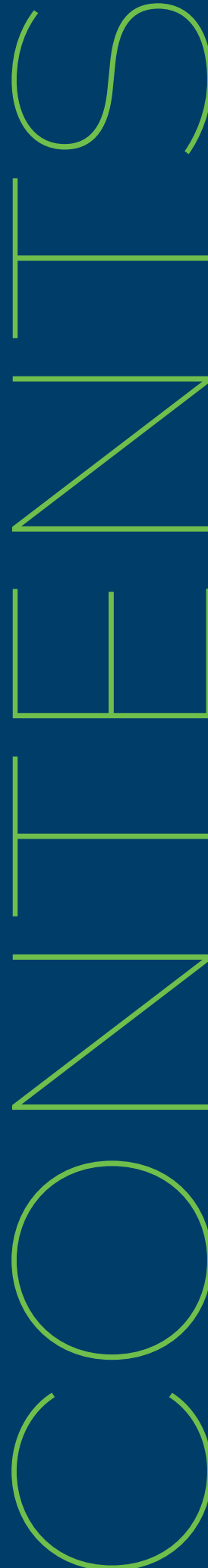




Enhance Airport Operations Safety and Efficiency with Weather Insights

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Introduction

The weather is the leading cause of air traffic delays in the U.S. airspace system, accounting for **75.48%** of occurrences. Thunderstorms, snowstorms, wind, lightning, icing, and fog contribute to those delays while creating potentially hazardous operating conditions at airports nationwide.

When combined with the growing number of passenger and air cargo flights, weather conditions demand increased attention from airport operators. In 2022, North American air carriers reported a 130% rise in annual traffic compared to 2021, and 2023 is expected to be even busier worldwide.

Airports must take on this added aircraft capacity demand, and as a result, construction and renovation are increasing. For passenger and cargo flights alike, the weather is a significant factor in efficiency and safety, and it all starts on the ground at airports. Adverse weather reduces volume, creates operational inefficiencies, and fuels airport capacity delays. It's critical to inform decisions with weather insights to ensure the safe, smooth movement of the added air traffic.





Growth of extreme weather



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Beyond the public safety implications, the economic damage of the growing number of extreme weather and climate events is more common as temperatures, sea levels, and the development of coastal areas increase. In recent years, the United States has experienced, on average, more than one individual billion-dollar disaster every month. Despite 2022 being an average hurricane season, the year saw the **third-highest** number of billion-dollar U.S. disasters since 1980. There were **18 separate billion-dollar events**,

including three hurricanes, two tornado outbreaks, a devastating fire season, numerous extreme storms, and a disruptive drought, resulting in **nearly 475 fatalities**.

While not directly included in these billion-dollar events, **extreme heat** and cold temperatures are also major weather considerations for airport operations as they tackle higher aircraft capacity demands. Heat waves occur more often, from an average of two heat waves per year during

the 1960s to six per year today. The average heat wave in U.S. cities is also growing in length, extending from an average of four days to five.

Given the significant economic role that U.S. airports play, generating more than **\$1.4 trillion** in annual economic activity and supporting more than 11 million jobs across the country, understanding and managing extreme weather risks must continue to be part of expanding airport operations.



The benefits of a Risk Communicator





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A [Risk Communicator](#) is a skilled meteorologist with strong communication skills and a deep understanding of airport operational processes and challenges. They deliver proactive support, so instead of an airport operator needing to reach out for a forecast, Risk Communicators will continually monitor the weather, leveraging insights from our leading meteorological solutions to provide precision forecasts and alerts as needed.

