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U.S. Military Wants to Own the Weather

By [Leonard David](#)
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The one-two hurricane punch from [Katrina](#) and Wilma along with predictions of [more severe weather](#) in the future has scientists pondering ways to save lives, protect property and possibly even control the weather.

While efforts to tame storms have so far been [clouded by failure](#), some researchers aren't willing to give up the fight. And even if changing the weather proves overly challenging, residents and disaster officials can do a better job planning and reacting.

In fact, military officials and weather modification experts could be on the verge of joining forces to better gauge, react to, and possibly nullify future hostile forces churned out by Mother Nature.

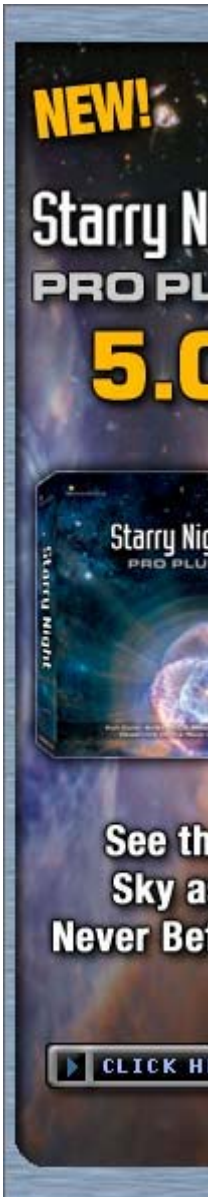
While some consider the idea farfetched, some military tacticians have already pondered ways to turn weather into a weapon.

Harbinger of things to come?

The U.S. military reaction in the wake of Hurricane Katrina that slammed the U.S. Gulf coast might be viewed as a harbinger of things to come. While in this case it was joint air and space operations to deal with after-the-fact problems, perhaps the foundation for how to fend off disastrous weather may also be forming.

Numbers of spaceborne assets were tapped, among them:

- ▶ Navigation and timing signals from the Global Positioning System (GPS) of satellites;



- ▶ The Global Broadcast Service, a one-way, space-based, high-capacity broadcast communication system;
- ▶ The Army's Spectral Operations Resource Center to exploit commercial remote sensing satellite imagery and prepare high-resolution images to civilian and military responders to permit a better understanding of the devastated terrain;
- ▶ U.S. Air Force Space Command's Space and Missile Systems Center Defense Meteorological Satellite Program (DMSP) satellites that compared "lights at night" images before and after the disaster to provide data on human activity.

Is it far-fetched to see in this response the embryonic stages of an integrated military/civilian weather reaction and control system?

Mandate to continually improve

The use of space-based equipment to assist in clean-up operations -- with a look toward future prospects -- was recently noted by General Lance Lord, Commander, Air Force Space Command at an October 20th Pacific Space Leadership Forum in Hawaii.

"We saw first hand the common need for space after the December 2004 tsunami in the Indian Ocean," Lord said. "Natural disasters don't respect international boundaries. Space capabilities were leveraged immediately after the tsunami to help in the search and rescue effort...but what about before the disaster?"

Lord said that an even better situation is to have predicted the coming disaster and warned those in harm's way. "No matter what your flag or where you waive it from...the possibility of saving hundreds of thousands of people is a mandate to continually improve," he advised.

The U.S. Air Force is also looking at ways to make satellites and satellite launches cheaper and also reduce the amount of time it takes to launch into space from months to weeks to days and hours, Lord said. Having that capability will increase responsiveness to international needs, he said, such as the ability to send up a satellite to help collect information and enhance communications when dealing with international disasters.

Thunderbolts on demand

What would a military strategist gain in having an "on-switch" to the weather?

Clearly, it offers the ability to degrade the effectiveness of enemy forces. That could come from flooding an opponent's encampment or airfield to generating downright downpours that disrupt enemy troop comfort levels. On the flipside, sparking a drought that cuts off fresh water can stir up morale problems for warfighting foes.

Even fooling around with fog and clouds can deny or create concealment -- whichever weather manipulation does the needed job.

In this regard, nanotechnology could be utilized to create clouds of tiny smart particles. Atmospherically buoyant ultra-small computer particles could navigate themselves to block optical sensors. Alternatively, they might provide an atmospheric electrical potential difference -- a way to precisely aim and time lightning strikes on

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 **IMAGES**



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U.S. Air Force Defense Meteorological Satellite Program (DMSP) satellites compare "lights at night" images before and after Hurricane Katrina disaster. U.S. Air Force



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High frequency Active Research Program (ARP) based in Gakona, Alaska, dedicated to upper atmosphere and solar-terrestrial research. U.S. military operations might be inadvertently providing clues for modifying the credit: HAARP

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enemy's head – thereby concoct thunderbolts on demand.

Perhaps that's too far out for some. But some blue sky thinkers have already looked into these and other s "Weather as a Force Multiplier: Owing the Weather in 2025" – a research paper written by a seven perso military officers and presented in 1996 as part of a larger study dubbed Air Force 2025.

Global stresses

That report came with requisite disclaimers, such as the views expressed were those of the authors and di official policy or position of the United States Air Force, Department of Defense, or the United States gove Furthermore, the report was flagged as containing fictional representations of future situations and scenari

On the other hand, Air Force 2025 was a study that complied with a directive from the chief of staff of the / examine the concepts, capabilities, and technologies the United States will require to remain the dominant force in the future."

"Current technologies that will mature over the next 30 years will offer anyone who has the necessary resc ability to modify weather patterns and their corresponding effects, at least on the local scale," the authors (explained. "Current demographic, economic, and environmental trends will create global stresses that prov impetus necessary for many countries or groups to turn this weather-modification ability into a capability."

