WHITE PAPER

Real weather: The hidden tactical advantage in modern warfare

AUTHORED BY

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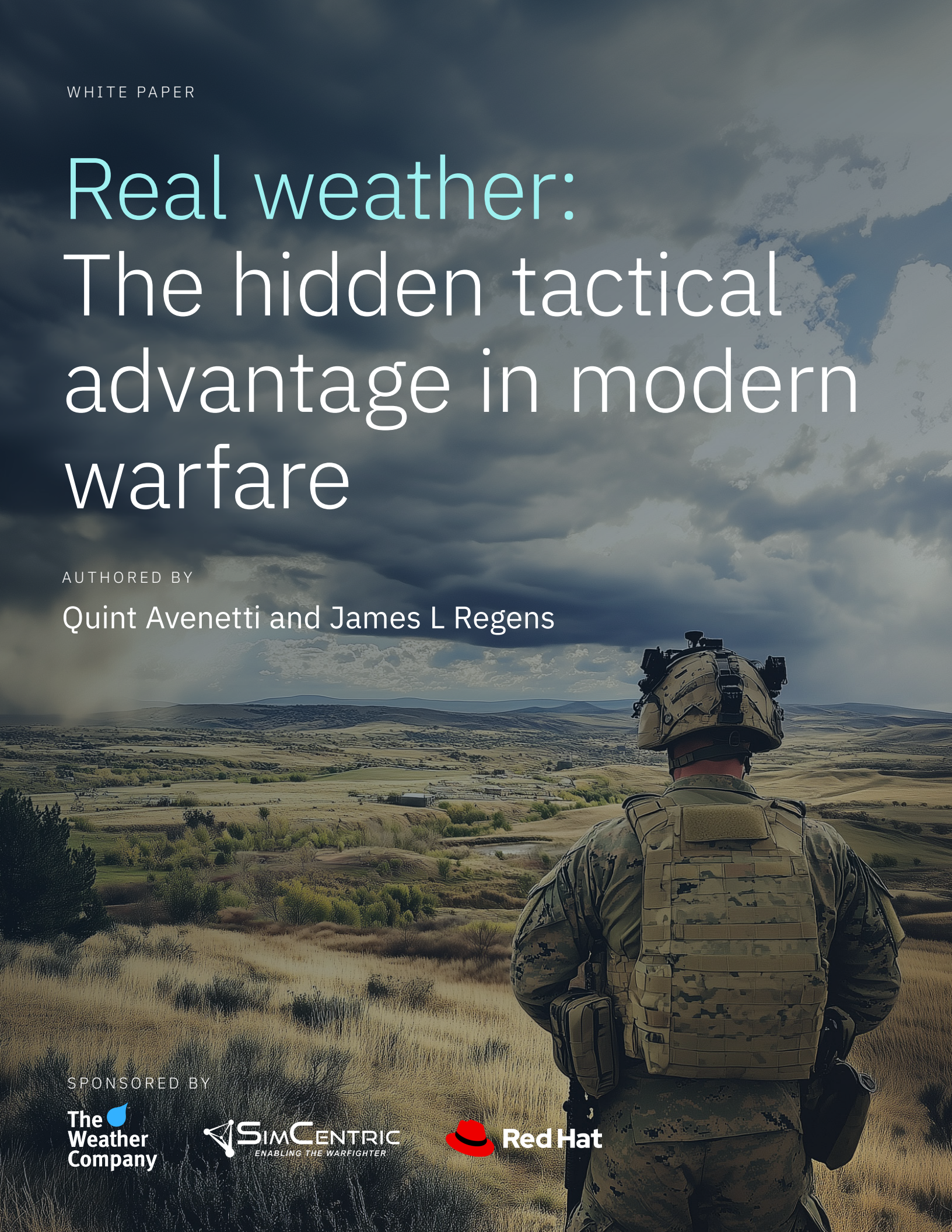

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Introduction

Weather shapes the combat environment. It literally affects every aspect of military operations – from fire and maneuver to logistics and training.

The consequences of an impactful weather event can influence victory or defeat on the battlefield.[1] Napoleon lost because an unexpected storm the night before Waterloo bogged his artillery in mud. The Allies triumphed on D-Day when they correctly predicted that a break in bad weather would allow the amphibious invasion of Normandy on June 6, 1944.[2] In 2003, the U.S.-led Multi-National Force - Iraq advance on Baghdad was delayed for several days by a massive sandstorm.[3] That's why it's no surprise that for thousands of years, armies have strived to obtain reliable weather forecasts.

Military meteorology has come a long way since the days when armies sacrificed animals to predict omens before battle. Satellites, radars, ground-based sensors, and computer models now provide forecasts with an accuracy that Napoleon or Eisenhower would have envied.