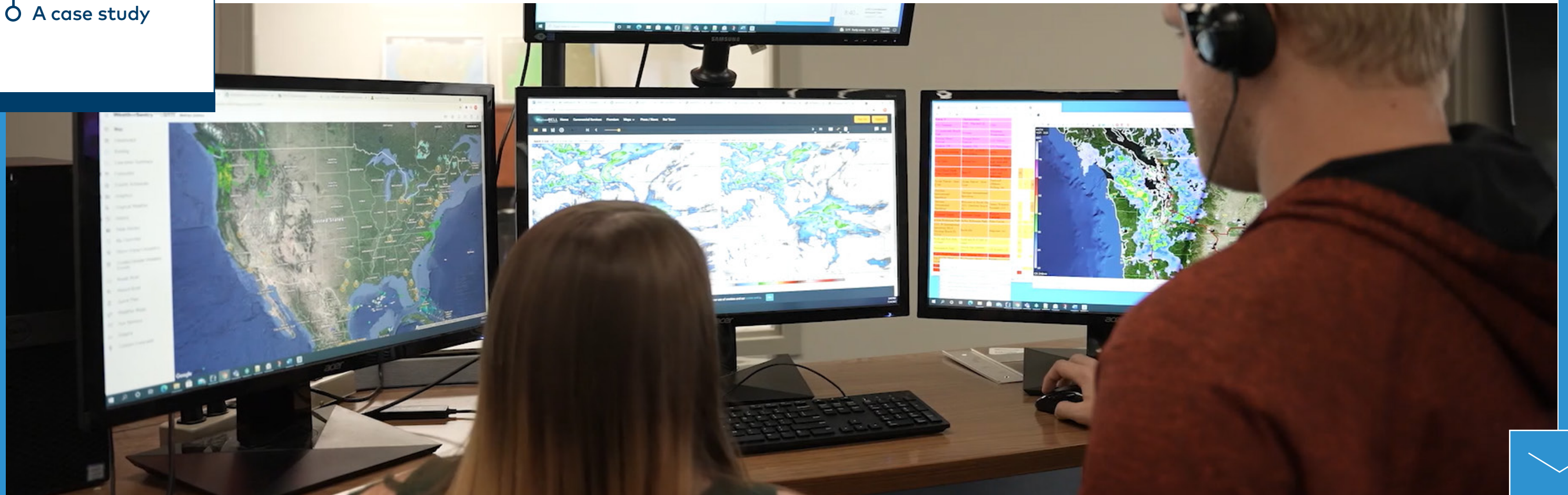
DTN Risk Communicators access accurate weather forecasts, industry-leading alerts, storm corridor information,

global lightning detection, and other data through our proprietary products, including [WeatherSentry®](#). The solution can serve as a single source of truth for an entire operations team, allowing all team members to confidently make faster, better-informed decisions.

While airport operations teams may already receive standard forms, templates, forecasts, and other weather information, a Risk Communicator takes things further. They provide highly-specialized briefings, videos, and personalized

communication that amplifies and applies operational consequences of the weather. Risk Communicators inform decisions related to ground operations, potential airport closures, scheduling, resource management, and more.

There are three critical phases to minimizing weather impacts on airport operations, and DTN offers solutions to alleviate challenges at every turn.



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Phase 1: Prepare

Even if an airport operations team knows how typical weather conditions may impact their facility, extreme weather still has business implications. Those specific risks are often common across the industry but may vary from location to location. They must first be identified to mitigate or manage them efficiently.

A pre-season planning workshop is the first step to addressing risks. The workshops can be held seasonally, as appropriate, or as part of annual planning. They typically involve all stakeholders, along with a Risk Communicator, and are an opportunity to discuss the airport's needs, necessary operational changes, and communication structures. The team will review existing action plans, realign them as necessary, determine what constitutes a weather event, and confirm thresholds for proactively monitoring before significant events occur. In addition, weather plans will consider tolerances, financial implications, lead times, and communication processes to maximize efficiency while promoting safety for all involved.

Looking at tropical weather and hurricanes as an example, airport operations must have an all-hands-on-deck approach to making critical decisions well ahead of an impending storm. The planning phase is crucial for aligning stakeholders, so the collective group can prepare for potential issues that may result from the expected conditions. During the planning process, the Risk Communicator will ensure there are plans for sharing regular updates on the forecast track, rainfall, wind strength and direction, storm surge, tornado potential, and establish confidence levels and uncertainties for the impacts. The Risk Communicator is an essential part of the communication process and is critical to conveying the weather risks and operational implications to the airport's team.

Because of the nature of airport operations, there is already a healthy respect and understanding of the weather. Still, this planning process gives operations teams access to additional insights that can help improve safety and efficiencies. A Risk Communicator is a partner who serves as the weather expert, helping airport operations prepare to deliver the best possible results.

