

October 27, 2026

HEAT STORMS

Giant 'heat storms' are scorching the Earth.
This is the story of the biggest one on record

- A Reuters data-driven examination shows surge in massive heat waves.
- Heat storms used to be rare. Now they swarm the planet.
- For more than 18 years straight, at least one heat storm has been roiling the planet every day.
- Read how the biggest one upended life around the world from Texas to Ivory Coast to Poland.

FILE PHOTO: Manuel Flores walks on a dry area that shows the drop in the level of Lake Titicaca, Latin America's largest freshwater basin, as it is edging towards record low levels, on Cojata Island, Bolivia, October 26, 2023. REUTERS/Claudia Morales/File Photo

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FILE PHOTO: Flames and smoke rise from a line of trees as a wildfire burns at the Dadia National Park in the region of Evros, Greece, September 1, 2023. REUTERS/Alexandros Avramidis/File Photo

Giant 'heat storms' are scorching the Earth. This is the story of the biggest one on record

~By Maurice Tamman, Ben Welsh, Pete McKenzie, Charlie Szymanski, Delgerzaya Delgerjargal, Robbie Corey-Boulet, Loucoumane Coulibaly, Jeff Horwitz and Joan Faus~

In less than a lifetime, about six and a half decades, heat waves have evolved from sporadic, isolated episodes to massive, cascading weather events that can blanket vast swaths of the planet for months or even years at a time.

The largest heat wave of the 1960s reached about 6% of the planet as it drifted for 46 days over the Atlantic Ocean, parts of Latin America and West Africa.

The largest one this decade swept across almost 85% of the globe during its 367-day lifetime, stretching into the polar latitudes and touching virtually every human being on Earth.

To continue calling such sprawling phenomena "heat waves" would be like calling a monsoon a rain shower. To understand the new reality of these immense expanses of heat, Reuters consulted with two dozen meteorologists and climate researchers – and analyzed temperatures for every hour of every day since 1960 for more than one million grid squares covering the entire globe. Out of those results we developed a new concept: the "heat storm."

Simply put, heat storms are supersized heat waves. Reuters uses a conservative benchmark to define an ordinary heat wave: five or more consecutive days of abnormally high temperatures. Then we define the largest heat waves – those that at their peak cover at least 1% of the globe, roughly half the size of Can-

about five active storms per year. This decade, heat storms have swarmed the planet, averaging about 102 a year.

One of them caused this summer's deadly heat in Europe, notching the highest June temperatures ever recorded in Bordeaux, Budapest, and Bilbao, the

ernments estimated were more than 10,000 excess deaths in a single week, and prompted Belgian zookeepers to cool their tigers by feeding them raw meat encased in ice.

The largest heat storm on record – the one that lasted for 367 days over 2023-2024 and reached almost 85% of

recalled a student who was face-down at his desk, crying. When Arrojado coaxed the boy into looking up, Arrojado saw his face and chest covered in blood. The boy, Arrojado said, had suffered a spontaneous nosebleed, a common problem in extreme heat. As more blood pumped from his nostrils, Arrojado recalled, the child pleaded with Arrojado to call his mother.

As the same heat storm encased southern Louisiana for months, it exacerbated a historic drought. The state burned, suffering what the governor called "the worst wildfire we've seen since at least the Second World War" – and close to 600 other fires in August alone. Two months later, smoke from a smoldering marsh fire developed into a blinding "super fog" that caused a highway pile-up of at least 158 cars, killing seven people.

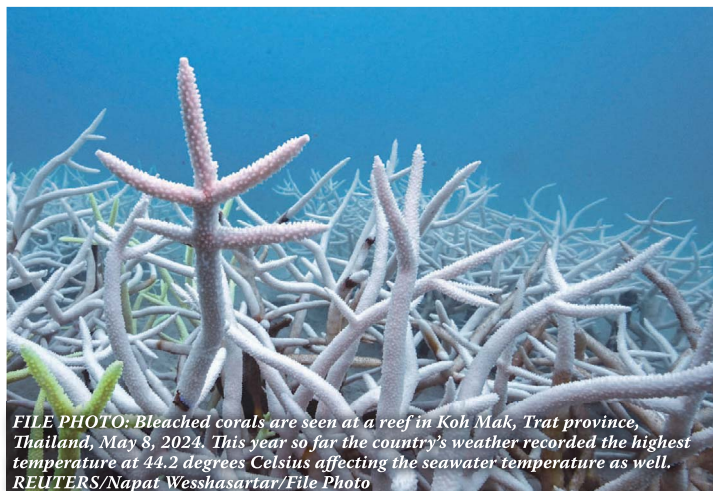
The same heat storm helped fuel a 2023 Mediterranean cyclone that dropped massive rains over Libya. In the dead of night, two dams burst near the coastal town of Derna, washing away entire neighborhoods. A week later, on her hands and knees, Sabreen Blil clawed with her bare hands

at the rubble of her brother's house, hoping to dig out the dead. As she wept, she recited their names. "Taym, Yazan, Luqman, Salmah, Tumador, Hakim and his wife. Oh my God. My family, where are you?" she wailed. "Oh God. Even just one – my God – just let me find even one body."

During the annual Hajj pilgrimage in Saudi Arabia, the heat storm drove temperatures at Mecca's Grand Mosque to 51.8 C (125.2 F), killing more than 1,300 pilgrims. Bodies lay in the streets. And as Europe's largest recorded fire spread in Greece during the span of that same heat storm, the inferno killed migrants traversing the thick Dadia forest. Their corpses remained in the woods for days; even the vultures that might have fed on the bodies had fled the flames.

These far-flung and seemingly unrelated catastrophes all shared a common connection: one single heat storm.