Nonetheless, there's a crucial capability gap today: real-time, actionable, and contextualized weather forecasts at tactical and operational levels. Next week's forecast isn't what matters most to an infantry platoon, aircraft squadron, or naval vessel conducting operations. Tactical success hinges on what specific conditions will be like an hour, a day or weeks from now, for their local area or target zone. And they need this information delivered to them wherever they are, even when connectivity is limited.

The need for tactical weather forecasts is critical in a world experiencing increasing frequency and magnitude of impactful weather events. With a changing climate and the expanding nature of battlefield theaters, the chance that weather will have significant impact on the battlefield with potentially catastrophic consequences during battle or training is increasing. However, that creates opportunity for significant tactical advantage by those prepared for both the weather that will occur as well as embracing and exploiting the uncertainty in the forecasts of those impacts.

This paper identifies effective, feasible, and affordable solutions available now. Combining innovative private-sector meteorological capabilities with existing mission planning and training systems, warfighters can benefit from robust, modern weather and forecast information. These solutions can help fill a capability gap that benefits operations, training, force preservation, logistical planning, maintenance, and many other activities.

1. https://doi.org/10.1080/03071847.2024.2328059
2. https://www.iwm.org.uk/history/how-d-day-was-delayed-by-a-weather-forecast
3. https://www.latimes.com/archives/la-xpm-2003-mar-26-war-iraq26-story.html

Impactful weather shapes the tactical environment

America has only just begun to confront and address the national security implications of the dramatic increase in impactful weather in a changing climate over the last two decades. “We assess that climate change will increasingly exacerbate risks to U.S. national security interests as the physical impacts increase and geopolitical tensions mount about how to respond to the challenge,” according to the 2022 U.S. National Intelligence Estimate.

In the United States, there were 28 weather-related disasters – including floods, drought, and freezes – that each resulted in at least $1 billion in damage in 2023, according to the National Oceanic and Atmospheric Administration.[4] Since January, 2024 has already witnessed serious floods in California, deadly fires in Greece, the earliest ever category 5 hurricane in the Atlantic, and unusually severe cold in Scandinavia.

Climate comprises the macro-level processes – stretching over decades or longer – that generate weather conditions. If the climate is changing, then inevitably the weather will, too.

Yet changes to weather are not uniform. A rise in the Earth’s temperature can have different effects across different regions at different times. The common denominator is that future weather events are more likely to be severe and more impactful on military campaigns.

For the U.S. military, this creates a dilemma. Because it operates globally, it must be prepared to conduct and sustain tactical missions in a variety of climates and weather conditions. However, preparation usually is based on historical experience. Because all weather events are unique, and weather in a changing climate more likely exposes those unique characteristics, **the past is an imperfect guide to preparing for weather’s impacts on future operations**. It’s generally impossible to prepare for all weather contingencies at all times, so this places a premium on accurate and timely forecasts, and strategic use of that data and its uncertainties to gain a tactical advantage.

Current trends indicate the military must prepare for new meteorological norms that include:

Extreme heat. Record or near-record temperatures occurred around the world in 2023-2024, including the Pacific Northwest, Europe, and the Persian Gulf. Iran, for example, suffered a heat index of 158 degrees Fahrenheit in August 2023.[5]

Heavier rainfall. Rising temperatures allowing the atmosphere to contain exponentially more water are likely to result in rainfall events characterized by higher amounts, some extreme. Europe, for example, suffered severe flooding in 2023, including 23 Italian rivers that burst their banks.[6]

Drought. Although individual rainfall events may be more intense, they also may be less likely, leading to a rise in the frequency of long-duration periods without much precipitation. This will lead to increased periods of drought that can lead to higher chances of dust and smoke impacts on visibility, changing vegetation environments, and political strife.

More powerful hurricanes. The proportion of hurricanes that are classified as Category 3 and above has doubled since 1980, according to the Environmental Defense Fund.[7] Between 2000 and 2023, 15 Category 3 or higher hurricanes made landfall in the United States.[8]

4. https://www.climate.gov/news-features/blogs/beyond-data/2023-historic-year-us-billion-dollar-weather-and-climate-disasters
5. https://www.washingtonpost.com/weather/2023/08/09/iran-persian-gulf-extreme-heat
6. https://www.copernicus.eu/en/news/news/observer-esotc-2023-europe-experienced-extraordinary-year-extremes-record-breaking
7. https://www.edf.org/climate/how-climate-change-makes-hurricanes-more-destructive
8. https://www.aoml.noaa.gov/hrd/hurdat/All_U.S._Hurricanes.html