The DTN solution

Risk Communicator workshop – airport operations managers can schedule workshops to create or review weather plans and trigger charts to support the overall operations plan. The plan should define weather threats, triggers, and actions for each phase and aspect of any potential weather event. A workshop can also outline the preferred communications structure and cadence to ensure critical weather information is shared quickly with the right personnel through the appropriate channels.

Risk mitigation support



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Phase 2: Activate

The decision-making support phase puts the plan into action, with the Risk Communicator working closely with the airport operations team. They will actively monitor weather events and brief the group through a variety of formats, including daily briefings, real-time monitoring and updates, impact guidance, and key stakeholder briefings. Critical data and forecasts are essential, but when there is potential for multiple weather scenarios to occur, requiring varied responses, risk communication allows an operations team to make the best-possible decisions. Here are a few events where a Risk Communicator can add greater value.

Wind

The wind is one of the more significant causes of weather-related [airport delays](#), and strong crosswinds are the main threat, along with storm-related downbursts. Looking at the thresholds agreed upon during the workshop planning sessions, the Risk Communicator will monitor the wind situation and alert airport officials regarding significant risks and timing, allowing more lead time and decision-making confidence. Specific emergency response plans or the Emergency Operations Center (EOC) can be activated, and staffing adjusted based on a single source of weather intelligence from the Risk Communicator.

Tornadoes

The process is even more critical with tornado threats. The Risk Communicator helps assess and gives as much lead time as possible for high-pressure decisions, narrowing down the timeframe of when tornadoes may occur. Preparation ahead of potential tornadic activity can be extensive, but actions happen quickly once the plan is activated. This includes halting inbound and outbound air traffic, getting planes back to the terminal to unload, and providing proper messaging throughout the airport, as well as externally, about current dangers and protective measures. In addition to identifying threats, a Risk Communicator informs airport operators about additional significant weather to support decisions around restarting operations.

Lightning

The Risk Communicator can weigh in on lightning risks during operational periods and nail down the timing of the highest potential for improved preparedness. They can also deliver confidence levels on the timing of tarmac evacuations that move people to safety and when to resume normal operations. This maximizes efficiency and reduces downtime, leading to massive cost savings and fewer financial losses.

Indirect severe weather impacts
Thunderstorms and severe weather that won't directly affect the airport but are in the Terminal Maneuvering Area (TMA) can still lead to significant operational impacts. In these situations, aircraft must re-route, leading to delays, cancellations, and possible diversions to nearby airports. In the case of thunderstorms impacting another airport, nearby airports must prepare for potential extra inbound traffic. This is particularly true with hurricanes and tropical systems, when airports may be shut down entirely for a day or more, with the loss of capacity affecting efficiency.

Fog

Fog events contribute to significant disruptions. Leveraging the highly-accurate DTN forecast system, a Risk Communicator can provide lead time that allows for critical decisions before fog even forms, such as bringing staff in earlier due to the risks of reduced visibilities, forecasting flight delays, moving air traffic schedules around to accommodate the impacts, and sharing information with airport staff, airlines, and travelers to expect fog-related delays. With a strong plan, a Risk Communicator can provide higher confidence regarding when the fog will burn off or lift and the exact timeframes and locations for fog issues.

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Phase 3: Evaluate

A post-storm analysis is invaluable for learning and preparing for the next event. The Risk Communicator will create a post-event report that addresses many important questions. Was the risk assessment accurate? Did it help prepare for the weather event and prevent significant impacts? Was there an unexpected risk? Was the preparedness plan executed as agreed upon, or were there gaps? The knowledge gleaned from these post-storm evaluations helps operations staff better prepare for future weather events. It adds to the risk communication body of knowledge that supports other industries and the public. The post-storm analysis may also be helpful if forensic weather information is needed for incident management reporting or insurance claims.

A solid plan will help increase operational efficiencies, ensure passenger and ground staff safety, and reduce overall financial impacts. Without a plan, there could be significant costs for an airport. At the same time, it varies depending on the type of event, its severity and duration, and the airport's size. A single delayed aircraft costs the industry around **\$80 per minute**, with some events costing nearly \$1 million an hour, depending on the severity. Knowing that, access to a Risk Communicator is essential to the bottom line.