Heat storms inflict "a major disruption to global civilization," said James Renwick, professor of physical geography at New Zealand's Victoria University of Wellington. "Heat is the



FILE PHOTO: Bleached corals are seen at a reef in Koh Mak, Trat province, Thailand, May 8, 2024. This year so far the country's weather recorded the highest temperature at 44.2 degrees Celsius affecting the seawater temperature as well. REUTERS/Napat Wesshasartar/File Photo

ada – as heat storms.

Applying this definition, Reuters identified a startling transformation. Heat storms were rare in the 1960s, when they averaged

latter of which hit 42.7 degrees Celsius (108.9 degrees Fahrenheit). Roasting Europe for most of June and July, the heat storm warped steel railroad tracks, drove what European gov-

the globe – sent temperatures in parts of the Philippines up to 38 C (100.5 F), immiserating students in the country's mostly unairconditioned schools. In Manila, math teacher Joel Arrojado

biggest killer from climate change," he said, noting that it can lead to "famine, hunger, death, conflict over resources."

A NEW WAY TO UNDERSTAND CLIMATE CHANGE

Heat storms constitute a new way to conceptualize how Earth's climate is changing as humanity pumps greenhouse gases into the atmosphere.

The determination by climatologists that the average global temperature in 2025 was 1.47 C (2.6 F) above the pre-industrial level is useful to scientists and policymakers, but to many people it's so abstract as to be meaningless. What people do understand are heat waves – in Spanish, an "ola de calor"; in Arabic, a "mawjat harara"; in Mandarin, a "rè làng."

Yet no universal definition of a heat wave exists. For example, authorities differ over duration: The US National Weather Service defines a heat wave as "abnormally and uncomfortably hot" weather typically lasting "two or more days," while the meteorological agencies of Australia, France, Spain and the United Kingdom set the threshold at three days. Some of those countries also have different rules for what temperatures qualify as a heat wave.

Moreover, what constitutes a heat wave in Anchorage, Alaska, would not be consid-

ered a heat wave in Kuwait City. The climate in those places differs sharply, and a heat wave is an unusual period of hot weather for a particular place.

Such dueling definitions made it all but impossible to gauge whether heat waves are more common globally now than in the past. But the system Reuters has devised delivers the precision needed to do so.

We began by determining the historical temperature range for each day of the year from 1961 to 1990 for each of 1.04 million grid squares around the globe. The temperature data comes from the European Centre for Medium-Range Weather Forecasts, and our detailed methodology is here. A heat wave occurs when the daily high temperature for any location reaches at least the 90th percentile of the historical range – in other words, the hottest 10% – for five days in a row.

So a July heat wave in Istanbul is five or more consecutive days of at least 25.6 C (78.1 F), whereas one in Phoenix, Arizona, needs to reach 40.3 C (104.5 F).

In Reuters' definition, a heat wave can happen in any season, so in Istanbul a January heat wave would be five consecutive days of at least (11.2 C) (52.2 F), and in Phoenix the threshold would be 20.8 C (69.4 F).

To measure the geographical extent of heat waves, we map neighboring heat wave grid squares that form a cohesive area. Because very large heat waves exert an expanding effect on the planet's rising temperatures, Reuters created a further definition: If at any point a



FILE PHOTO: People sit in the shade on the Spanish Steps during a heatwave, as temperatures are expected to rise further in the coming days, in Rome, Italy, August 3, 2026. REUTERS/Remo Casilli/File Photo

heat wave covers 1% of the planet, we designate it a heat storm and give it a name, as is done with tropical storms and hurricanes.

Naming events is "a powerful way for people to understand that something is happening," Anthony Leiserowitz, director of the Yale Program on Climate Change Communication, told Reuters. Yet "we don't currently do that with heat waves," he said, even though heat has been estimated to kill almost half a million people a year. Defining and naming heat storms is an important innovation, he added, and could help people to track impacts and consequences.

As their numbers have swelled over the decades, heat storms and heat waves have not only caused individual catastrophes. They have also helped drive last-

ing, systemic effects.

They exacerbate droughts and intensify fires – from Chile to Europe, the largest conflagrations on record happened during heat storms – and if they hit while a woman is pregnant, studies have found that she's more likely to suffer everything from stillbirth to pre-eclampsia, a leading killer of expecting and post-partum women.

Warmer temperatures can usher in benefits, at least for some regions. Siberia now produces almost as much wheat as Russia's traditional breadbasket near the Black Sea. That's in part because increasing heat storms and heat waves have helped open far northern latitudes to agriculture while simultaneously contributing to droughts around the Black Sea that reduce production there.

18 YEARS OF CONSTANT HEAT STORMS

Tens of thousands of ordinary heat waves flicker in and out of existence every year. Like heat storms, they too have escalated in number, more than doubling from the 1960s to this decade. The vast majority are small, however, never even covering 0.01% of the planet, about the size of a square that you could drive across in less than two and a half hours. Only a minuscule fraction of heat waves ever gets big enough to become heat storms, which currently number about 102 annually.

Yet heat storms now claim the lion's share of Earth's unusually hot days, those in the top tenth of the historical range. In the 1960s, heat storms averaged 3% a year for any given spot on the planet. (The remainder comprised ordinary heat waves and short bursts of heat that didn't last long enough to become a heatwave.)

This decade, heat storms have accounted for almost 43% of such days.

As greenhouse gas emissions have increased, so too have heat storms and ordinary heat waves. From the 1960s to this decade, the amount of carbon dioxide in the atmosphere has increased by more than 30%. Over that time, the average portion of the planet likely to be covered by heat storms and heat waves has risen more than 12-fold. El Niño – the periodic episodes of unusually warm water in the Pacific Ocean that drive major weather patterns –

has acted as an accelerator, intensifying heat storms and heat waves.

Reuters has also examined the opposite of heat waves and heat storms – cold snaps and cold storms. They have dwindled. From the 1960s to this decade, the total area in a cold snap or cold storm on an average winter day has shrunk by almost 80%.