More intense thunderstorms and lightning. Moisture-laden air will likely generate storms with heavier rain, and in some cases, more powerful winds, and more lighting strikes. “Countries like the USA could see a 50% increase in the number of strikes by the end of the century,” warned Britain’s Royal Meteorological Society in 2023.[9]

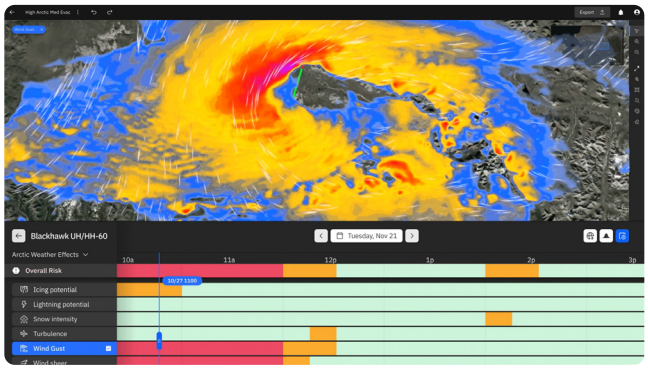
Stronger winds. After decades of wind speed slowing globally, winds are now becoming faster. Studies suggest that the jet stream may increase on average and have more extreme periods, perhaps triggering significant and severe weather events.[10] In particular, the North Atlantic jet stream may change, affecting transatlantic U.S. and NATO air operations.

Wildfires. The threat of wildfires is particularly acute, especially when it involves live fire operations and training. Nations such as the U.S. and Australia have experienced massive fires: in the U.S. alone, fire is burning twice as much tree cover in 2024 compared to 2004, according to fire experts.[11] Wildfires can also have profound impacts on visibility and healthy air making certain operations more difficult.

Rising sea levels. Sea levels are rising globally, and that rate is expected to increase dramatically in the coming decades. Further certain places, such as near the U.S. Naval bases in Norfolk, are experiencing rises even faster than the global mean. Rising sea-levels make the impacts from coastal storms even more serious putting infrastructure at risk in these zones. Meanwhile, melting Arctic ice is creating new shipping channels that could become flashpoints between rival powers such as the U.S., Russia, and China.

Less fog. Fog in coastal areas around the world is decreasing. In California, for example, fog previously appeared for 12 hours a day between May and October: now it’s nine hours a day with the season ending in September[12], according to the Public Policy Institute of California. Clandestine operations that rely on fog and other visibility obscurations to create strategic advantage may need to be rethought.

Impactful weather affects tactical performance



Impactful weather can alter operational outcomes, particularly for units not optimally prepared for it. Whichever side has superior meteorological capabilities – and truly appreciates the impact that weather has on operations – may enjoy at least a temporary advantage over its adversaries. Many commanders have taken advantage of fog, rain, and other weather events to conceal an attack, flanking maneuver, or withdrawal. A classic example is when a dense fog made it possible for Washington to withdraw the encircled Continental Army from Brooklyn Heights without any casualties. His troops crossed the East River to Manhattan in the middle of the night escaping the British Army preserving the beleaguered American forces. On the other hand, the 1980 mission by U.S. special forces to free American hostages in Iran was aborted after aircraft encountered an unanticipated sandstorm, illustrating how surprise weather events can derail operations.

9. https://www.rmets.org/metmatters/how-does-climate-change-affect-thunderstorms
10. https://news.uchicago.edu/story/jet-stream-will-get-faster-climate-change-continues-study-finds
11. https://wfca.com/wildfire-articles/are-wildfires-increasing-or-decreasing-in-the-us
12. https://www.ppic.org/blog/the-future-of-fog

Success requires an understanding of how weather affects various types of tactical units:

- **Personnel.** High heat, combined with high humidity, can create heat stroke conditions for personnel performing strenuous activities outdoors, such as long marches, steep climbs, and carrying heavy loads. Exposure to strong winds, dust, and heavy rain can be debilitating and disorienting. Operations may need to be timed to avoid these hazardous weather conditions. Additional logistics may be needed, such as extra water, appropriate clothing, and cooling or warming facilities. Medical contingency options matched to risk must be appropriate, available, and responsive. Operations involving chemical, biological, radiological, or nuclear (CBRN) capable enemies make already difficult tasks even more hazardous and challenging in inclement weather.

- **Manned ground platforms.** More rain, coupled with warmer temperatures and earlier thaws, produces mud that impedes vehicular movement, especially heavy armor, supply trucks, and any vehicles that lack good off-road capability. In 2022, for example, Russian armored columns were confined to Ukrainian roads, unable to tactically manuver due to swampy surrounding terrain, and were consequently ambushed and decimated by Ukrainian troops armed with anti-tank missiles. If softer ground conditions become more common, then forecasting wet weather becomes more important for timing maneuvers and securing vital road networks.