The DTN solution

The Risk Communicator can complete a post-event summary and analysis report for planning exercises to help mitigate future risks. Archived forecasts and alerts generated during service will be accessible in the Storm Risk dashboard for future review and planning phase improvements.

Risk mitigation support





The 2023 U.S. summer outlook



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The tropical forecast summary

A developing El Niño will influence this hurricane season, and we expect it to evolve differently than the recent run of La Niña years.

Compared to the high-impact 2022 hurricane season, this year will likely bring fewer storms than in recent years — although it depends on how quickly the El Niño unfolds. Historically, the presence of an El Niño pattern reduces hurricane activity in the Atlantic.

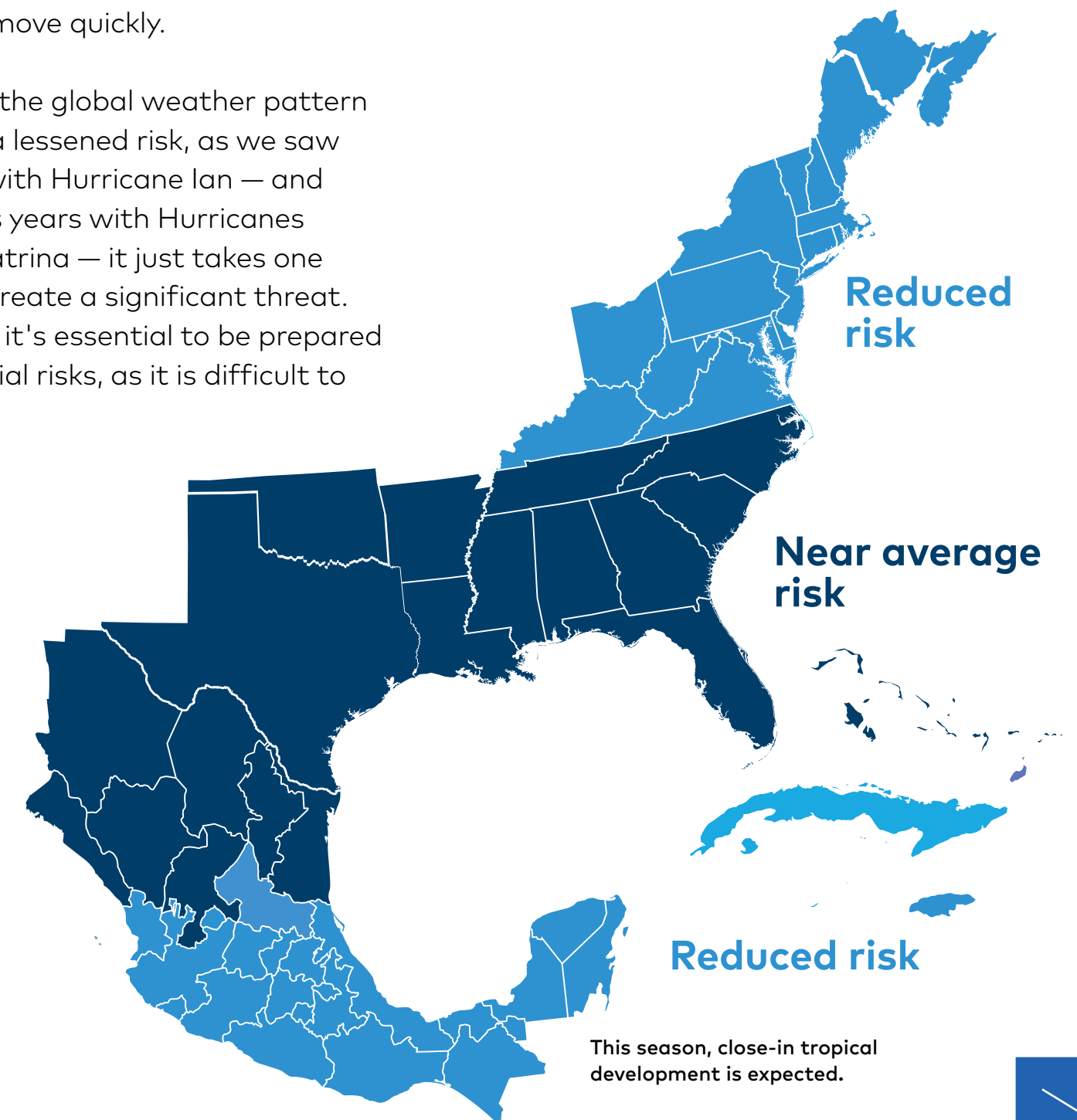
The official hurricane season begins on June 1 and runs through the end of November. This year, we expect a slightly below-average season with 13 named storms, seven hurricanes, and three major hurricanes. While we anticipate slightly below-normal activity overall, a single event can significantly impact the season, making readiness critical.

