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No easy answers in waging war against raging hurricanes

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The suggestions of ways to defuse hurricanes never stop coming: Icebergs, atom bombs, oil slicks and microwaves.

On Friday alone, the National Hurricane Center's director of research, Frank Marks, received six letters and two phone messages offering ideas.

But as intriguing as the concept may seem - especially to non-scientists - Marks and other weather experts say we are a long way from being able to control hurricanes and reduce their damage to mankind.

"I'll never say anything is impossible. Man is a very creative animal," Marks said. "I just say we're not ready now and not in the foreseeable future. We just don't know enough."

As the nation continues to deal with the devastation of Hurricane Katrina, it remains a beguiling question to wonder why we can't stop hurricanes before they become dangerous. Science has produced so many miracles that we assume no question is unsolvable.

But so far, hurricanes have resisted attempts to control them. Marks said the task is daunting because of limited knowledge about how hurricanes form, plus their size (Katrina was bigger than Florida) plus the energy they produce (more than the U.S. consumes in a single day). But researchers keep trying.

For more than 20 years, starting in 1961, the U.S. government conducted an experiment called Project Storm Fury, which sent planes into hurricanes. There they dispersed silver iodide outside the eye of the hurricane hoping to increase the rate of rainfall in the outer bands of a storm. In theory, that should have forced the eye to expand and lose some of its intensity - in the same way spinning ice skaters slow down by spreading their arms.

The government seeded four hurricanes: Esther (1961), Beulah (1963), Debbie (1969) and Ginger (1971). But the experiments were unsuccessful, apparently because hurricanes don't contain enough super-cooled water vapor for the seeding to produce more rain in the outer bands. The government abandoned the program in 1983.

"It's something we don't do anymore or talk about," Marks said with a chuckle.

Weather modification

Others continue to plug away.

Ross Hoffman is the principal scientist with Atmospheric and Environmental Research Inc., in Lexington, Mass. In 2003, Hoffman's company received a $500,000 grant from NASA to conduct computer modeling experiments on influencing hurricanes.

Hoffman and his associates based their experiment on the fact that a hurricane functions through a complex set of relationships involving ocean temperatures, wind currents, surface friction, rainfall and evaporation. Forecasting hurricanes is a process of plotting how incremental changes to each factor affects the hurricane. Hoffman examined whether man-made changes - such as using microwaves to heat the air around a hurricane - might change the speed or intensity of a hurricane.

Using data from two 1992 hurricanes, including Hurricane Andrew, Hoffman was able to demonstrate mathematically how increasing the temperature of a hurricane by about 3 degrees yielded decreases of 2 mph to 20 mph in the wind speed of a storm.

Hoffman, who published a summary of his findings in *Scientific American*, said modifying hurricanes remains a "far out"

idea. But he predicted it will happen one day.

"It may be 50 or 100 years. But I think there will be weather modifications that work in the future," Hoffman said. "The first steps are better forecasting, then figuring out how to influence (hurricanes). Creating the changes to influence them might require a large engineering project."

Hoffman said there is already an industry devoted to small-scale weather modification. Companies in California and Australia have cloud-seeding programs to improve snowfall in mountainous regions where melting waters fuel hydroelectric plants. Companies in North Dakota and Canada, are working on ways to improve rainfall and reduce hail damage to agriculture.

Moral issues

Hoffman cautioned, however, that weather modification has "societal implications," as changing weather in one place affects weather in another place. Such realizations played a role in limiting Project Storm Fury, as its cloud-seeding experiments had to be conducted well out in the ocean so the United States would not be accused of guiding the hurricanes toward one country instead of another.

"Hurricane Katrina recharged aquifers throughout the middle of the country," Hoffman said. "If we could have made it disappear, we would have. But there would have been some people affected negatively because it would have taken away their water supplies for next summer. There's always winners and losers if you change the weather."

Despite such concerns, many amateur meteorologists dream of making hurricanes disappear.

Most suggestions revolve around the same principle: Reducing a hurricane's ability to be fueled by warm ocean water. Marks has an ongoing correspondence with an Oklahoma truck driver who claims to have figured out a way to cool the ocean based on experiments in his backyard pool. Paul Duval, station manager for the National Weather Service in Tallahassee, said among the suggestions his agency has received have been exploding an atom bomb in a hurricane to dissipate its energy ("which would give us a radioactive hurricane"), putting an oil-like coating on the ocean to keep a hurricane from drawing up water vapor or towing an iceberg into the path of a hurricane to cool the water.

"It might have some effect, though I don't know where we'd get the iceberg," Duval said.

Marks said most lay people don't consider the political and financial consequences of their suggestions. But he encourages their ruminations. One day, a far-fetched idea may help mankind deal with killer hurricanes.

"I don't want to throw cold water on anyone," he said. "Ideas come from people thinking and having a passion."

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