- **Manned aircraft.** Wind, visibility and high temperatures affect aircraft takeoffs, landings, navigation, flight paths, payloads, fuel consumption and aerial refueling. More turbulence and severe weather events, such as hurricanes, hamper both land-based and naval air operations. In Iraq and Afghanistan, for example, high temperatures affected air density and flights by AH-64 Apache and other helicopters.[13] These factors can directly impact the daily Master Air Attack Plan (MAAP) and is potentially a critical factor in asset apportionment, weapons payload, ground unit support, and ultimately aviation combat efficiency throughout the Air Tasking Cycle (ATC).

- **Unmanned aircraft.** Wind speeds of greater than 15 miles per hour can be problem for unmanned aircraft systems (UAS), especially smaller commercial drones such as those used in the Ukraine-Russia war.[14] Atmospheric conditions affect links between drones and operators, as well as target detection, identification, and engagement by UAS and their controllers.

- **Ships.** Stronger winds can impact ship stability, navigation, and power consumption while excessive heat and humidity may affect equipment and crew performance. Ships attempting to sail in formation during severe storms run a greater risk of collision. Some studies suggest that warmer waters will change oceanic acoustics and hamper anti-submarine detection.[15] Rising sea levels will also affect amphibious operations and littoral warfare. For example, at the Battle of Tarawa in November 1943, U.S. Marines planned for their landing craft to go ashore at normal tide of five feet above the coral reef. But an unexpected neap tide reduced the depth to only three feet above the reef leaving ships, landing craft, and personnel as sitting ducks.[16]

- **Littoral craft.** High sea states significantly elevate the complexity and risk involved in deploying littoral craft and small boats for tactical force projection. These platforms often operate with minimal margins between their weight and buoyancy limits. Consequently, launching such craft without a clear, accurate understanding of weather forecasts throughout their entire route poses a persistent and well-documented risk to both the platforms and personnel.

- **Air defense.** Aviation and air defense units may confront more false radar signals caused by atmospheric conditions.

13. https://marcliebman.com/humidity-high-temperatures-altitude-and-helicopters-are-a-bad-mix
14. https://scanifly.com/blog/flying-a-drone-in-the-wind-cold-and-other-challenging-environments
15. https://www.aspistrategist.org.au/new-study-suggests-climate-change-will-make-submarine-warfare-more-complex
16. https://www.usni.org/magazines/proceedings/1962/february/tarawa-tide-failed

– **CBRN.** Employment of CBRN (regardless of side) must take into account current and projected (minutes to hours from launch) zoned atmospheric conditions to help either ensure weapon system computations and target area conditions are accurate or protective posture is assumed in the case of threat launches. For example, an unexpected temperature inversion can have very significant impacts on CBRN dispersion with radically different outcomes. It can also materially influence communications and radar operations, as well as other important battlefield operations.

– **Bases.** Facilities need appropriate architecture and equipment to withstand heat, humidity, wind, snow, rain, and rising sea levels. High temperatures buckle runways, while parked aircraft are vulnerable to high-wind events, severe storms and hail, and blowing sand, dust and sea spray.

– **Logistics and maintenance.** Impactful weather can disrupt supply columns, aerial resupply, and medical evacuation. Rainy, humid, and dusty weather can cause more wear on equipment and require more preventive maintenance and additional stockpiling of spare parts.

Extreme weather affects weapon performance

While achieving remarkable levels of accuracy and lethality, guided weapons remain vulnerable to weather. Laser and electro-optical guidance are affected by weather conditions including rain, snow, dust, haze, and smoke from fires. Infrared and radar guidance can be thrown off by clouds, smoke, water vapor and haze.

The opportunity to strike Time Critical Targets (TCTs) is often dependent on a small window of time. The impact of aborting a mission due to incorrect weapon-target pairing based on inaccurate weather in the target area can have catastrophic consequences.

Many guided weapons rely on position, navigation and timing (PNT), especially GPS guidance. Heavy rain, snow, and fog can affect GPS signals; even small distortions or dilution of precision (horizontal, vertical, positional and time) in PNT accuracy can cause precision-guided weapons to miss their targets, potentially risking mission failure and increasing collateral damage.

An intriguing question is whether hypersonic weapons are vulnerable to severe weather. Several U.S. universities have been awarded research contracts to study whether even a small drop can damage vehicles traveling at hypersonic speeds of Mach 5 or greater.[17] Flight path atmospheric conditions can change within minutes and could prove crucial to successful target engagement.