Once again, this season we anticipate most storm activity will likely occur in the eastern Gulf of Mexico and along the southeast U.S. coastline.

Those storms could also move up the coast and impact New England and southeastern Canada's coastal areas. As these storms move north along the Northeast U.S. coast, they can create wind damage risks and coastal flooding concerns as these tropical systems generally move quickly.

And while the global weather pattern suggests a lessened risk, as we saw last year with Hurricane Ian — and in previous years with Hurricanes Ida and Katrina — it just takes one storm to create a significant threat. Therefore, it's essential to be prepared for potential risks, as it is difficult to

pinpoint the precise locations of a hurricane's landfall due to multiple factors, such as interaction with land, upper-level wind shear and steering patterns, and sea surface temperatures that affect the path and strength of hurricanes.



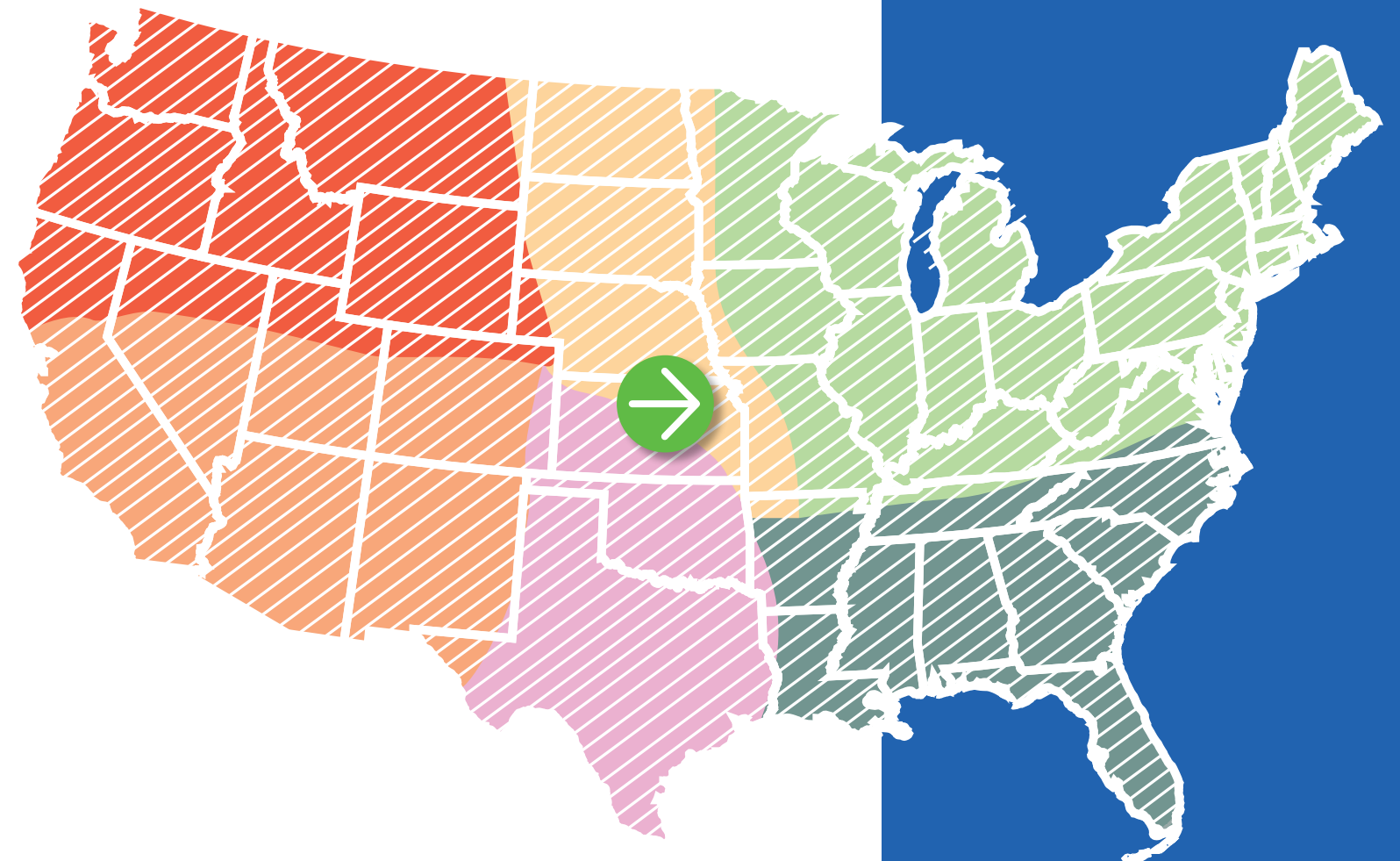
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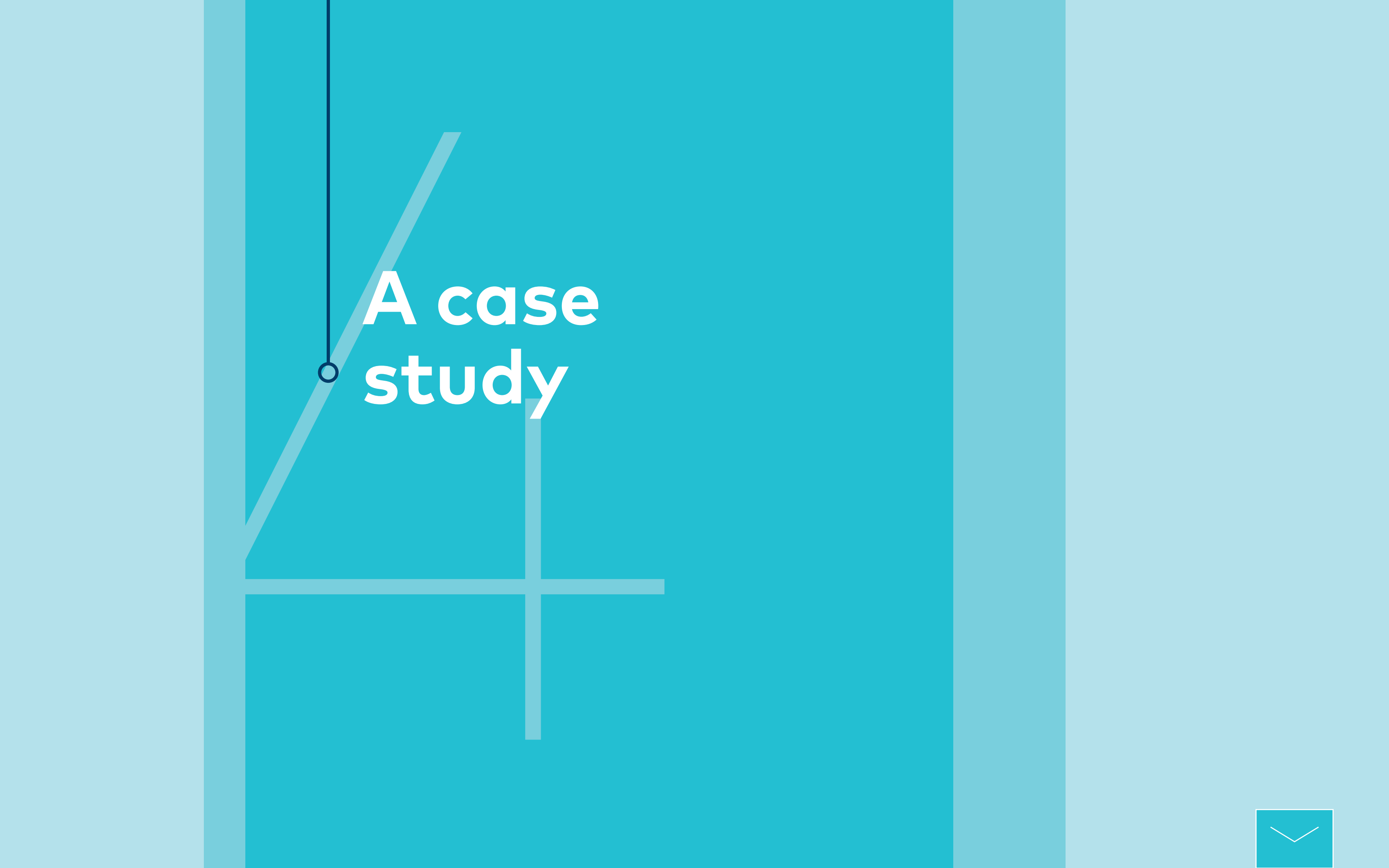
This summer, the overriding theme is above normal, with portions of the country experiencing greater heat and more rainfall than others. Areas west of the Rockies will see a hot summer with above-normal temperatures and below-normal precipitation. This will contribute to drought conditions in the Northwest and Southwest, as well as the south-central region.