Despite their mammoth scale, the phenomenon of heat storms has been largely invisible to the public. Until recent decades, heat storms were rarer and smaller, so easier to overlook.

But perhaps as importantly, they hadn't been defined and named in the sharp way that typhoons and hurricanes are. Yes, people in Montreal, Perth and Hong Kong knew they were baking in a stretch of hot days – but they did not know that they were all experiencing one unitary heat storm.

As part of this series examining heat storms and their effects, Reuters has integrated an online Heat Storm Tracker into our regular weather coverage. With this tool, people can see what had previously gone unnoticed and, using that knowledge, tally the impact of heat storms as they rage across regions.

The rapid evolution of heat has not only made individual heat storms larger. Now, in sharp contrast to even 20 years ago, massive heat storms often run into, merge with, and split off from one another. What has become common are heat storms that run consecutively, simultaneously or both – heat storm cascades.

The duration of these cas-



FILE PHOTO: An elderly survivor is transported to a safer place in heavy machinery following flash floods and mudslide at Devighat in Nuwakot district, Nepal, August 26, 2026. REUTERS/Navesh Chitrakar/File Photo



FILE PHOTO: A man walks on the cracked ground of the Baells reservoir, as drinking water supplies have plunged to their lowest level since 1990 due to extreme drought in Catalonia, in the village of Cersc, in the region Bergueda, Spain, March 14, 2023. REUTERS/Nacho Doce/File Phot

cadecades swelled from an average of roughly two months in the 1960s to nine months in the first part of the 2000s. Then, on July 6, 2008, a cascade started – and has not stopped. For more than 18 years straight, 6,681 days, at least one heat storm has been roiling the planet, and often more than one.

Many of them have been colossal. In the almost half century between 1960 and the start of the current 18-year cascade, only five heat storms had ever reached a peak size bigger than a tenth of the planet, about the area of Europe and Asia combined. The ongoing cascade has included 56 such mega heat storms.

The largest of these was one we have named Heat Storm Vera, the storm that killed the Hajj pilgrims, intensified the Louisiana wildfires, and touched nearly 85% of the planet over its 367-day lifespan.

What follows is a biography of Vera, from its birth on July 29, 2023, through its last day on July 29, 2024, that shows how the storm connected and often devastated communities scattered across the globe.

TEXAS, AUGUST 2023:

FRIDAY NIGHT LIGHTS

On a sweltering evening in August 2023, as Heat Storm Vera coiled around the American South, Justice Trumpler led his high school football team onto the field for the season's first game. In hopes of playing college ball, the 17-year-old captain had invited coaches and recruiters to watch. As the game kicked

off at 7:30pm, the temperature was 37.8 C (100 F).

Texas's passion for high school football – the American version, not the one that transfixed billions during this summer's World Cup – was captured in the iconic movie Friday Night Lights, about a team gunning for the state championship. But players of American football suffer 11 times as many heat-related injuries as athletes in all other sports combined, according to data from the University of Connecticut Korey Stringer Institute.

That's because the football season starts in the summer, the sport demands intense physical exertion, and many of its players, such as the 255-pound offensive lineman Trumpler, have large bodies that are harder to cool down. There's another reason: In contrast to most other warm-weather sports, American football features heat-trapping helmets and heavy padding.

Meanwhile, Texas is spending ever more time in extreme heat. Across the entire three decades from 1960 to 1989, the city of Austin – home to Trumpler's Bowie High School – experienced a total of 557 days in heat waves and heat storms. This decade, our analysis shows, that number has already surpassed 700. During the football season, Heat Storm Vera enveloped Austin for 39 days.

By halftime, the Bowie Bulldogs led 14-0. As the teams broke apart, Trumpler's parents said they watched him walk to the field's edge and vomit. A trainer hosed it away.

Through the second half, they saw Trumpler stop to dry heave at least twice, they said, and he seemed slow to get off the turf after plays. At one point, his parents saw

him walk toward the opposing team's huddle, a sign of mental confusion.

Trumpler's father, Jason Trumpler, told Reuters he began shouting from the bleachers for the coaches to pull his son out of the game. When that didn't work, he went to the railing separating the stands from the field and continued yelling. Trumpler kept playing.

Bowie's coach did not respond to multiple requests for comment. The school's principal referred Reuters to a school district spokesman, who did not respond to messages seeking comment.

Other players struggled, too. So many boys fell to the ground after plays that Bowie's game commentators declared it a "cramp epidemic." By the fourth quarter, the score was tied. The coaches could have ended the game, but the referee announced it would go into overtime.

"Both teams are going to start on the 25 (yard line) of their opposition and, uh, keep on going until somebody dies," said one commentator. "Don't say that," replied the other.

The "unfortunate" phrasing, the first commentator told Reuters, was intended to convey how hard the teams were playing under very tough conditions.

Just before the second-to-last play, a leg cramp brought Trumpler to the ground. His coach finally pulled him out. "Texas has that mentality of 'you gotta be tough, you gotta play through pain,'" said Jason.

Jason took Trumpler home, but the teen couldn't stop throwing up. After an ice bath failed to cool Trumpler down, Jason said, he drove his son to the hospital.

When Trumpler's mother, Jennifer Norman-Wolfe, arrived, he couldn't recognize her voice, she said, and couldn't tell her how many brothers he had.

Reuters was not able to review Trumpler's medical records, but his parents said tests showed their son's kidneys were failing, and his brain was swelling so much that doctors said they might need to drill a hole in his skull to relieve the pressure. Doctors couldn't assure them their son would survive, they said.

Twelve high school football players in the US have died from heat over the last decade, according to statistics compiled by the National Center for Catastrophic Sport Injury Research. Trumpler was released after two days in the hospital.

Later, his parents said, they sent his medical records

to Bowie High School and tried to discuss what had gone wrong. But they said the school's athletic staff infuriated them by suggesting they hadn't done enough to alert coaches about his condition during the game, Trumpler's father told Reuters. A month later, Trumpler's parents saw a video of an official for the governing body for Texas high school sports, the University Interscholastic League, referring to their son's injury as a "questionable" heat-related incident.