The growing deployment of long-range fires – including artillery rockets, rocket-assisted howitzer shells, and cruise missiles – are making real-time and enhanced near real-time weather forecasts of the target area increasingly essential. Precision weapons aimed at a target 100 or 1,000 miles away must contend with changing atmospheric conditions over the launch zone, the entire intervening trajectory, and the target zone, increasing the need for firing computations to be frequently redone with updated meteorological data.[18]

17. https://mae.ucf.edu/ucf-lands-new-project-to-study-effect-of-rain-on-hypersonic-travel
18. https://patents.justia.com/patent/10983250

Impactful weather affects tactical operational success.

Precipitation, temperature, and wind affect regional vegetation patterns, which can affect camouflage, concealment, lines of sight, fields of fire, and the quantity and density of vegetation. Extreme weather events literally can change the terrain. High wind and intense or prolonged rain can create obstacles such as downed trees and mudslides or gouge out new gullies in the soil. Likewise heavy rainfall in desert terrain impacts vehicular movement, channeling routes of march along predictable and targetable lines of transportation.

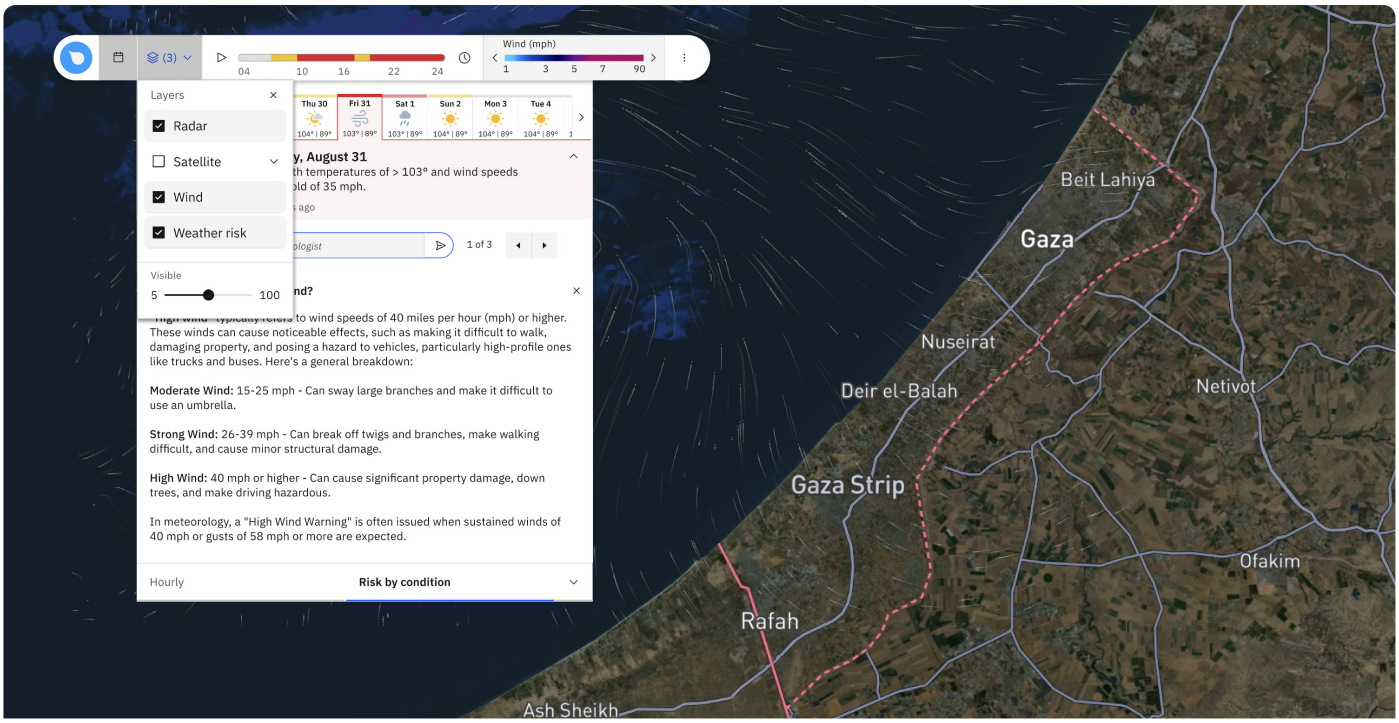
On the other hand, weather can also be an ally. A storm can impede or constrain options for an enemy armored column or infantry unit's mobility, or ground hostile aircraft, and provide cover for an attack by adversarial forces both geographically and temporally. Conversely, tactical options are expanded for the commander with visibility of optimal weather conditions for their own maneuver, whether seeking concealment or clarity for their force element. The commander armed with more accurate predicted weather and a complete understanding of the alternative outcomes of the weather, has a distinct advantage in planning for and executing courses of action.

