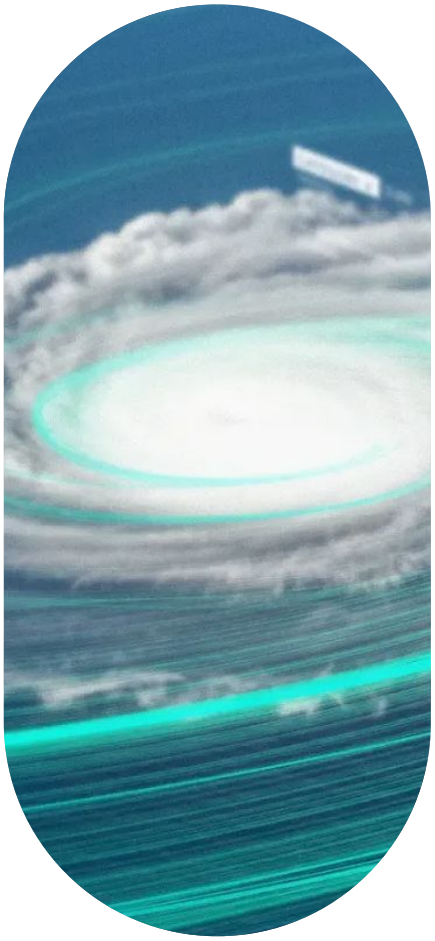
Google

How Google AI is reshaping global crisis resilience

2026

Yossi Matias and Kate Brandt



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Introduction: The era of better crisis prediction

At Google, our goal is to improve the lives of as many people as possible through technology—and with AI, we can do this better than ever before. In this moment of rapid transformation and innovation, we're improving our capabilities to make progress against some of humanity's biggest challenges. AI gives us an incredible opportunity to better predict and detect natural disasters to help keep people safe. Our vision for our crisis resilience efforts is simple: **no one should be surprised by a natural disaster**.

Extreme weather events and natural disasters are increasing dramatically, devastating communities and defining a new period of "mega-disasters." In 2025—one of the three warmest years on record[1]—more than 350 major weather-related disasters impacted over 110 million people around the world.[2] In North America, wildfires raged across the continent, and in Asia, record heat affected 770 million people.[3] These severe impacts have continued into 2026, including a devastating June heatwave[4] and fires in Europe.[5] Adding to these concerns, global sea surface temperatures hit near-record highs in April, which will likely trigger even worse droughts, wildfires, and floods.[6]

The estimated true cost of natural disasters—when factoring in indirect economic and ecosystem losses—reaches over $2 trillion per year.[7] Businesses are feeling these impacts, too. Over 80% of companies say extreme weather has disrupted their operations or driven up operational costs in the past five years.[8] With projected future corporate losses from extreme weather reaching $714 billion globally, early action is an economic imperative.[9]

Yet, the real toll of these crises is ultimately measured in human lives. Over the past decade, the number of people affected by weather-related disasters has increased by 75%[10]—leaving over 250 million people displaced from their homes.[11] While prediction alone can't prevent displacement, it is an essential component for effective planning before and after a disaster—enabling communities to take proactive measures that reduce the loss of life and effects of these crises.

To help address these challenges, we're building AI models that extend prediction horizons and detect extreme weather and natural disasters—from floods and hurricanes to wildfires and extreme heat. None of this can be done alone, which is why we partner with governments, NGOs, and first responders to help make this critical information widely available. We strive to support and empower these partners with the tools they need to keep their communities safe. Together, we're helping communities not only respond to disasters after they hit, but to prepare for them before they arrive and more efficiently aid in post-disaster recovery.

Our models help give people the time to reach safety and stay out of harm's way—predicting flash floods in urban areas up to 24 hours ahead, riverine floods up to seven days in advance, and cyclones up to 15 days out, plus tracking wildfire boundaries in near real time. We're partnering with official alert agencies in over 100 countries to deliver these warnings directly to Google users. In 2025, Google helped connect people with crisis information for natural disasters and other types of crises over 10 million times per day, on average.[12]

As we expand this work, we remain focused on a path forward that is collaborative, human-centered, and powered by AI.

Google Research has developed AI models to forecast riverine floods and flash floods in urban areas.

Our vision: No one should be surprised by a natural disaster

We're working toward a world where no one is surprised by a natural disaster. To achieve this vision, we're focused on predicting natural disasters to help as many people as possible stay safe.

Our crisis resilience work relies on three things: developing technology, ensuring broad access, and working alongside local partners (Figure 1). This combination is how we get predictions directly into the hands of the communities that need them most.

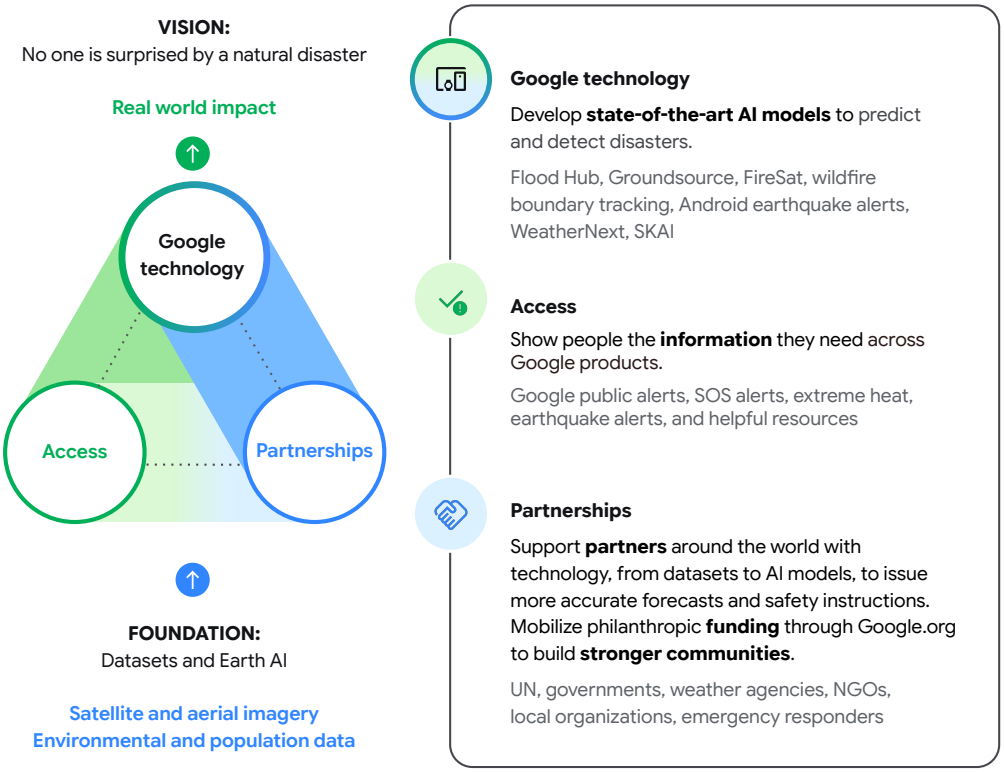


Figure 1: Google's crisis resilience ecosystem
Google's datasets and Earth AI feed into state-of-the-art technology, and access and partnerships form a continuous feedback loop that powers real-world crisis resilience and impact.

