing power.

Technology Scan

The intelligence gives governments the information necessary to better handle refugees, make more informed zoning decisions and limit construction in flood zones.

Led by senior scientists in the fields of hydrology, machine learning, and spatial analysis, C2S combines several flood data streams — including optical and radar satellites, historical flood maps, and on-the-ground intelligence — with machine learning to deliver vital and actionable information about the extent and impact of ongoing flood events.

The company aims to provide insurers and other disaster risk holders with previously inaccessible data, helping them to ensure new markets, respond to emergencies, and plan for future flood risk.

“C2S has two key technologies that are useful for the insurance business,” Lacovara said. “Using our algorithms, we can look at old satellite data as far back as the 1980s and provide a footprint for any flood anywhere in the world, which allows a different look at the historical risk.

“The second piece is research into historical versus modeled outcomes for higher-frequency flooding, which is significantly more accurate than modeled output.”

With so many satellites in space, C2S is able to model high-frequency flooding as it occurs. “If you look at the flooding in Pakistan in September,” Lacovara said, “modeling would have been entirely impossible using any other technology than satellites.”

<https://riskandinsurance.com>