Neither the school district nor the UIL official responded to requests for comment. In an interview, UIL Executive Director Jamey Harrison said that the organization relies on schools to report the details of medical events and avoids instituting rules based on individual incidents.

Heat storms are starting to reshape Texas football. State filings show that since the beginning of this year, at least four school districts in the state have registered to build indoor or covered practice spaces, two with price tags in excess of \$10 million. And this year, the UIL adopted new rules requiring rest breaks, ice baths and shortenings or cancellations of practices in high heat. Yet these rules are not mandatory for football games themselves.

Two weeks after his hospitalization, as Heat Storm Vera continued baking Austin, Trumpler resumed playing football. He declined to speak to Reuters, but wrote on X at the time that "it felt so good to return."

His heat injury, however,

seemed to throw off college recruiters. Division I teams, those with the biggest and best programs, stopped calling, Trumpler's father recalled. His mother said Trumpler himself seemed tepid about the prospect, which had once been his dream, and he is not currently attending college.

"Our son, Justice, is tough and built for football, mentally and physically," she wrote at the time. "This heat was tougher."

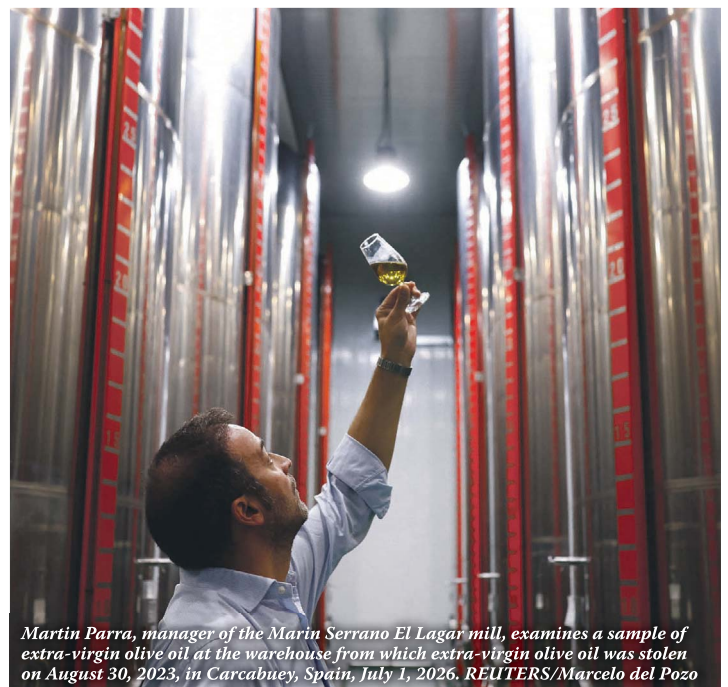
SPAIN, AUGUST 2023:

"PIRATES OF LIQUID GOLD"

Early in the morning of August 30, 2023, a team of thieves carefully maneuvered a tanker truck through the winding roads of the small Spanish town of Carcabuey, intent on an audacious heist.

Around 2:30 a.m., according to a local police official, the thieves pulled into a gated driveway on the edge of town. They shut off lights and cut through the rickety gate's padlock. They left no fingerprints because they wore gloves. Once inside, they beelined for their unusual loot: extra virgin olive oil, which they siphoned from industrial-sized tanks.

Over the previous several months, a series of heat storms had helped fuel a drought that devastated the olive crop and sent the price of olive oil skyrocketing,



Martin Parra, manager of the Marin Serrano El Lagar mill, examines a sample of extra-virgin olive oil at the warehouse from which extra-virgin olive oil was stolen on August 30, 2023, in Carcabuey, Spain, July 1, 2026. REUTERS/Marcelo del Pozo



FILE PHOTO: A researcher from the Mamiraua Institute for Sustainable Development retrieves dead dolphins from Tefe lake, which flows into the Solimoes river, which has been affected by the high temperatures and drought in Tefe, Amazonas state, Brazil, October 2, 2023. REUTERS/Bruno Kelly/File Photo

raising the value of the stolen 56 metric tons to a staggering \$546,000. Journalists nicknamed the thieves the Pirates of Liquid Gold.

By dawn, when the olive mill's manager, Martin Parras, arrived, all that remained was an oil streak on the driveway. Parras was so overcome, he said, that he walked into a nearby olive grove, sat beneath the trees and wept.

Spain's southern region around Carcabuey, houses are painted white to repel the sun, and residents take long breaks during the hot afternoons. Olive trees, which evolved to have for-

midable heat tolerance, have thrived here for centuries.

But the trees have struggled in the new heat storm era. Between March 12 and August 1, when Vera first reached Carcabuey, the little town endured eight other heat storms that rolled one into the next with almost no break. The combination of early heat and scarce rain burned the olive flowers, preventing them from opening and pollinating, Parras said.

In the past five to 10 years, locals say, the heat that once lasted from June to August can now stretch from April to November, and it stays

hot later into the evening. "People used to go out around 7 or 8 in summers but now it can be 9 or 9:30 and there's no one in the streets," said Juan Lara, who has been running a pastry shop near Carcabuey for 46 years.

Heat Storm Vera spent a total of 127 days over Carcabuey. At first, Vera teased the city, brushing it briefly before smothering the town for three weeks until a couple of days before the theft. Temperatures surpassed 40 C (104 F) several times.

Parras said about half the olives at his Marin Serrano El Lagar mill ended up

unusable, with scant flesh and barely any oil. "Olive trees had a yellow color like when grass dries, and leaves fell," he recalled. "It was monstrous."

The price of olive oil spiked by 44% that year, largely because the withering heat and drought reduced output by roughly half in Spain, the world's largest producer. Some Spanish supermarkets placed alarms on bottles to prevent theft, but no one thought thieves would target a mill's huge metal tanks. At Marin Serrano El Lagar, the only alarms were in the office and a room storing oil that was already bottled.