Technology

We're building state-of-the-art AI models to predict and detect crises that were once considered impossible to foresee (Figure 2). Instead of just repurposing existing tools, we're creating new foundational, peer-reviewed research—setting new standards for how early and accurately we can predict floods, cyclones, earthquakes, and wildfires.

- **Floods:** Published in Nature, our global hydrological model enables riverine flood forecasting in areas without physical water gauges, extending early warnings to over two billion people in around 150 countries.[13] We've also developed Groundsource, a new approach that uses Gemini to transform millions of public reports into a high-quality dataset to aid crisis prediction—starting with urban flash floods. *Learn more on page 13.*
- **Cyclones:** Our WeatherNext weather forecasting models achieved state-of-the-art accuracy in predicting a cyclone's formation, track, intensity, size, and shape. Our models give forecasters an extra day to prepare, as our three-day forecasts are as accurate as what prior models were able to provide for two days. *Learn more on page 18.*
- **Earthquakes:** Android smartphones can detect seismic events by operating like a global crowdsourced network of mini-seismometers. By analyzing accelerometer signals in real time, our algorithms detect initial primary waves (P waves) and can estimate an earthquake's epicenter and magnitude within seconds—sending alerts before more destructive secondary waves (S waves) arrive. *Learn more on page 20.*
- **Wildfires:** We pair AI with satellite imagery to map active wildfire boundaries across 34 countries, displaying this information on Google Search and Google Maps, including during driving navigation. We're also collaborating on FireSat to work toward detecting wildfires as small as a standard shipping container (roughly 5x5 meters) anywhere on Earth. *Learn more on page 21.*

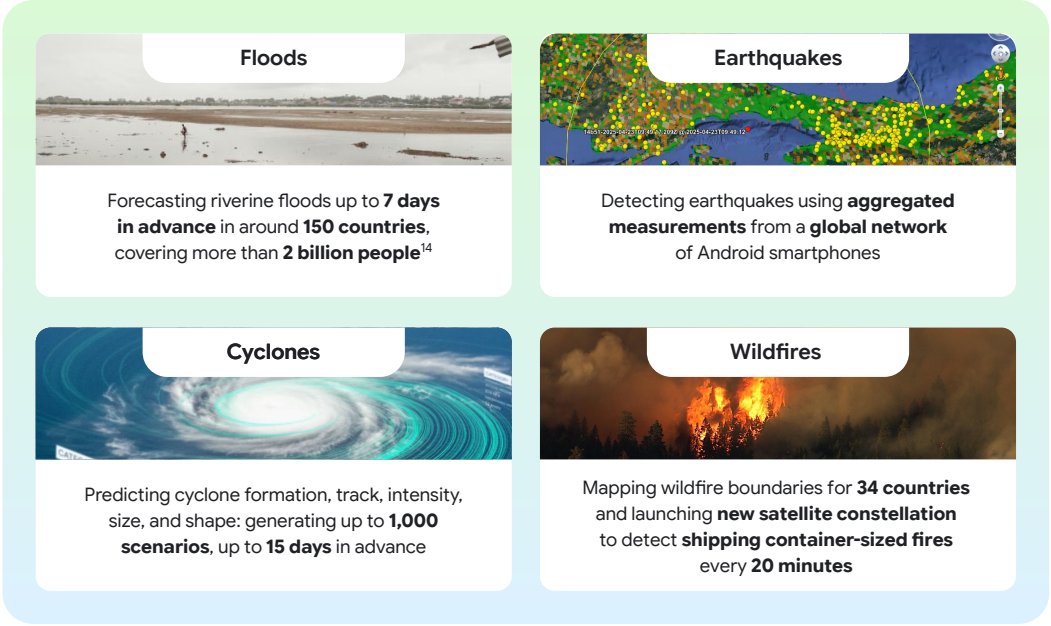


Figure 2: Google's technology for crisis resilience
Google's state-of-the-art technology for predicting floods, fires, cyclones and earthquakes.

Extending prediction horizons

While Google AI can predict and detect natural disasters with increasing accuracy, the true value lies in extending the prediction horizon—the window of time between the alert and the physical event—with the same level of accuracy. For example, our WeatherNext model achieved state-of-the-art accuracy in predicting a cyclone's formation, track, intensity, size, and shape. On average, our model gives forecasters an extra day's worth of predictive accuracy: our three-day forecasts are as good as what prior models were able to provide for only the next two days.

Extending the prediction horizon is critical because the actions that individuals, first responders, and governments can take vary dramatically across different time scales. It is important to note, however, that prediction windows vary significantly depending on the nature of the crisis—extending the horizon for cyclones differs from the rapid, short-term detection required for earthquakes.

Crisis	Prediction horizon	Google technology	Impact examples
Cyclones	Up to 15 days	WeatherNext	· Inform meteorological agencies evacuation orders. · Secure and board up buildings. · Pre-position utility crews, emergency supplies, and rescue teams.
Riverine floods	Up to 7 days	Global hydrological model Flood Hub	· Deploy anticipatory cash assistance to vulnerable households (e.g., GiveDirectly). · Pre-deploy flood defenses like sandbags. · Evacuate livestock and protect critical assets.
Urban flash floods	Up to 24 hours	Groundsource Flood Hub	· Relocate vehicles to higher ground. · Clear local storm drains and block street access to low-lying areas. · Avoid traveling through flooded roads.
Wildfires	Updated every 15-20 minutes	Boundary tracking FireSat	· Dispatch fire crews to small, newly detected fires (down to 5x5m via FireSat). · Map safe driving evacuation routes around active fire zones.
Earthquakes	Seconds to minutes	Android Earthquake Alerts System	· Take cover away from objects that are likely to fall or break. · Trigger automated shutdowns of gas lines and industrial machinery. · Pause public transit, trains, and elevators to prevent derailments or trapping.

Access

Predicting a disaster is only half the battle; people also need to be warned about it. To bridge this gap, we make critical information accessible when it matters most to those who need it by ingesting and disseminating alerts. In 2025, we helped connect people with crisis information for natural disasters and other types of crises over 10 million times per day, on average.[15]

For example, Google Public Alerts surface information from Common Alerting Protocol (CAP) feeds—the international standard for authoritative digital emergency alerts—to deliver official alerts from public authorities from over 100 countries. This enables us to deliver more warnings directly to Google users worldwide—often through push notifications—so critical alerts reach more people faster (Figure 3).