On the East Coast, a wetter pattern will prevail with above-normal rainfall. The Northern Plains and Mississippi Valley will also see above-normal precipitation later in the summer. While temperatures will be closer to normal in the East, the humidity will be higher, contributing to uncomfortable air temperatures at times.

Potential El Niño development will also play a pivotal role in summer weather across the United States. While it could take some time for this change to be reflected in the circulation, model guidance currently suggests the Midwest could see cooler temperatures later in the season.

The Southern Plains will start the season with drought, increasing the risk of above-normal temperatures. There's good news for Texas; it will likely not be quite as hot as last year, with somewhat better chances for rain across the state. In terms of severe weather, there have already been 261 tornadoes so far this year, and more average severe weather conditions should continue into early June.





A case study



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A case study

A major urban airport taps into Risk Communicator to manage winter weather

One of the largest airports in terms of size and traffic turned to DTN and its team of Risk Communicators to prepare for the 2022-23 winter season. To kick off the relationship, a Risk Communicator led a pre-winter season workshop for all stakeholders months before expected winter conditions. The team discussed the airport's specific needs, potential operational changes, and the efficiency and effectiveness of its communication structure. Additionally, they reviewed action plans and aligned on set thresholds to indicate when to start proactively monitoring ahead of significant weather events.

Through the workshop, the team agreed that before any impending weather event, the Risk Communicator would proactively contact airport personnel up to seven to 10 days out, offering insights into the upcoming weather pattern, especially around significant cold and precipitation.

If an event developed, the Risk Communicator was ready to execute the communication protocols established during the workshop. The operations team agreed that as a weather event approached — and especially during an ongoing event — the risk communicator would provide constant updates and actionable insights into current conditions, near-term forecast trends, and post-storm conditions for clean-up.

For DTN Risk Communicators, offering around-the-clock weather support — especially during long-duration events — is at the heart of the company's commitment. In January 2023, the Risk Communicator provided proactive winter weather monitoring and critical decision-making insights into a significant winter storm. As a result, the airport team made well-informed decisions to effectively adjust staffing to be available during the worst part of the storm, resulting in less overtime pay. The real-time forecasts also fueled decisions that improved efficiency in clearing airport roads, runways, and the tarmac.

During the post-storm analysis, the airport realized its actions resulted in massive cost savings, shorter delays, fewer cancellations, safer conditions, and fewer disruptions for connected airports. Overall operations were more efficient as there were fewer disruptions to airport supply chains and less stress for airport personnel, airline employees, and passengers. Further analysis also looked at other event metrics, including data around snow, ice, wind speeds, and additional factors, which helped with regulatory and insurance needs. The Risk Communicator also reviewed the handling of the event, how their insights were used in decision-making, and noted necessary plan modifications for future events.



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