Spanish police arrested a 50-year-old man who had crushed olives at the mill for more than two decades until he left in 2020 after an argument over his salary. Authorities suspect the man conspired to steal the oil with the owner of a rival mill just down the road, the local police official said. The owner was also arrested. Both men were later released, but remain under investigation. They told Reuters they did not steal the oil, with the 50-year-old suspect saying he's eager to clear his name.

The real culprit, according to mill manager Parras, has not been indicted. "Climate change has completely affected olive fields," he said. "Has it been the cause of the theft? Totally." If the heat hadn't driven the price so high, he added, "There would have been no theft."

BRAZIL, SEPTEMBER 2023:

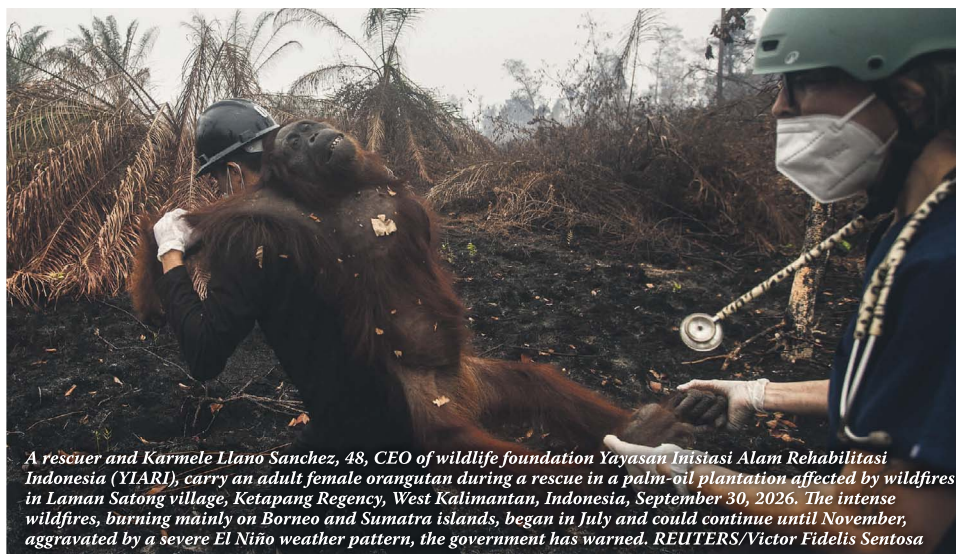
DEATH OF THE DOLPHINS

On September 28, 2023, an environmental scientist named Ayan Fleischmann sat in a small boat at the heart of a vast Amazonian lake and watched a dolphin die. The creature moved in jagged circles, its body shuddering. Suddenly, it sank.

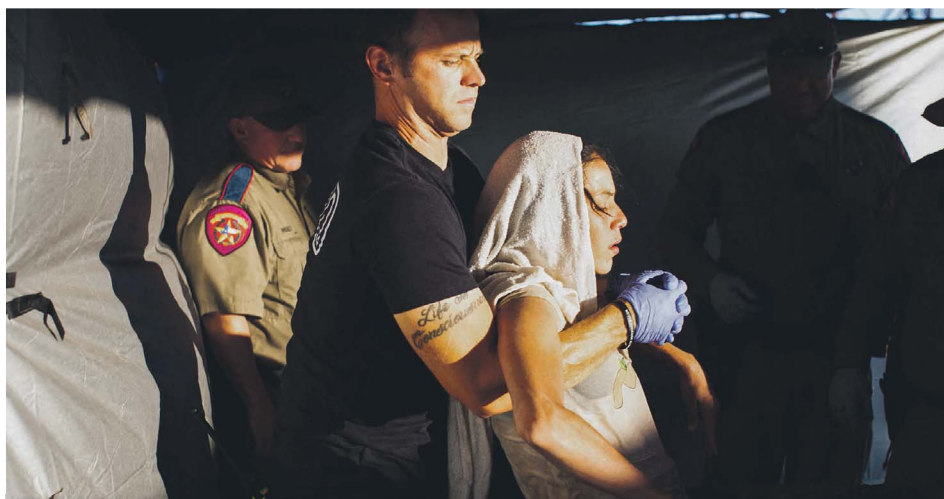
As Fleischmann watched the dolphin vanish into the darkness of Lake Tefe, smoke from nearby wildfires fouled the air. An algal bloom stained the waters blood-red. Dozens of dolphin corpses dotted the lake's beaches. Photos taken by Fleischmann's team show the dolphins' skin wrinkled like melted plastic or peeling to reveal yellow flesh. This, Fleischmann recalled thinking, might be what Hell looks like.

With its distinctive pink color, the river dolphin is one of the Amazon's most iconic and mythologized creatures. According to legend, they would transform into humans at night to seduce locals. The dolphin was put on the endangered species list eight years ago, after poaching and rainforest destruction caused its numbers to plummet. Now, heat storms have emerged as an urgent new threat.

Heat Storm Vera settled over the Amazon in late July and spent a total of nearly seven months over Lake Tefe, simmering it for 42 days in a row before Fleischmann watched the dolphin die. The heat storm helped warm the lake to a high of 41 C (105.8 F) — the temperature of a standard jacuzzi. For the dolphins, such temperatures were catastrophic; Fleischmann's research team later concluded that the creatures had effectively been cooked



A rescuer and Karnele Llano Sanchez, 48, CEO of wildlife foundation Yayasan Institusi Alam Rehabilitasi Indonesia (YIARI), carry an adult female orangutan during a rescue in a palm-oil plantation affected by wildfires in Laman Satong village, Ketapang Regency, West Kalimantan, Indonesia, September 30, 2026. The intense wildfires, burning mainly on Borneo and Sumatra islands, began in July and could continue until November, aggravated by a severe El Niño weather pattern, the government has warned. REUTERS/Victor Fidelis Sentosa



FILE PHOTO: Firefighter EMT William Dorsey lifts a migrant woman suffering from heat exhaustion onto a stretcher in the border community of Eagle Pass, Texas, US, June 26, 2023. REUTERS/Kaylee Greenlee/File Photo

alive.