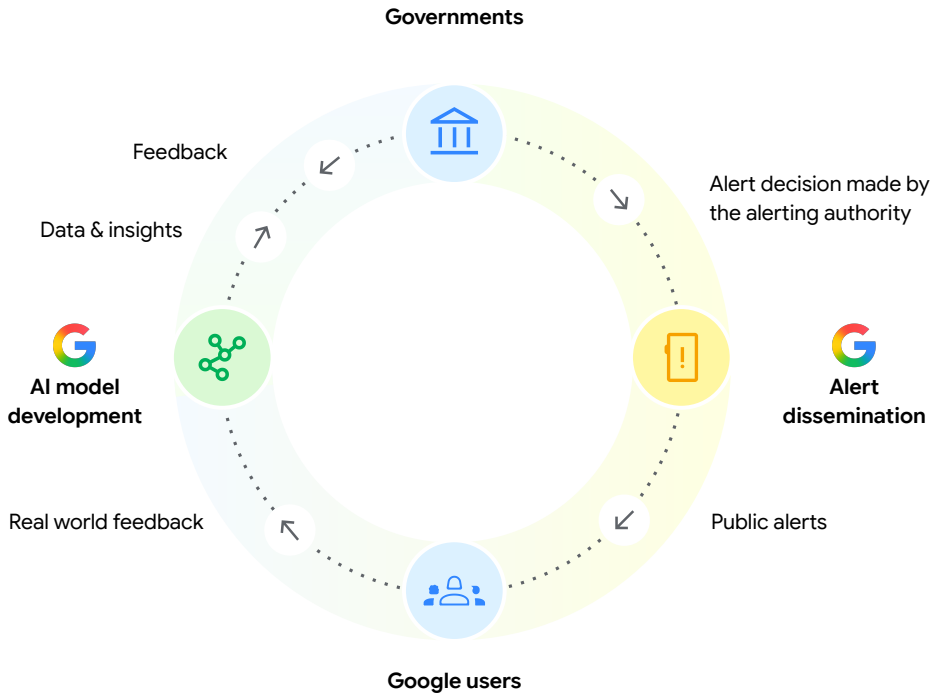


Figure 3: Virtuous cycle of alerts, partnerships, and model improvements
Google surfaces CAP alerts to expand critical reach and create a responsive emergency ecosystem.

SOS Alerts are another way we make emergency information more accessible during a crisis. We bring together relevant and authoritative content from the web, social media, and Google products, and then highlight that information on platforms like Android, Google Search, and Google Maps. These alerts can share emergency phone numbers, official news feeds, useful translations, navigation or road-closure warnings, and even donation opportunities for those outside the crisis area.

Beyond alerts, we also share other helpful resources during a crisis—including navigation warnings, merchant updates, and air quality information. For example, Google Maps shows prominent alerts for routes that are affected by crisis activity and provide alternative routes, when possible. Merchants can use Google Business Profile to update hours, share critical information, and surface crisis-related locations—like shelters, food banks, and more—directly on Google Maps. And the air quality layer on Google Maps provides users in over 90 countries with up-to-date air quality data, helping them make more informed decisions about outdoor activities and reduce their exposure to pollution.

Partners

We know we can't achieve a world where no one is surprised by a natural disaster on our own. That's why we partner across sectors—with governments, NGOs, first responders, and more—to collectively advance crisis resilience. By combining advanced AI models with local leadership, we help empower these essential groups with the tools they need to protect communities before, during, and after a crisis.

Governments, intergovernmental organizations, and city leaders play a critical role in setting policy, managing public infrastructure, and deploying early warning systems at scale. We collaborate with authoritative bodies like the United Nations Office for Disaster Risk Reduction (UNDRR) to help national governments integrate Google models directly into their official warning systems. Flood Hub and our Flood Hub API, which we provide at no cost, assist government agencies like National Meteorological and Hydrological Services (NMHSs) by feeding real-time flood data into monitoring systems like the Texas Disaster Information System. We also enable urban planners to more efficiently identify and address urban heat islands with our Heat Resilience Tool. To reduce these heat islands, trees are essential, and Google's high-resolution tree canopy data helps hundreds of cities with tree canopy assessments. Google has supported the UN's Early Warnings for All initiative since its launch at COP27 (at which we took an active role) to enhance multi-hazard early warning systems globally.

> Google has been an important partner in advancing Early Warnings for All. Three things that stand out: its ability to extend early warning services to communities and countries that have long been underserved, often despite sparse ground data; its responsiveness to needs on the ground, deploying its technological capabilities quickly to address emerging challenges; and its commitment to building local capacity so that the benefits endure well beyond the life of the project.
>
> **Kamal Kishore**
> Special Representative of the United Nations Secretary-General for Disaster Risk Reduction (SRSG), and Head of the United Nations Office for Disaster Risk Reduction (UNDRR)

When extreme weather and natural disasters threaten lives, frontline teams need immediate, actionable intelligence to coordinate evacuations and keep people safe. Through WeatherNext, we give first responders and other partners up to 15 days of advance warning on a cyclone's formation, track, intensity, size, and shape. Additionally, we provide forecasts for riverine floods up to seven days in advance through Flood Hub, giving emergency responders the vital lead time needed to anticipate floods before waters rise.

Nonprofits and civil society organizations are often the first to reach vulnerable populations, deliver financial support, and guide long-term recovery. To accelerate the work of humanitarian aid organizations following natural disasters, Data Insights for Social and Humanitarian Action (DISHA) and the World Food Programme developed a damage assessment process in collaboration with Google and the United Nations Satellite Centre (UNOSAT). This process uses SKAI—Google's AI-powered post-disaster damage assessment model—to compare pre- and post-event satellite imagery and map structural and building damage across entire cities in near-real time. We also partner with organizations like GiveDirectly that use Google AI to target emergency aid by identifying low-income households before or during a crisis so cash assistance can be delivered directly to those most in need. From 2004 to 2025, Google.org contributed over $250 million to crisis support, with a focus on local nonprofits leading recovery efforts. As of 2026, Google.org has also contributed more than $40 million to the AI Collaborative: Wildfires, a coalition aimed at transforming the world's relationship with fire and building proactive wildfire resilience with the help of AI technology.

Google.org partners with local governments, like the city of Seattle, to enhance public services and connect more effectively with communities.

Earth AI: A unified foundation for disaster response

To predict a natural disaster, we must first understand the planet. While individual models offer valuable insights on their own, solving complex, real-world problems requires a connected view of the world.

Google Earth AI serves as that unified foundation. Combining decades of Earth modeling with Gemini's advanced reasoning, Earth AI brings together satellite imagery, population data, and environment insights to help enterprises, cities, and nonprofits with everything from environmental monitoring to disaster response.

Google Earth Engine, a part of Earth AI, is one of the most advanced cloud platforms for planetary-scale environmental data analysis. Earth Engine ingests petabytes of data daily from diverse sources—including public satellite constellations (like Copernicus Sentinel and NASA Landsat), global weather models, and geophysical data, including terrain, land cover, and cropland data. This massive data repository is updated regularly, providing an active, historical, and highly detailed digital twin of the Earth. By handling the heavy lifting of storing and processing all that data, Earth Engine enables researchers and AI models to spot environmental changes that were once invisible.