Weather impacts training

Intensive and realistic live training is a foundation of military proficiency. Real-time training in physical environments, as opposed to synthetic environments, can be especially vulnerable to harsh and unexpected weather conditions. An array of factors can constrain training under such conditions:

- Excessive heat and humidity may exceed health and safety parameters for outdoor training such as foot marches and physical conditioning.
- Drought may bar the use of live ammunition due to the threat of wildfires.
- Increased storms, clouds, and wind may complicate aerial training and exercises.
- High winds may make airborne drops of troops, equipment, and supplies too hazardous.
- Amphibious training and littoral maneuvers may be curtailed by storms and high winds.
- Excessive precipitation may limit heavy armored movement across certain corridors that present a high bogging risk. This risk applies equally to any recovery platform should an armored vehicle become stuck.
- Lack of visibility presents risk to rotary wing maneuver due to increased risk of terrain and/or ground collision.
- Lightning activity may limit tactical air maneuvers and constrain electrical detonation of explosive ordinance.

The threat of accidental wildfires can also be a risk associated with real-time training in physical environments. For example, some 80 percent of the 125 to 150 wildfires per year at Fort Johnson in Louisiana are caused by training, the Army said in 2023.[19] In July 2024, training at the Warren Grove Air to Ground Range in New Jersey was temporarily curtailed by a fire.[20] As the climate continues to change, increased frequency and duration of drought will compound the risks of accidental wildfires.



19. https://home.army.mil/johnson/about/garrison-directorates-and-support-offices/directorate-public-works/environmental/natural-resources-management/wildfires
20. https://www.military.com/daily-news/2024/07/17/wildfire-breaks-out-bombing-range-after-guard-conducts-controlled-loud-activity.html

This may prove particularly frustrating during complex exercises that have to be scheduled well in advance, including locking in time on training facilities and transporting units to the training site.

Weather can be a major cause of fratricide during operations and training. Fog and rain can contribute to misidentification of friendly forces or contribute to navigational errors that place friendly troops where they shouldn't be. Among the most notorious examples was Operation Cottage, the August 1943 invasion of the Aleutian Island of Kiska. Some 35,000 U.S. and Canadian troops landed in dense fog. Though the Japanese had already abandoned the island, weather-abetted friendly fire incidents contributed to 28 U.S. and Canadian fatalities by the end of the second day.[21]

Current forecasting systems don't meet mission planning needs

The current generation of military meteorological systems lack several essential features for detecting and mitigating the effects of severe weather, creating capability gaps, especially at the tactical edge, including:

- **High-bandwidth needs.** Heavy bandwidth requirements cause a serious problem for tactical users with limited or degraded connectivity. No matter how accurate the forecasts are, they're of limited use if they can't be delivered to those who need them most, when they need them most. This issue is exasperated in an opposed operating environment against a near-peer adversary.

- **Lack of clarity around the fuller array of probable weather outcomes.** Current military forecasting systems generally don't offer a probabilistic range of potential meteorological outcomes. To help military operations maximize the odds of success, especially in increasingly dynamic weather conditions, this capability is essential. Merely knowing the singular odds of the most likely outcome on a given day may not be sufficient for successful planning and execution. For example, while a particular day may have an 80% chance of having sufficiently calm winds, the 20% chance that winds will be stronger than tolerated and hence jeopardize the safety and success of the mission may be too high a risk to continue as planned.

21. https://arsof-history.org/articles/v4n2_op_cottage_page_1.html

Current training and mission planning systems lack real weather data

A common dilemma in using meteorological data for planning and simulation is what type of data to use. For the longest time, simulators and other training and mission planning systems tended to rely on synthetic weather data, which consists of artificial data 'generated' to mimic the mathematical characteristics and structure of individual weather phenomena such as thunderstorms and cyclones. A problem with synthetic data is that it doesn't always accurately represent the holistic relationship of the weather conditions to, or as influenced by local conditions such as true influences of the terrain. Synthetic data may be sufficient to give users a general sense of how weather may affect a vehicle or aircraft, but it would be more beneficial to leverage the real weather conditions, forecasted at a specific location and time when that vehicle or aircraft is to be used.

Another option is to use weather observation data, which relies on observed weather conditions at a specific place and time (an example is METAR, of which there are approximately 5,000 stations across the globe). While a step up from synthetic weather data, observational weather is limited to point-in-time/location observations and only represents weather at the current or past time and not necessarily the conditions to be encountered during a future mission. It also doesn't represent the full three-dimensional variations that occur in a specific theater.

An ideal solution is having *real* weather data consisting of a complete assembling of volumetric weather conditions from past, current weather and future conditions to hours, days or even weeks ahead. Such weather data helps deliver the most impactful, accurate, and life-like influence on planning and mission needs.