Pulling it all together

The report on weather-altering ideas underscored the capacity to harness such power in the not too distan

"Assuming that in 2025 our national security strategy includes weather-modification, its use in our national strategy will naturally follow. Besides the significant benefits an operational capability would provide, anoth to pursue weather-modification is to deter and counter potential adversaries," the report stated. "The techn waiting for us to pull it all together," the authors noted.

In 2025, the report summarized, U.S. aerospace forces can "own the weather" by capitalizing on emerging and focusing development of those technologies to war-fighting applications.

"Such a capability offers the war fighter tools to shape the battlespace in ways never before possible. It pr opportunities to impact operations across the full spectrum of conflict and is pertinent to all possible future: concluded.

But if whipping up weather can be part of a warfighter's tool kit, couldn't those talents be utilized to retarge life, limb and property-destroying storms?

All-weather worries

"It is time to provide funds for application of the scientific method to weather modification and control," saic Eastlund, chief technical officer and founder of Eastlund Scientific Enterprises Corporation in San Diego, C

Eastlund's background is in plasma physics and commercial applications of microwave plasmas. At a lectu month at Penn State Lehigh Campus in Fogelsville, Pennsylvania, he outlined new concepts for electroma interactions with the atmosphere that, among a range of jobs, could be applied to weather modification res

"The technology of artificial ionospheric heating could be as important for weather modification research a have been for particle physics," Eastlund explained.

In September, Eastland filed a patent on a way to create artificial ionized plasma patterns with megawatts inexpensive microwave power sources. This all-weather technique, he noted, can be used to heat specific atmosphere.

Eastlund's research is tuned to artificial generation of acoustic and gravitational waves in the atmosphere. steering winds to help shove around mesocyclones and hurricanes, as well as controlling electrical conduc atmosphere is also on his investigative agenda.

Carefully tailored program plan

Eastlund said that the reduction in severity or impact of severe weather could be demonstrated as part of a tailored program plan.

"In my opinion, the new technology for use of artificial plasma layers in the atmosphere: as heater element steering winds, as a modifier of electrostatic potential to influence lightning distribution, and for generation and gravitational waves, could ultimately provide a core technology for a science of severe weather modification," Eastlund told *SPACE.com*.

The first experiments of a program, Eastlund emphasized, would be very small, and designed for safety. For example, heating a sample of air in a jet stream could be heated with a pilot experimental installation. Such experiments would use relatively small amounts of power, between one and ten megawatts, he pointed out.

Both ground-based and space weather diagnostic instruments could measure the effect. Computer simulations compare these results with predicted effects. This process can be iterated until reliable information is obtained. The effects of modifying the wind.

Computer simulations of hurricanes, Eastlund continued, are designed to determine the most important weather conditions for hurricane formation. Computer simulations of mesocyclones use steering wind input data to predict severe weather development.

After about 5 years of such research, and further development of weather codes, a pilot experiment to modify steering winds of a mesocyclone might be safely attempted. Such an experiment would probably require 50 megawatts, Eastlund speculated.

"I estimate this new science of weather modification will take 10 to 20 years to mature to the point where it is possible to control the severity and impact of severe weather systems as large as hurricanes," Eastlund explained.

Inadvertent effects?

Another reason for embarking on this new science could be to make sure inadvertent effects of existing programs, such as the heating of the ionosphere and modifications of the polar electrojet, are not having effects on weather, Eastlund stated.

As an example, Eastlund pointed to the High frequency Active Auroral Research Program ([HAARP](#)). This is a facility for upper atmospheric and solar-terrestrial research, being built on a Department of Defense-owned site near Gakona, Alaska.

Eastlund wonders if HAARP does, in fact, generate gravity waves. If so, can those waves in turn influence weather systems?

Started in 1990, the unclassified HAARP program is jointly managed by the U.S. Air Force Research Laboratory and the Office of Naval Research. Researchers at the site make use of a high-power ionospheric research instrument to temporarily excite a limited area of the ionosphere for scientific study, observing and measuring the excited area with a suite of devices.

The fundamental goal of research conducted at the facility is to study and understand natural phenomena in the Earth's ionosphere and near-space environment. According to the HAARP website, those scientific investigations have major value in the design of future communication and navigation systems for both military and civilian use.

Messing with Mother Nature

Who best to have their hands on the weather control switches?

The last large hurricane modification experiments -- under [Project Stormfury](#) -- were carried out by the U.S. Eastlund said. "It is likely the Department of Defense would be the lead agency in any new efforts in severe weather modification."

Additionally, federal laboratories with their extensive computational modeling skills would also play a lead role in the development of a science of weather modification. NASA and the National Oceanic and Atmospheric Administration (NOAA) would find their respective niches too. The satellite diagnostic capabilities in those agencies would also play a role, Eastlund suggested.


It appears that only modest amounts of government dollars have been spent on weather modification over the years.

"Hurricane Katrina could cost \$300 billion by itself," Eastlund said. "In my opinion, it is time for a serious scientific effort in weather modification."

"Global warming appears to be a reality, and records could continue to fall in the hurricane severity sweepstakes," Eastlund said. "When I first suggested the use of space-based assets for the prevention of tornadoes, many people expressed their displeasure with 'messing with Mother Nature'. I still remember hiding in the closet of our home in Houston as a tornado passed overhead. It is time for serious, controlled research, with the emphasis on scientific research for the good of mankind," he concluded.

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