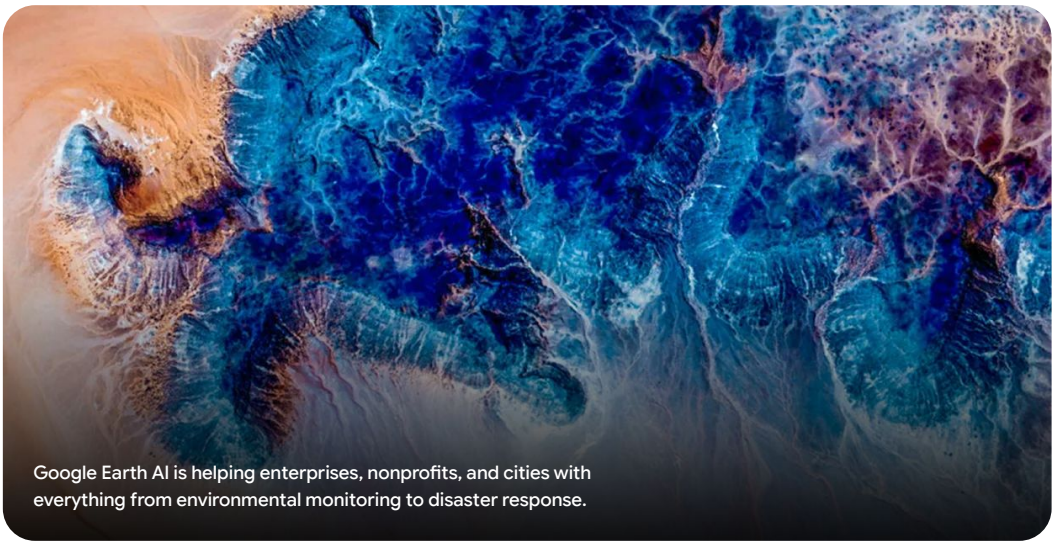
Capabilities

Detecting environmental changes is only the starting point. Google Earth AI turns complex planetary data into actionable intelligence. Instead of focusing on just one narrow domain, we can combine geospatial, environmental, and population data to address complex, cross-cutting challenges. The following examples illustrate how we apply this approach to common types of data:

- **Detecting building footprints:** Our AI models have mapped the locations, outlines, and heights of 1.8 billion buildings across the Global South. These datasets—both Open Buildings and the Open Buildings 2.5D Temporal Dataset—are critical for crisis response, as they allow models to track population density and infrastructure risks over time while identifying vulnerable communities that are missing from traditional maps.
- **Understanding population dynamics:** We use a foundational model to combine distinct data sources—like aggregated web search trends, weather, air quality, and local characteristics—to better understand how living environments impact their health and well-being.
- **Tracking surface water for flood detection:** Earth AI uses radar and satellite imagery to map surface water boundaries globally. Trained on decades of flood history, these models distinguish between permanent water bodies, seasonal changes, and active flooding. This provides essential ground-truth data to further improve hydrological forecasting systems.

- **Mapping wildfire boundaries:** By combining AI with satellite data, Earth AI models map active wildfires and track their boundaries, providing up-to-date information so communities can take action and stay safe.
- **Forecasting severe weather:** By delivering earlier and more accurate extreme weather forecasts for events like cyclones, Earth AI models improve the lead time needed for partners to better understand weather uncertainties and prepare for extreme conditions.

Because crisis resilience cannot be solved in isolation, we actively open-source some of our Earth AI datasets, models, and APIs to empower the global scientific community. By providing researchers, NGOs, national meteorological agencies, and others with access to tools like WeatherNext, NeuralGCM, our hydrology modeling framework, and our Open Buildings datasets, we're enabling local experts to build customized, culturally relevant adaptation strategies that protect their own communities.



Google Earth AI is helping enterprises, nonprofits, and cities with everything from environmental monitoring to disaster response.

Case studies in resilience: Bridging the gap between AI and action

The following case studies show how Google's crisis resilience technologies—spanning extreme weather, earthquakes, floods, wildfires, and disaster response—bridge the gap between planetary-scale AI and actionable, on-the-ground early warnings that protect lives and livelihoods.

Floods

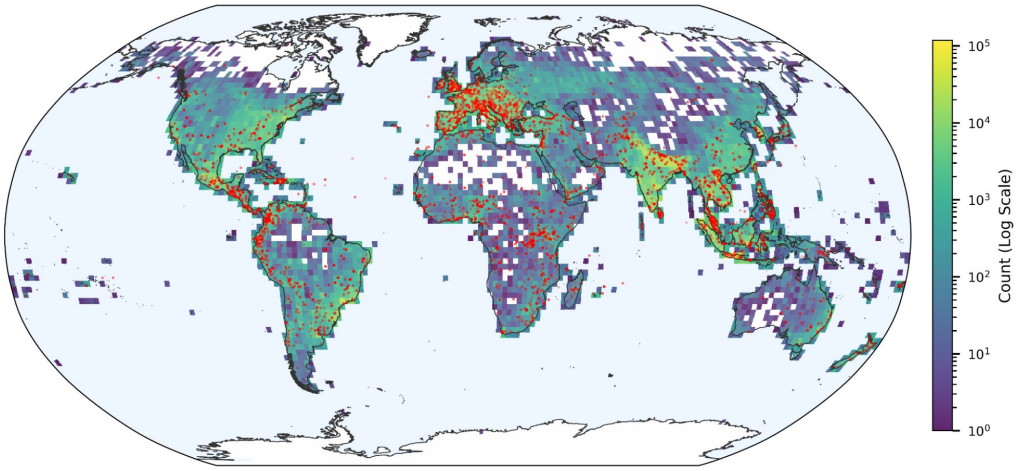
Floods are one of the most common natural disasters, which is why we focused on them first. We started in 2018 with a pilot in India's Patna region—one of India's most flood-prone states—which proved that machine learning could predict floods reliably. This led to a global modeling breakthrough for riverine floods, published in Nature, which allowed us to expand our flood forecasting methodology to data-scarce regions. From there, we developed a way to predict sudden urban flash floods, even without the historical records traditional models rely on.

Riverine and urban flash flood forecasts

Google's Flood Hub is a visual resource that displays flood maps, water trends, and real-time flood forecasts based on our AI models and global data sources. With forecasts up to seven days in advance for riverine floods, our flood forecasting information covers more than two billion people in around 150 countries for the most severe events.[16]

In 2026, we added flash flood forecasts in urban areas to Flood Hub. Using a new AI-powered methodology called Groundsource, which uses Gemini to transform unstructured news reports and public records—including millions of records of historical floods spanning more than 150 countries (Figure 4)—into structured data, we can provide near-global urban flash flood forecasts up to 24 hours in advance. The same methodology could also potentially be applied to build historical datasets for other hazards to accelerate global crisis resilience efforts.

Looking ahead, we plan to expand our 24-hour flash flood forecasting capabilities from urban areas into more rural communities.



Legend
● Floods from the Global Disaster Alert and Coordination System (GDACS)

Figure 4: Groundsource global flood event density
Global map showing the density of flood events in Groundsource, incorporating flood data from GDACS.

Partnerships

To expand and improve these tools, we work closely with National Meteorological and Hydrological Services (NMHSs), regional governments, and strategic partners.