There are numerous benefits to using real weather data. Data showing actual weather conditions that tactical units will face, anywhere across the globe at any time, can be immensely valuable. The use of real weather data, including probabilities of various meteorological conditions, helps users rehearse and prepare for the most likely spectrum of weather conditions.

Commercial real-time weather forecasts can close meteorological capability gaps

Militaries are increasingly leveraging dual-use, market-ready systems and tools that enhance their operational capabilities, especially given the constraints and demands on military budgets. Commercial weather forecasting networks can help address many of the capability gaps in current military meteorological systems without requiring the military to fund an entire bespoke capability program. Certain commercial providers, such as The Weather Company, offer solutions with continually updated global forecasts with a high degree of temporal and spatial fidelity, precision and accuracy. Equally important, forecasts are presented in user-friendly formats so that essential conditions, such as temperature and rain are easily identifiable. For those who want more detailed weather updates, there are options to examine historical and high/low temperatures, rainfall, and other data.

The widespread use of commercial off-the-shelf (COTS) and plug-and-play technologies enable commercial providers to feed real-time weather forecasts into mission planning and training systems. This helps the military take advantage of the enormous private meteorological infrastructure. Many commercial forecasts can offer several features to help military users prepare for extreme weather:

Accuracy. The competitive nature of the private sector encourages commercial forecasters to devise meteorological models and paradigms that provide reliable forecasts. Third-party studies have shown that some providers achieve consistently more accurate forecasts than standard government sources.[22]

Timeliness. Commercial weather providers offer real-time weather updates, as well as instant warnings of extreme weather.

Coverage. Some commercial weather providers have worldwide coverage enabled by previously untapped global data sets such as satellite radiances, aircraft observations, radiosondes, proprietary data like pressure sensor readings from smartphone users, and globally applicable forecast models that leverage these data.

Accessibility. Commercial weather public and bespoke websites are designed to be accessible by a variety of users, including those in remote locations and with limited connectivity.

User-friendliness. Commercial providers are accustomed to providing forecasts and other weather data in a user-friendly manner that leverages color-coded graphics and AI-assisted context to make information accessible and easy to understand.

Integration. Commercial weather systems provide forecast data that can be integrated into existing mission planning and training systems, allowing users to quickly judge heat, rain, wildfire, and other risks.

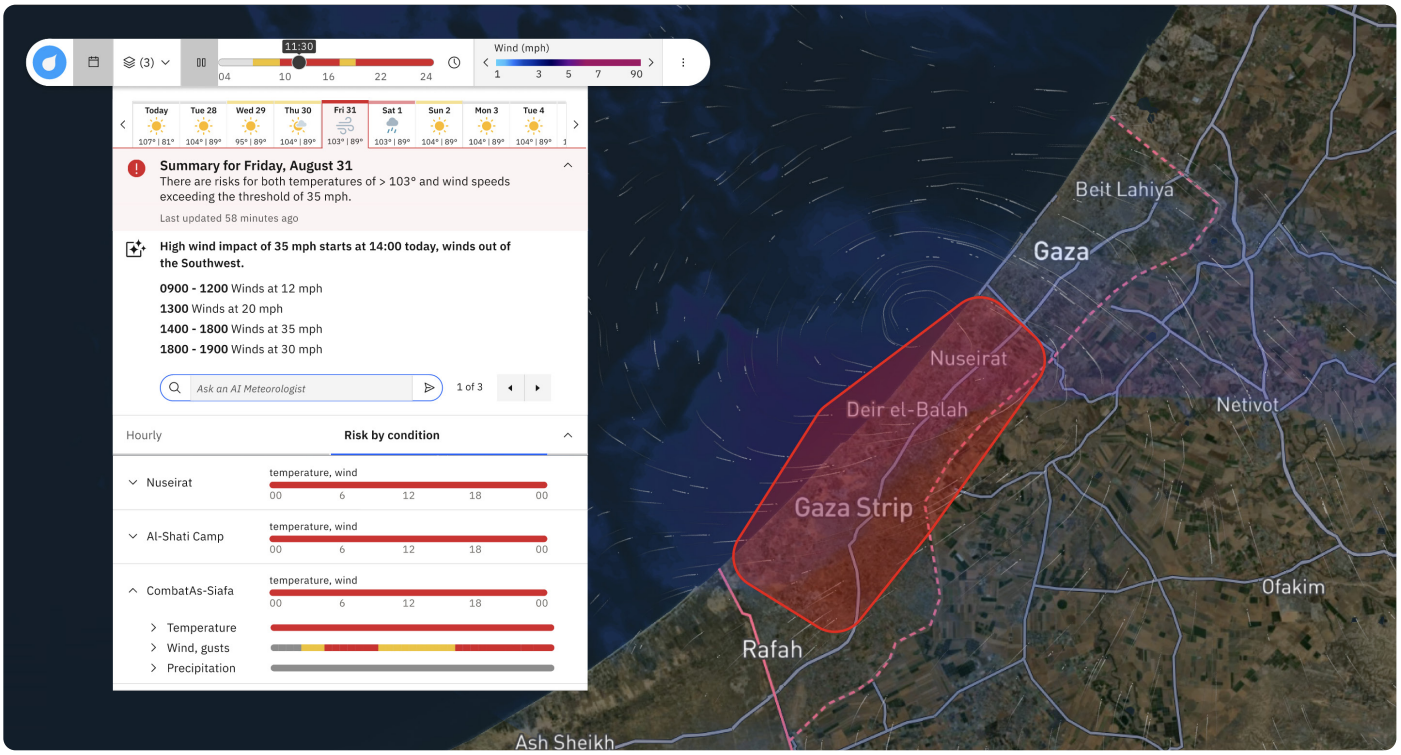
Cost efficiency. Unlike a bespoke capability funded solely by military resources, capability costs for commercial weather systems are shared over thousands of clients and use cases, helping provide the military a much more favorable return on investment.