Fleischmann, 34, had been studying how the waters of Lake Tefé were changing for several years. "It became a friend. I see it every day," he said. But as the heat storm festered, he recalled, so much of the lake dried up that when he and his colleagues visited local villages, they were pelted by whirlwinds of sand whipped up from newly exposed beaches.

Later, Fleischmann's research institute autopsied the dolphins that washed up on the lake's shores. Temperatures were so high that most of the corpses rotted faster than they could be studied, said Hilda Chávez-Pérez, a biologist who oversaw the study of the bodies. But in those they could examine, she said, the researchers kept finding that the dolphins' brains were bruised and their organs speckled with blood: telltale signs of heat stress. Many had empty stomachs, indicating that they had lost the ability to feed in the heat.

The lake's normal population is at least 700 river dolphins, said Fleischmann, but during September and October, when Vera scalded the area for all but one day, more than 200 died. "Nobody had ever seen that magnitude of mortality," he said. "It was like a death circus."

POLAND, FEBRUARY 2024: WEIRD WINTERS

In Poland's Tatra Mountains, the first months of 2024 were full of strange signs.

In mid-February, bears woke from hibernation

weeks early and began roaming the ranges. Frogs also emerged early, ranger Tomasz Zajac remembered, rising from the rotting leaves and underwater silt beneath which they had hunkered through the cold months. Although snow still clung to the high peaks, it was so slushy that it frequently slipped in mini-avalanches that left black scars of exposed rock.

While heat storms are hottest in summer, they can also mellow typically frigid months. Heat Storm Vera, which enveloped the Tatras for 31 days in January and February, sent the temperature up to 17 C (62.6 F). In neighboring Germany, Vera prompted the country's weather service to tell people to leave behind their warm coats as they celebrated the annual winter carnival, while in the UK, television hosts joked about unusually "hot and steamy" Valentine's Day temperatures in the English town of Llover.

But winter heat storms can also cause unexpected harm. In January of this year, bone-chilling cold descended on eastern Canada and the US, causing Toronto to endure 23 straight days of sub-freezing cold and gripping parts of Minnesota in temperatures that plunged to minus 41.7 C (minus 43 F). Paradoxically, those frigid temperatures were largely caused by winter heat waves in the northern polar regions and Greenland, where residents basked in unseasonably balmy days that reached 11.3 C (52.3 F). That northern mass of warm air shunted a cold front down over eastern North America, in what climatologists call a polar vortex.

Tennessee got so cold that freezing rain encased trees in ice, causing many to collapse under the weight. Forest silence was occasionally

broken by a sound resembling gunshots as sap froze and expanded, splintering tree trunks. Almost half of Pittsburgh's snowplows stopped working, forcing the city to leave roads uncleared for days and trash on the streets for a week. The extreme cold killed at least 100 people across the US, caused power losses for more than a million customers, drove more flight cancellations than any time since the COVID 19 pandemic, and forced school closures from Milwaukee to Atlanta. Even in Cuba, farmers woke to frost on their crops.

Heat Storm Vera spent weeks over Europe in January and February, effectively transforming winter into spring. By mid-February, local media estimated that a quarter of European ski resorts were closed due to lack of snow. It was so warm that many resorts couldn't even make artificial powder.

Amid the unseasonal heat, intense rain battered parts of Europe and neighboring countries; as Vera settled over the southern Turkish city of Antalya, flash floods inundated entire neighborhoods, with the sudden flow submerging fire trucks and buses.

In the Tatra Mountains, winter's end is marked by the blossoming of crocuses. More than a hundred million typically bloom starting in mid- to late-March, turning the valleys into purple oceans. Rangers have to patrol Chocholowska Glade — where crocuses bloom most densely — to prevent tourists stampeding the flowers into the ground. In late February, that frenzy was supposed to be weeks away. But on February 29, ranger Zajac noticed a flash of color amidst Chocholowska's freshly-uncovered grass. He squatted to get a better look at the purple petals unfolding

around an orange stamen. Earlier than he could ever remember, the first crocus had arrived.

THE PHILIPPINES, APRIL 2024:

COLLAPSING CHILDREN

Partway through April 2024, on the top floor of Sagkahan High School in the Philippines' Tacloban City, Jeffrey Polido was giving a lesson on typhoons to 50 sweating 14-year-olds in a concrete classroom with two rickety fans. Interrupting him, a student burst through the door with news: Yet another child had collapsed.

Polido — a 37-year-old science teacher who at that time ran the school's health clinic — raced outside to the stricken girl and took her vitals. He and the student who had alerted him carried the child down several flights of stairs to the clinic to recover. Then, Polido walked back to his roasting classroom and resumed teaching, knowing it would happen all over again. After all, he told Reuters, he had already seen dozens of students collapse.

Polido, along with the teacher who comforted the student with the gushing nosebleed, didn't know it but they were on the front-line of Heat Storm Vera. The heat was intensified by its most dangerous accomplice: humidity. As a result, a temperature of 33 C (91.4 F) in steamy Tacloban felt like 47 C (116.5 F), while hotter parts of the Philip-

pinos reached "feels like" levels of 53 C (127.5 F) — at which point the country's weather bureau warned, "Heat stroke is imminent." For the millions of children in schools cooled only by fans, the thick muggy heat was especially dangerous.