For example, Weathernews integrated Google's flood and cyclone models into its platform to help authorities in Vietnam, the Philippines, and Indonesia better forecast these threats. In Vietnam, this system accurately identified flood zones and delivered warnings three days before Typhoon Matmo struck.

We're also teaming up with the African Union Commission to integrate AI flood forecasts into their continental early warning network (the Africa Multi-Hazard Early Warning and Early Action System) and to support capacity development for regional and national emergency centers.

In addition, we're collaborating with the World Meteorological Organization (WMO) and national weather services in Czechia, Nigeria, Uruguay, and Vietnam on a joint pilot to evaluate how local data affects AI forecasting in regional river basins. We found that including local river data in our global models improves forecasts in ungauged areas and is an effective way to strengthen national forecasting efforts.

> The collaboration between the World Meteorological Organization and Google offers huge potential to accelerate progress towards Early Warnings for All, ensuring that everyone is protected against hazards like floods and tropical cyclones. It is particularly exciting because it anchors Google's AI innovation and its global technological reach in trusted and accountable National Meteorological and Hydrological Services which interpret the science and are responsible for authoritative government warnings to protect lives and livelihoods.
>
> **Celeste Saulo**
> Secretary-General, World Meteorological Organization

These early warnings help aid groups send relief before disaster strikes. In Nigeria, GiveDirectly and the International Rescue Committee used Google's forecasts to provide anticipatory assistance to households before flooding peaked. Similarly, in Adamawa State, the UN's humanitarian agency (OCHA) launched a $7 million initiative along the Benue River using our models, helping about 350,000 people prepare with pre-emptive assistance.

> With Google's historical data, we identified the areas most at risk of flooding. Using the Google Flood API, we determined when floods were about to hit our target areas, allowing us to deliver cash assistance ahead of the peak to those most in need.
>
> **Federico Barreras**
> Humanitarian, GiveDirectly

We're also partnering with fintech companies like Atram to protect small businesses. During a pilot in Kenya with around 10,000 borrowers, local flood alerts automatically triggered financial relief—like paused loan repayments—giving people financial breathing room when disaster struck.

In Nigeria, the NGO GiveDirectly uses Google's Flood Forecasts to distribute emergency cash ahead of rising waters so communities can evacuate and safeguard their belongings.

Research

To further advance research, we open-sourced both our Groundsource dataset for flash floods in urban areas and our hydrology modeling framework. This lets experts build new approaches while keeping full control of their own local data. For example, the Czech Hydrometeorological Institute developed an adapter to our hydrology framework within Deltares' Delft-FEWS platform, enabling its team and other forecasters worldwide to use the model in their existing software.

A multi-year study in Bihar, India—conducted by Yale University, Tufts University, and the Inclusion Economics India Centre—showed the clear real-world impact of these alerts. They found that, when trained local agents delivered accurate Flood Hub warnings, communities hit by severe flooding suffered less property damage, protected more crops, and had more reliable access to food.[17]

Extreme weather

Extreme weather—like sudden monsoons, fast-forming cyclones, and dangerous urban heat waves—require local precision and more advance notice. Using advanced models like NeuralGCM and WeatherNext alongside specialized applications like our Heat Resilience Tool, we provide governments and communities with reliable forecasts so they can prepare earlier and make safer decisions.

Monsoons

Monsoons—seasonal winds that bring heavy rains across the tropics—are notoriously difficult to forecast, because small atmospheric shifts can drastically alter these weather patterns. This leaves millions of people whose livelihoods depend on the reliability of seasonal rains without the information they need.

AI is now bridging this gap. Developed by Google Research, NeuralGCM is an open-source model that combines traditional physics-based modeling with machine learning to simulate Earth's atmosphere. By training on satellite data, NeuralGCM simulates global precipitation faster and more accurately than standard models. It's especially effective at predicting extreme precipitation—severe events that have historically been difficult to forecast, yet are essential to understand for public safety, infrastructure resilience, food security, and climate adaptation.

In 2025, the Indian government partnered with an international research team to select its monsoon forecast model. The University of Chicago's Human-Centered Weather Forecasts Initiative teamed up with researchers from IIT Bombay, IISc Bengaluru, and the University of California, Berkeley to evaluate several models. They found that Google's NeuralGCM model and the European Centre for Medium-Range Weather Forecasts's Artificial Intelligence/Integrated Forecasting System did the best job predicting when and where the Indian monsoon would start. The team blended statistics from the India Meteorological Department's extensive rain gauge network with these two top-performing AI models. This hybrid system more accurately predicted the onset of the monsoon season in India up to a month in advance, and even spotted an unusual mid-season dry spell ahead of time.

In the summer of 2025, 38 million farmers in India received AI-powered forecasts of the start of the monsoon season (Photo credit: Precision Development [PxD]).

The Indian government was then able to deliver timely predictions to 38 million farmers nationwide. With weeks of advance notice, farmers knew when to plant their crops and could adapt to the delayed rains. That proactive decision-making has the potential to nearly double annual farmer income.[18] We're now working to expand these forecasts to other major agricultural regions in India, like the North Indian Plain, and to adapt the model to predict winter crop cycles.

Beyond long-term seasonal shifts, we're also solving for the "here and now" of global precipitation. Through "nowcasting"—hyperlocal, short-term weather forecasts—we're making reliable real-time weather information easier to access. Using our MetNet model, we're bringing these AI-powered weather forecasts directly to people across Africa on Google Search. By combining satellite data with ground observations, the model can deliver state-of-the-art precipitation forecasts even in data-sparse regions. For coastal and agricultural communities, having this near-real-time data can help people quickly respond to changing weather.

Cyclones

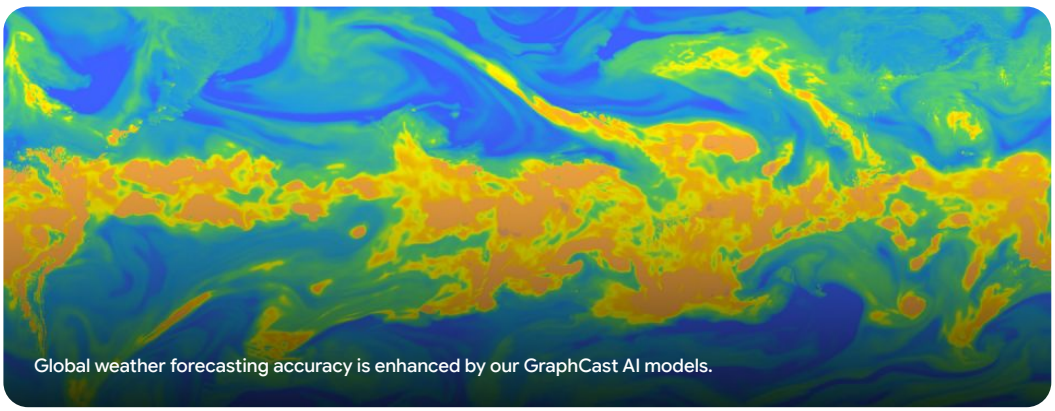
Tropical cyclones—also known as typhoons or hurricanes—are extremely dangerous storms, endangering lives and devastating communities in their wake. While figuring out where a cyclone will hit is difficult, predicting its strength is even harder.