22. ForecastWatch, Global and Regional Weather Forecast Accuracy Overview, 2017-2022, commissioned by The Weather Company

The capabilities of an ideal military forecasting system

To meet the needs of tactical users, a weather forecasting system must be accurate, accessible, and flexible.

This means missions can have access to more reliable weather forecasts, in a manner that does not require bulky or elaborate equipment, or heavy bandwidth. It should also help planners to model and experiment with future meteorological factors to determine the best course of action.



Specifically, a military forecasting system should have the following features:

- **Current, past and accurate future weather conditions.** Weather forecasts should extend at least as far out as the planning horizon of the mission needs, with particular focus on the hours and days ahead with precision.

- **Localized forecasts.** Coverage should address the user's immediate area down to at least a few square kilometers, but scale to include larger areas as the tactical mission dictates.

- **Truly global, now.** Not just tied to physical sensor locations, or reliant on the deployment of remote sensors. Access to weather anywhere across the globe can be a necessity, over oceans, high mountain ranges, deserts, major/minor cities and towns, everywhere.

- **Customizable data.** Different units need different types of weather data: an infantry platoon's requirements are not the same as a fighter squadron or missile battery. Rather than preselecting data – or inundating users with data they don't need – the source and interface should allow users to easily access whatever meteorological information they require.

- **Weather alerts.** In environments vulnerable to extreme weather events, users should receive clear and instant alerts of dangers such as lightning strikes, or conditions favoring wildfires. They should also have the option of configuring alerts for specific situations, such as wind warnings for parachute drops. Users should also be able to create risk categories: for example, what is the expected degree of risk for airborne operations based on visibility and wind shear?

- **Low bandwidth.** Bandwidth requirements should be low enough that tactical users can receive updates on their mobile devices, even in austere areas and degraded connectivity. However, for other use cases with ample bandwidth, a richer set of content should be available to enable fuller access and use of a broader set of data for higher level omniscience over the mission.

- **Compatibility.** Forecasting systems should be able to plug into mission planning systems with minimal effort, including clear overlays that neatly fit into the common operating picture.

- **Equipment-specific.** The system should be capable of assessing the vulnerability of specific equipment – such as a particular model of helicopter or tank – to various weather conditions.

- **What-if scenarios.** Forecasts should provide rich enough probabilistic data to allow what-if analysis, such as how a course of action might unfold under varying meteorological conditions that represent the limited set of possibilities specific to each event and not all climatological possibilities.

- **Standards-based interoperability.** Delivery of weather effects data and analysis in a standards-based, non-proprietary format helps ensure flexible long-term integration options within multiple complementary systems.

Conclusion

In a world where impactful, dangerous, and unusual weather is becoming more commonplace, weather intelligence is vital.

Future battles will be fought in a joint all-domain battlespace, where combat will occur at greater ranges, greater speed, increased lethality – and will demand ever-faster speed of action. A growing number of platforms and weapons will depend on precise PNT data that can be vulnerable to disruption and distortion by weather. Therefore, arming commanders with timely, accurate, and executable atmospheric data in all phases of combat operations will help ensure success. This will require providers capable of offering capabilities and features that can be tailored to the current needs of units and their missions. It can also be a material benefit for forces that embrace and fully use weather information for a strategic advantage, and a disadvantage to those that don't and just "deal" with it.

Reliable real-time weather forecasting is feasible now to help enable preparedness for tactical success in the battlespace. Because the U.S. military confronts threats from multiple rivals in a dangerous geopolitical environment, such a system is needed more than ever.

Let's talk

To learn more about harnessing the power of weather to make better, more informed decisions, contact our experts today.

Contact us