



- Earth home
- Earth news
- Earth watch
- Comment
- Charles Clover
- Greener living
- Earth Pulse
- Science
- Messageboards

- Announcements
- Culture
- Blogs
- Comment
- Crossword
- Dating
- Digital Life
- Earth
- Education
- Expat
- Family
- Fantasy Games
- Fashion
- Features
- Food & Drink
- Football
- Gardening
- Health
- Horoscopes
- My Telegraph
- Obituaries
- Promotions
- Property
- Science
- Sudoku
- Telegraph offers
- Weather
- Your Money
- Your View

## US government aims to tame hurricanes

By Richard Gray, Science Correspondent  
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With winds that rip apart buildings and can produce more power than a nuclear bomb, it would seem humans can do little against the devastating force of a hurricane.

- [Previous weather modifying schemes](#)
- [James Lovelock's plan to pump ocean water to stop climate change](#)
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The United States government, however, has other ideas and is now attempting to pit some of the world's best minds against these indomitable forces of nature.

The Department of Homeland Security has asked scientists to draw up new plans on how hurricanes and other tropical storms can be weakened before they hit land.

Three years after Hurricane Katrina caused more than \$50bn of damage and killed 1,800 people when it blasted through New Orleans, American government officials have asked for a new programme into hurricane modification.

Scientists believe they can weaken the strength of tropical storms and steer them off course using a range of methods that include spraying fine particles into hurricanes or cooling the sea water in areas where they form.

But attempts to tinker with such powerful weather systems will alarm critics who believe modifying hurricanes could have unintended consequences to the climate, and could leave governments open to lawsuits if they fail to prevent storms with the new technology.

William Laska, programme manager of science and technology at the Department of Homeland Security, said it was essential if future loss of life and destruction was to be avoided.



Critics say attempts to tinker with such powerful weather systems could have unintended consequences for the climate

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The project has been given an estimated price tag of around \$64m (£32m) over six years. Scientists will first conduct tests using models and small scale experiments before the most promising idea is developed for large scale testing.

Among the plans is a scheme to seed hurricanes with microscopic particles of salt that have been released into a storm from an aircraft. Research has shown that such seeding can cause hurricanes to dump large quantities of rain over the sea before it reaches land. The rainfall also carries away the heat that powers the hurricane, weakening it.

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Hurricane intensity is linked to the amount of heat that builds up inside the storm, so scientists believe that by wicking heat away from the hurricane, the ferocity of the winds can be lessened before it meets the land.

Most Atlantic hurricanes tend to form when sea water at the surface warms to more than 26.5°C. As temperature increases, the strength of the storm grows too. Other schemes aim to weaken or prevent hurricanes by cooling the sea temperature.

Dr John Latham, a British researcher at the National Centre for Atmospheric Research in Colorado, has proposed spraying a fine mist of sea water into the clouds over the parts of the Atlantic Ocean where hurricanes form, to increase their brightness. This would mean more sunlight is reflected back into space, causing the sea to cool.

He said: "Even cooling the surface of the water by a couple of degrees will reduce the intensity of the storms and the frequency with which that they form."

Other scientists have suggested using thousands of floating buoys in the ocean, which would harness wave power to pump warm surface water down and draw cold water from 650 feet below the surface to the top.

Professor Stephen Salter, an engineer at Edinburgh University, has designed 300 ft wide buoys that use ocean waves to force the water from the surface down long tubes into the ocean so that the heat in the surface is carried away.

Other groups have proposed smaller buoys that use the motion of the waves to draw cold water upwards from below the surface.

Research has also suggested that spraying soot particles into a hurricane could help to weaken the storm. Dr Moshe Alamaro at the Massachusetts Institute of Technology claims that the black soot would absorb heat from the sun, reducing the temperature difference between the air inside the storm and the air outside, which is partly responsible for increasing the wind speeds.

He has also proposed spreading a thin film of oil on the surface of the ocean in front of developing storms. This, he believes, would reduce evaporation from the sea's surface and decrease the amount of heat drawn from the sea by the hurricane.

But this approach has also alarmed environmentalists who fear that even if naturally occurring oils are used, this would harm marine wildlife.

Most of the ideas will be expensive to develop or deploy, but with fears that the most powerful category five storms will occur more frequently as the climate warms, scientists believe the projects are worthwhile.

Dr Joe Golden, a leading hurricane modification researcher at the University of Colorado in Boulder, said: "A single hurricane can cause damages of over \$1bn, and that is happening with more often.

"If there is a glimmer of hope scientifically of weakening hurricanes with minimal environmental side-effects then we have to give it our best shot."

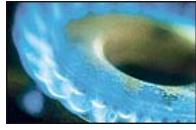
#### Previous weather modifying schemes

Controversial schemes to modify the weather have been attempted by many countries, but critics often doubt their success due to the relatively poor knowledge about the mechanisms that cause weather in the first place.

1. Russian military pilots have admitted that they seeded rain clouds to wash out radioactive fallout from the air in an attempt to protect the capital Moscow in the wake of the Chernobyl nuclear disaster.
2. A recent cloud seeding operation to clear the skies of rain ahead of public holidays this month went wrong when cement dropped from one of the aircraft failed to fragment and smashed through the roof of a house in Moscow.
3. The United States has tried seeding clouds using silver iodide released from aircraft in a bid to beat droughts and increase crop yields. Despite millions of dollars of investment, the techniques effectiveness have never been proved. The US military also attempted to use cloud seeding in Vietnam in an attempt to spark floods that would destroy Vietcong supply routes in an operation known as Project Popeye.
4. The Chinese authorities have said they intend weather modification to protect outdoor venues from rain during the Olympic Games later this year. They claim they have perfected a technique that reduces the size of rain drops and can delay rainfall.
5. Declassified documents have confirmed the UK's Ministry of Defence conducted experiments with rain clouds in 1952, code named Operation Cumulus. After the experiment, a destructive rain storm destroyed the village of Lynmouth, Devonshire and killed 35 people.

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