In 2025, we launched Weather Lab, an interactive website for sharing our AI weather models, including our experimental tropical cyclone model powered by WeatherNext. In just minutes, this state-of-the-art model can generate up to 1,000 possible scenarios to predict a cyclone's formation, track, intensity, size, and shape up to 15 days ahead of time. In research published in Nature, we showed that our model offers an extra day or more of lead time advantage over leading operational models—an accuracy boost comparable to the progress seen over the last decade.

During the 2025 hurricane season, we teamed up with the U.S. National Hurricane Center (NHC) to validate our approach in real-world conditions. Our model's predictions helped the NHC forecast the rapid intensification of Hurricane Melissa, the Category 5 hurricane that struck Jamaica in October 2025. The NHC noted that combining Google DeepMind's model with regional hurricane models from the National Weather Service gave forecasters confidence in predicting rapid intensification at exceptionally long lead times.[19] This historic forecast marked the first time the NHC accurately predicted a storm would become a Category 5 while it was still just a Category 1.[20]

> Because of that early warning, we were able to give advance notice to the public to say move from certain areas. That reduction in harm really does make a difference to our people. So it saved their lives, and it saves the livelihoods that they want to secure.
>
> **Evan Thompson**
> Principal Director, Met Service Jamaica

Building on this work, we're open sourcing our models and partnering with meteorological agencies in other cyclone-prone regions, helping experts protect vulnerable coastal populations across Australia, the South Pacific, and East Africa.



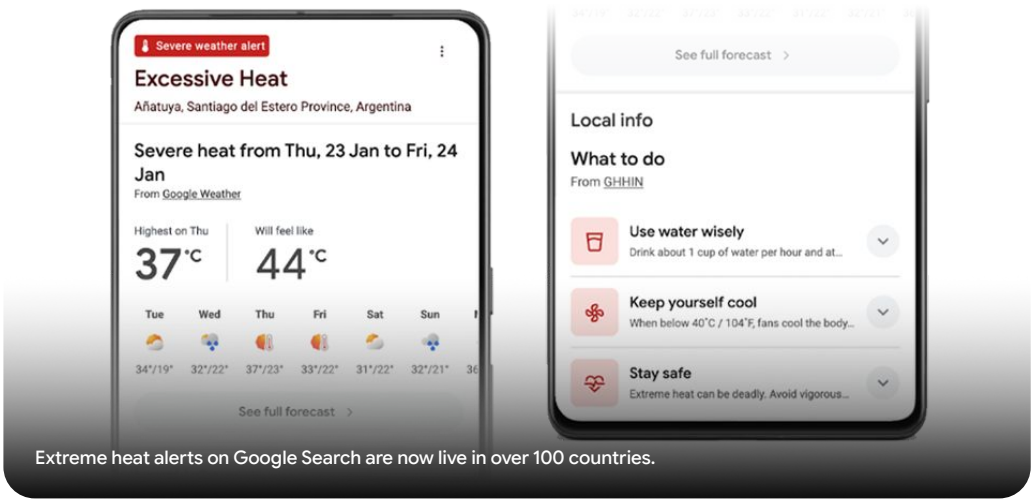
Global weather forecasting accuracy is enhanced by our GraphCast AI models.

Extreme heat

Extreme heat is the deadliest climate risk we face today, and cities bear the brunt of it.[21] Because asphalt, concrete, and lack of vegetation trap heat—a pattern known as the "urban heat island" effect—cities can be up to 7°F (4°C) hotter than surrounding areas.[22] That extra heat puts people's health at risk, strains power grids, and makes daily life uncomfortable—but most cities don't have the local data they need to address it.

That's where Google's Heat Resilience Tool comes in. By combining satellite imagery, tree canopy data, and building datasets, this AI tool highlights which neighborhoods are the most vulnerable. City planners can simulate the cooling impact of interventions—like installing "cool roofs," planting trees, or adding reflective pavement—before investing capital. For example, research published in Nature shows how we've used AI to map the reflectivity of buildings at scale, helping cities pinpoint where cool roofs will lower surface temperatures. Moving forward, we plan to expand our Heat Resilience Tool to major cities in the Global South, where rapid urbanization and rising temperatures are creating significant risks.

Alongside this work, Google.org provided $5 million in funding to the World Resources Institute to help develop the Cool Cities Lab. Co-designed with local leaders and technical experts and built using globally accessible open data, this platform helps city officials find practical ways to cool down neighborhoods—such as planting trees or adding cool roofs—to protect any community around the world from extreme heat.



Extreme heat alerts on Google Search are now live in over 100 countries.

Beyond planning tools for cities, we're also delivering real-time warnings directly to individuals. When temperatures spike, extreme heat alerts are automatically triggered on Google Search based on heat index calculations and global climate data. Alongside these alerts, we share safety tips from the Global Heat Health Information Network. In 2025, this system delivered severe heat warnings and cooling resources to users in officially designated heat-alert zones. During a heatwave, users searching for help see an interactive map of nearby cooling shelters with operating hours and contact details—making it simple to find a safe place to cool down when it matters most. We're also developing new AI models to predict and alert users to dangerous combinations of extreme heat and high humidity up to 48 hours in advance.

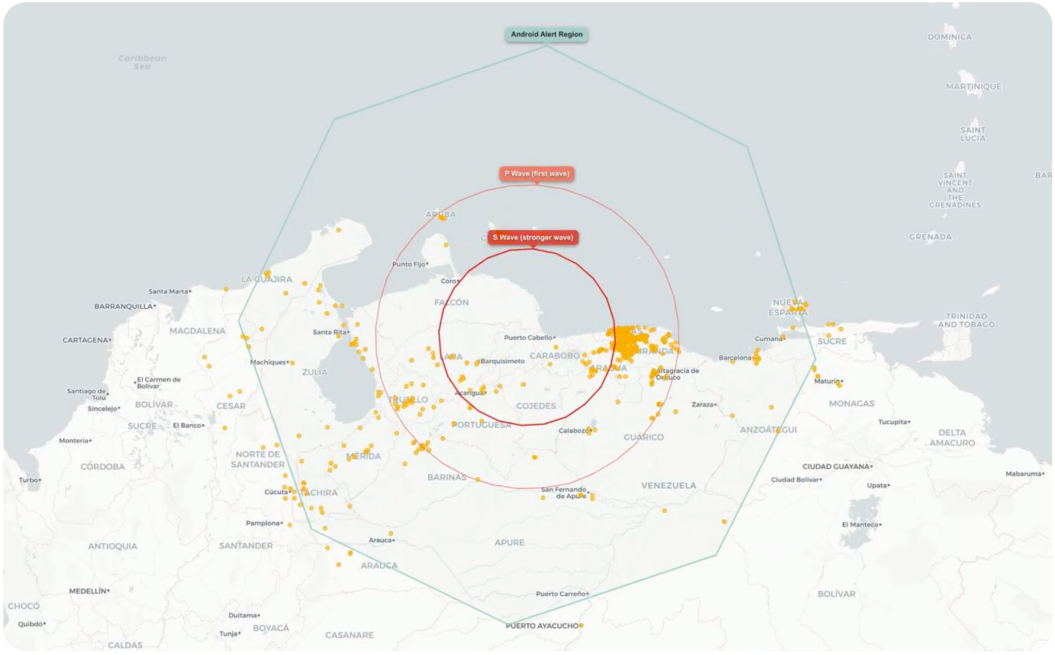
Earthquakes

Earthquakes strike without warning, making every second count. To help people react, we built a system that aggregates measurements from the motion sensors inside Android phones (called accelerometers), effectively turning them into a global network of mini-seismometers that detect quakes when they start and then alert nearby phones.