In Manila, Jenita Simangan, 49, watched her 50-strong class of five-year-olds break out into rashes, complain of headaches, and say the heat made their skin feel like it was burning, she recalled. Partway through the heat spell, she said, one five-year-old staggered into class and began vomiting uncontrollably. As the child stood in a puddle of watery bile speckled with half-digested chunks of lunch, Simangan felt herself panic. It was the worst moment she'd experienced in two decades of teaching, she said.

Heat Storm Vera hit Tacloban particularly hard, tormenting the city for a total of more than nine months. Standing in a rare spot of shade at Sagkahan High School earlier this year, Cloe Novella, 17, recalled sitting in her class and trying to catch the weak breeze from one of the classroom's old fans when she realized one of her best friends hadn't said anything since they sat down. Turning around, Novella saw her friend appeared to be sleeping, tapped her, and quickly realized that her friend had lost consciousness. Novella's teacher told one of her classmates to fetch Polido, who came and carried the student to the clinic, where she recovered. She was one of more than 40 who Polido estimated fainted during Vera.



Students practice the proper method of carrying an unconscious patient during a basic first aid training at Sagkahan National High School in Tacloban, Philippines, July 19, 2026. REUTERS/Eloisa Lopez



Cocoa farmer Jules presents examples of cacao pods and dried cacao tree leaves similar to those observed during the drought, at the plantation of his late father, former village chief Brou Kouassi, whose crops were affected by early 2024 extreme weather, in Digrikro, a village near Daloa, Ivory Coast, August 26, 2026. REUTERS/Luc Gnago

The Philippines soon suspended in-person classes across the country and has since changed its school calendar to avoid exposing students to the most extreme temperatures. Yet for Novella and her fellow students, Heat Storm Vera kickstarted a new era of near-perpetual heat.

LJ Corsanes, 17, said he frequently plunges into temperature-induced panic attacks. "It's like going into a fight," he said of going outside. "It's like opening a door to hell."

Over the entire 1960s, heat storms hit Tacloban for only 7 days, and the city experienced 245 days of ordinary heat waves. This decade, ordinary heat waves have touched Tacloban for fewer than 40 days – but heat storms have engulfed the city for more than 1,470 days. That's over 200 days a year.

Tropical archipelagos such as the Philippines are particularly vulnerable to heat storms, Reuters' analysis shows. The warm ocean heats the air from below while sunshine not only beats down from above but also reflects off the surrounding water. Other tropical islands, such as Guam, Haiti and much of Indonesia, spend most of the year in heat storms.

The implacable heat is forcing students to learn grim new skills. In July, Polido gathered 80-odd teenagers for first aid training with the Red Cross. Over two days, they practiced how to

begin chest compressions, how to lift an unconscious person to safety, and how to position someone who has passed out so they don't choke on their tongues.

For some, the heat has become eerily normal. Novella said it makes her feel "like I am burning in pain and fire." But, she added, "It is not strange, because I am used to feeling the heat already."

IVORY COAST, NOVEMBER 2023-JUNE 2024:

DEATH OF A CHOCOLATE CHIEF

In his half-century as a farmer of cocoa, the raw ingredient of chocolate, Chief Brou Kouassi earned enough money to marry five times, send his 12 children to school, and float a little cash to his neighbors. He even had a nickname – "À Nous Deux," or "Just Between Us" – a phrase people used when they came seeking assistance on the hush-hush.

In 2023, Heat Storm Vera started stalking Digrikro, the village in western Ivory Coast where Kouassi had been chief since 2000. At first, the heat storm came and went, lurking for up to two weeks at a time. Then, beginning November 1, Vera besieged the area for more than four months straight, sometimes sending temperatures above 38

C (100.4 F). "La secheresse" – the drought – also began in November, according to local farmers and United Nations rainfall data.

His sons had taken over the hard labor, but every morning Kouassi still pulled on his boots and went out to survey his 22-hectare farm. As Heat Storm Vera shriveled the pods and sent brittle leaves falling from the branches, Kouassi would shake his head and lament that he had never seen so many trees dead or dying.

His sons would go out in the morning with their machetes to cut down the cocoa pods but return just a few hours later because, as Kouassi's son Jules put it, "the trees didn't give us anything." Jules said the cocoa yield on his portion of the land for February to April 2024, an important harvesting time, was less than half of normal.

Ivory Coast and its neighbor Ghana produce about 50% of the world's cocoa. But in the wake of Heat Storm Vera, the harvest in those two countries fell by half.

Vera had collaborators, among them disease, which preys more easily on heat- and drought-weakened cocoa trees, and an El Niño, which likely intensified the heat storm. But Vera and the drought it exacerbated were relentless, with the heat storm lingering over one cocoa region of Ghana for a total of almost 11 months. In 2024, the price of cocoa almost tripled.

In West Africa, where almost all the cocoa is produced by smallholder farms such as Kouassi's, the stakes were existential. Kouassi urged his sons to abandon cocoa for heat-resistant crops such as rubber or cashews. "He kept saying, 'If you don't replace the cocoa trees, you'll have nothing to eat,'" recalled Jules.

In June 2024, as Heat Storm Vera took its last licks at Digrikro, Kouassi fell ill. After a medicinal broth of leaves didn't work, his family sent him to the hospital, where Jules recalls doctors saying his father had malaria and anemia. He spent four days in the hospital, at a cost of 320,000 CFA, or about \$525. But his illness persisted, so they sent him back again, paying another \$525. They considered a third trip for the same high cost, but they couldn't afford to keep sending him back because the devastation of the cocoa crop had beggared the family.

Kouassi's one-story concrete farmhouse offered little respite from the clammy heat. As his illness worsened – swelling that began in his feet spread all the way up to his thighs – he struggled to sleep more than a few hours each night. With money scarce and Western medicine failing, he asked to go to the village where he was born to visit a traditional healer or, if that failed, to be buried next to his parents.