When a phone detects movement that matches an earthquake's P wave, it sends an approximate location to our earthquake detection server. By combining signals from many phones in near-real time, we can detect an earthquake and estimate its magnitude and epicenter. The Android Earthquake Alerts system then sends early warnings to nearby users, often arriving before the more damaging S wave hits.[23]

We saw this system in action during the magnitude 7.2/7.5 doublet earthquake in Venezuela in June 2026 (Figure 5), when the first alert went out just three seconds after the earthquake began. People received alerts anywhere from a few seconds to two minutes before the S wave, depending on their distance from the epicenter. In total, the system delivered over 11 million alerts, giving people crucial seconds to get to a safe place and take cover.

Looking ahead, we plan on expanding the Android Earthquake Alerts System's coverage, improving the speed and accuracy of the alerts, and finding new ways to share alert information with people beyond those directly affected.



Legend
● Phones that detected shaking ○ P-wave's estimated location ○ S wave's estimated location

Figure 5: Android Earthquake Alerting system detecting the June 2026 doublet earthquake in Venezuela
Phones detecting seismic waves as the 7.2/7.5 doublet earthquake progressed in Venezuela.

Wildfires

Wildfires are becoming more frequent and severe, threatening lives, communities, and vital ecosystems. To help, we're using AI to transform wildfire management from reactive monitoring to proactive, early detection. Our work has evolved from tracking active wildfire boundaries in near-real time across over 30 countries to deploying advanced early-detection satellites that help pinpoint and monitor fire risks with unprecedented precision.

Wildfire boundary tracking

Our AI-powered wildfire boundary tracking tool uses satellite data to map active wildfire boundaries around the world. For certain fires, these visualizations appear in Google Search and Google Maps, and are shared through push notifications to nearby users in select regions.

Since our early work, we've expanded coverage to 34 countries—including seven new additions in 2026. Depending on the region, we refresh these wildfire maps as often as every 15 to 20 minutes (and at least every 12 hours elsewhere), offering an up-to-date picture of an existing fire's spread.

We're surfacing this information through alerts and features that provide information about how to stay safe to people who are near a wildfire. In 2025, we generated more than 520 crisis alerts on Google Search that provided timely wildfire information to over 75 million users around the world. As one example, this critical information helped Chilean families and emergency responders navigate dangerous forest fires in January 2026.

Early detection with FireSat

To detect wildfires even sooner, we collaborated with partners to develop FireSat, a satellite system built specifically for wildfire monitoring. The program is led by the nonprofit Earth Fire Alliance in partnership with Muon Space and Google Research, and supported by funding from Google.org, the Gordon and Betty Moore Foundation, the Bezos Earth Fund, and others.

FireSat uses custom infrared sensors to detect fires of all sizes and deliver high-resolution multispectral imagery with unmatched detail. Following the first proto-satellite launch in early 2025, three additional satellites were successfully deployed in July 2026, expanding the constellation toward the goal of more than 50 satellites.

Currently, many wildfire authorities depend on satellite imagery that's low-resolution or only updated a few times a day. Once fully operational, the FireSat constellation will provide global updates every 20 minutes or less, enabling the early detection of wildfires as small as a standard shipping container (roughly 5x5 meters) anywhere on Earth.

Partnerships

We're supporting community-led fire management through the AI Collaborative: Wildfires. Backed by over $40 million from Google.org, this Collaborative unites a diverse coalition of leading nonprofits, academic institutions, government agencies, and technologists to transform the world's relationship with fire and build proactive wildfire resilience with the help of innovative AI technologies. Together, we're deploying tools that identify and track wildfires in near-real time, model fire behavior, and empower local decision-makers with insights they need to reduce catastrophic damage. For example:

- **Watch Duty:** Through $2 million in funding, a Google.org Fellowship, and Google Cloud credits, we supported Watch Duty in building an AI infrastructure that accelerates emergency alerts at scale by monitoring live emergency radio traffic, surfacing critical signals faster, and supporting—not replacing— human decision-making.
- **Woodwell Climate Research Center:** Through $2 million in funding and Google Cloud credits, we supported Woodwell Climate Research Center. In Brazil they are delivering GIS training and tools to indigenous women's fire brigades, enabling them to monitor and prevent wildfires using Google Maps and Google Earth Engine. In Alaska and Canada, these resources support efforts to identify and address fire management needs, analyze carbon savings and the cost-effectiveness of carbon protection, create permafrost and carbon vulnerability maps, and expand fire management work.
- **UC San Diego:** Funding of $1.8 million from Google.org will help support the University of California San Diego's Societal Computing and Innovation Lab and its Wildfire Science and Technology Commons, a collaborative platform designed to accelerate the development of wildfire technology.
- **AFAC & CSIRO:** In Australia, the Australian and New Zealand Council for Fire and Emergency Services (AFAC) and Commonwealth Scientific and Industrial Research Organisation (CSIRO), the national science agency, are preparing to use FireSat data to improve detecting, tracking, and responding to bushfires.

> Speed matters in emergencies. We've built a nonprofit that leverages the best talent and infrastructure in service of communities. The Google.org Fellowship will accelerate this work using Google Gemini so that life-saving information reaches people faster.
>
> **John Mills**
> CEO and co-founder, Watch Duty

Disaster response

After a disaster, the biggest challenge is getting aid to people as quickly as possible. AI can help governments and organizations speed up this process.

To help make this happen, the DISHA initiative collaborated with Google and the United Nations Satellite Centre (UNOSAT) to build a new damage assessment tool. Google Research granted DISHA pro-bono access to our Open Buildings and building damage assessment models to analyze pre- and post-disaster satellite imagery and spot structural and building damage in near-real time. The DISHA tool was recently enhanced with a new interface, marking a new phase of operational impact. It can quickly scan hundreds of thousands of buildings, saving UNOSAT specialists time and effort.

The tool has been deployed for earthquakes, floods, complex emergencies, and cyclones. When Hurricane Melissa devastated Jamaica in October 2025, this AI tool assigned preliminary damage scores to over 385,000 buildings to inform recovery efforts (Figure 6). Following the hurricane, GiveDirectly used Google's SKAI assessments to quickly identify the most severely damaged areas in Jamaica's Saint Elizabeth Parish in order to deliver targeted cash assistance to impacted families. More recently, after the February 2026 floods in Colombia, UNOSAT combined these AI building maps with radar images of the flooding, helping both the national government and UN humanitarian agencies direct their relief operations.

> The Google model helps to equip the humanitarian community with analysis and insights they need to get life-saving aid out faster and with maximum efficiency.
>
> **Lars Bromley**
> Former Specialist, United Nations Satellite Centre

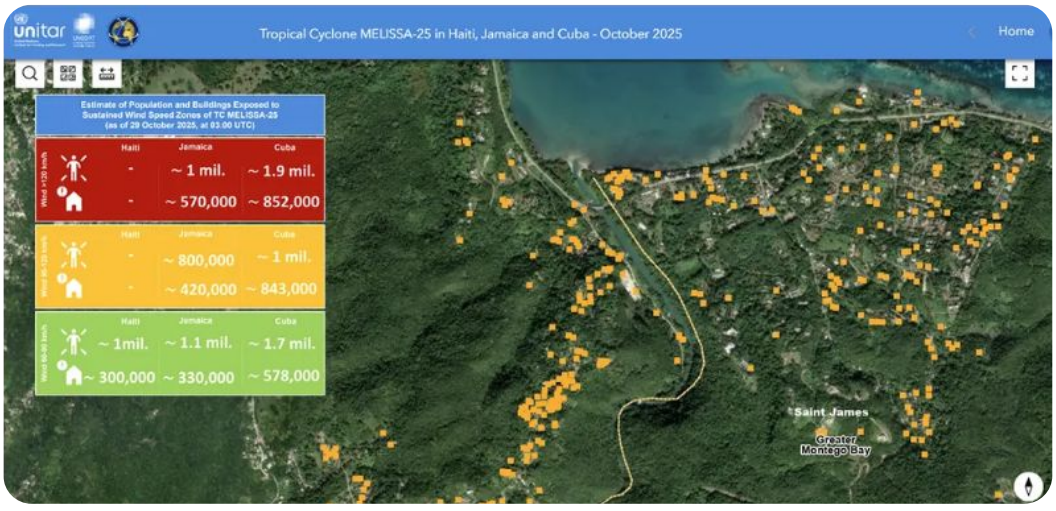


Figure 6: Map from DISHA's damage assessment tool of buildings damaged by Cyclone Melissa
Buildings damaged by Tropical Cyclone Melissa identified by the DISHA AI-assisted Damage Assessment solution.

The path forward: Collaborative, human-centered, and supported by AI

While our foundational models can already predict disasters with unprecedented lead times, much of the work is ahead of us. As we look to the future, the integration of AI into global crisis response is entering a new, transformative era. The next frontier is about communication, synthesis, and trust.

During an active disaster, emergency teams are rarely short on data—they're buried under it. Conflicting information from news reports, social media feeds, sensor readings, and satellite imagery pour into command centers, creating an information overload that can slow critical decision-making. But GenAI can help cut through the noise by turning this flood of data into concise, verified briefings on road closures, rising water levels, or blocked evacuation routes. For example, government agencies are using Google Workspace with Gemini to turn complex, legally-precise official documents into clear, actionable, and personalized safety updates that the public can actually use.

Speed matters, but accuracy matters more. Effective crisis response requires balance: missing a warning puts lives at risk, but sending too many false alarms causes people to tune them out. That's why human oversight and strict verification checks are built into the process, ensuring every summary is reliable before anyone acts on it.

> AI has the potential to improve information synthesis, enhance communications and planning, reduce administrative burden, and enhance decision-making while keeping humans in the loop. By reducing administrative burden, AI can help emergency management devote more capacity to mission-critical work only people can do.
>
> **Report on AI for Disasters and Emergencies, AI for Disasters + Emergencies**

Building toward a world where no one is surprised by a natural disaster takes more than technology—it takes teamwork. By combining Google's technological breakthroughs with the on-the-ground expertise of governments, humanitarian organizations, and local community leaders, we can build a more resilient planet. The path forward is collaborative, human-centered, and supported by AI.

Endnotes

[1] "Global Temperature Report for 2025," Berkeley Earth, January 2026.

[2] "2025 Disasters in Numbers," CRED, April 2026.

[3] Refer to endnote 1 above.

[4] "Brutal June Heat Wave Killed as Many as 14,000 Europeans," Politico, July 2026.

[5] "Wildfires in Europe: Is 2026 Already the Worst Year on Record?," Euronews, August 2026.

[6] "Surface Air Temperature for April 2026," Copernicus Climate Change Service (C3S), April 2026.

[7] "From Billions to Trillions: Flagship UN Report Reveals True Cost of Disasters and How to Reduce Them," United Nations Office for Disaster Risk Reduction, May 2025.

[8] "What the Market Thinks: Findings from our Corporate Resilience Survey," MSCI Institute, October 2025.

[9] "Disconnected Defenses: Extreme Weather Risk Across Corporates, Cities and Financial Systems," CDP, May 2026.

[10] "The Sustainable Development Goals Report 2025," United Nations, July 2025.

[11] "Global Report on Internal Displacement 2025," Internal Displacement Monitoring Centre, May 2025.

[12] Based on estimated impressions of alerts provided through our crisis response portfolio from January 1 to December 31, 2025.

[13] The estimated population covered for significant events is as of July 2025, based on the forecasted flood risk area, using the WorldPop Global Project Population dataset. Significant flood events are events that meet a predetermined threshold based on an internal rating scheme that takes into account a number of factors.

[14] Refer to endnote 13 above.

[15] Refer to endnote 12 above.

[16] Refer to endnote 13 above.

[17] "Building Community-Level Flood Early Warning Systems for Vulnerable Households in India," Yale, last accessed July 2026.

[18] "Providing Farmers with Better Forecasts Helps Them Adapt to Climate Change," The University of Chicago, February 2024.

[19] "Tropical Cyclone Report: Hurricane Melissa," National Hurricane Center, October 2025.

[20] "The Best Hurricane Forecasts of 2025 Came From an AI Model," CNN Climate, December 2025.

[21] "Extreme Heat: What to Know About the Deadliest Climate Risk of Our Time," World Economic Forum, last updated January 2026.

[22] "Urban Heat Islands 101," Resources for the Future, March 2023.

[23] Note that phones can detect shaking for reasons other than an earthquake, which is a source of noise the system needs to handle.

Google

How Google AI is reshaping global crisis resilience

2026

Want to learn more?

For governments or nonprofits interested in learning more, please contact us at crisis-resilience-partnerships@google.com.

To explore Google's sustainability approach, visit our Sustainability website. Refer to our Sustainability blog for ongoing news and progress, or sign up to the Google Sustainability newsletter for the latest updates and event information. To explore our crisis resilience approach, visit our Crisis resilience website.

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Forward-looking information

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Cover photo details

Aerial view of a wildfire sweeping through a forested region; Aerial view of a floating aquaculture town, vulnerable to rising coastal weather risks; Tropical cyclone simulation over the ocean, illustrating Google DeepMind's Weather Lab cyclone forecasting capabilities.