Kouassi traveled by bus, which typically takes more than six hours to cover the 200 kilometers, much of

it on a choppy dirt road. Years earlier, before heat storms shattered his livelihood, Kouassi had built an eight-bedroom house there with a large patio, where he relished visits from relatives and neighbors, some whispering hush-hush stories. His sons hoped the more comfortable environment and traditional remedies might help him regain his health.

The healer took 90,000 CFA, a little less than \$160, then refused any more payments even though he kept bringing clay pots filled with medicinal concoctions. But his father continued to decline, Jules recalled, and finally pulled his son aside and asked him "to take care of the family because he didn't know if he would survive." Kouassi died on October 27, 2024, aged 68. No official cause of death was given.

His beloved cocoa farm has not recovered. Many of the trees are dead or sick, Jules said, and revenue remains in a rut. Kouassi himself lies buried under a blank headstone, his family unable to afford the finishing tribute: a name plaque. Nor have they been able to raise enough money for a traditional funeral, a fact that torments Jules. In the culture of their Baoulé ethnic group, the failure to hold that ceremony – complete with a sheep sacrifice, drumming and dancing – means his father cannot go peacefully into the afterlife. "It's like his soul is still walking around here," Jules said, "unable to rest."

FEBRUARY, 2026: A MASSIVE NEW HEAT STORM

Over its lifetime, Heat Storm Vera drifted over nearly 85% of the planet, more than any heat storm on record. Its peak size, covering 31.3% of the Earth on January 5, 2024, was also a record. Until this summer.

Heat Storm Raimundo, which broiled Europe and stoked massive wildfires in Spain and France, extended over 33.8% of the globe on August 28. Since its inception on February 28, 2026, Raimundo has touched almost three quarters of the planet's surface.

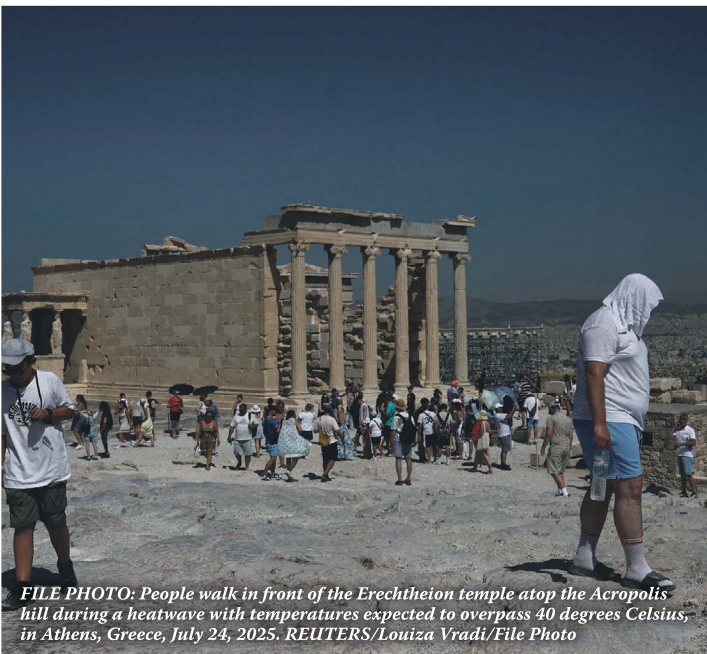
Both heat storms spent time over a melting Nepalese glacier before its collapse on August 26 and the catastrophic flooding that followed, killing thousands. Early indications suggest that warming temperatures contributed to the collapse of the glacier and the bedrock beneath it.

Up until the glacier gave way, it had spent about 58% of this decade in a heat storm or heat wave, up from 7% during the 1960s. For the six days immediately preceding its collapse, the glacier had been blanketed by Heat Storm Raimundo.

Raimundo isn't yet finished. It has been heating the earth for 235 days and counting.

(Reporting by Maurice Tamman in New York; Ben Welsh in New York; Pete McKenzie in Sydney and Tacloban, the Philippines; Charlie Szymanski in Phoenix, Arizona; Delgerzaya Delgerjargal in New York and Ulaanbaatar, Mongolia; Robbie Corey-Boulet in Dakar, Senegal, and Daloa, Ivory Coast; Loucoumane Coulibaly in Abidjan and Daloa, Ivory Coast; Jeff Horwitz in San Francisco and Austin, Texas; and Joan Faus in Barcelona and Carcabuey, Spain; Data analysis: Maurice Tamman, Ben Welsh, Charlie Szymanski and Delgerzaya Delgerjargal; Graphics: Adrián Blanco and Feilding Cage; Visual Editing: Feilding Cage; Additional reporting: Anna Włodarczyk-Semczuk in Warsaw, Gleb Bryanski in Moscow and Hina Suzuki in Tokyo; Editing by: Mark Schoofs and Claudia Parsons).

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FILE PHOTO: People walk in front of the Erechtheion temple atop the Acropolis hill during a heatwave with temperatures expected to overpass 40 degrees Celsius, in Athens, Greece, July 24, 2025. REUTERS/Louiza Vradi/File Photo



FILE PHOTO: An aerial view shows a destroyed bridge in the aftermath of a deadly storm and flooding that hit Libya, in Derna, Libya, September 20, 2023. REUTERS/Zohra Bensemra/File Photo



FILE PHOTO: Muslim pilgrims gather on the Mount of Mercy at the plain of Arafat, as water mist is sprayed due to high temperature during the annual hajj pilgrimage, outside the holy city of Mecca, Saudi Arabia, June 27, 2023. REUTERS/Mohamed Abd El Ghany/File Photo



Ferenc Szepe, 72, looks at his herd, which has been reduced because of drought, near Jaszszentlászlo, Hungary, June 14, 2026. Szepe was forced to sell or slaughter some of his herd due to the high cost of feed, while drought meant his land could no longer support them. REUTERS/Marton Monus



FILE PHOTO: A view of a wildfire spreading over the Burgohondo mountains, in Avila, Spain, July 23, 2026. REUTERS/Ana Beltran/File Photo