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Scientists a step closer to steering hurricanes

By **Tim Shipman in Washington**
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Scientists have made a breakthrough in man's desire to control the forces of nature – unveiling plans to weaken hurricanes and steer them off course, to prevent tragedies such as Hurricane Katrina.

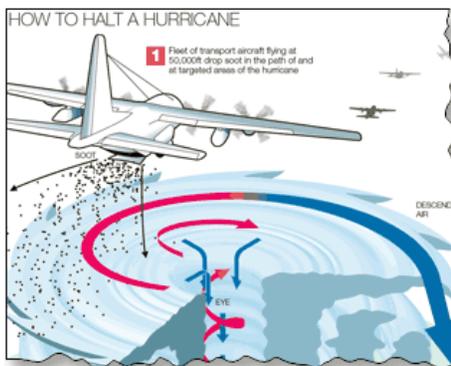
The damage done to New Orleans in 2005 has spurred two rival teams of climate experts, in America and Israel, to redouble their efforts to enable people to play God with the weather.

Under one scheme, aircraft would drop soot into the near-freezing cloud at the top of a hurricane, causing it to warm up and so reduce wind speeds. Computer simulations of the forces at work in the most violent storms have shown that even small changes can affect their paths – enabling them to be diverted from major cities.

But the hurricane modifiers are fighting more than the weather. Lawyers warn that diverting a hurricane from one city to save life and property could result in multi-billion dollar lawsuits from towns that bear the brunt instead. Hurricane Katrina caused about \$41 billion in damage to New Orleans.

Hurricanes form when air warmed over the ocean rises to meet the cool upper atmosphere. The heat turns to kinetic energy, producing a spiral of wind and rain. The greater the temperature differences between top and bottom, and the narrower the eye of the hurricane, the faster it blows.

Moshe Alamaro, of the Massachusetts Institute of Technology (MIT), told The Sunday Telegraph of his plans to "paint" the tops of hurricanes black by scattering carbon particles – either soot or black particles from the manufacture of tyres – from aircraft flying above the storms. The particles would absorb heat from the sun, leading to changes in the airflows within the storm. Satellites could also heat the cloud tops by beaming microwaves from space.



How to halt a hurricane: [Click to enlarge](#)

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"If they're done in the right place at the right time they can affect the strength of the hurricane," Mr Alamaro said.

The theory has so far been tested only in computer simulation by Mr Alamaro's colleague, Ross Hoffman. Mr Alamaro said: "With small changes to this side or that side of the hurricane we can nudge it and change its track. We're starting with computer simulations, then will hopefully experiment on a small weather system."

Last month scientists at the Hebrew University of Jerusalem announced that they had simulated the effect of sowing clouds with microscopic dust to cool the hurricane's base, also weakening it. The dust would attract water but would form droplets too small to fall as

rain. Instead, they would rise and evaporate, cooling hot air at the hurricane base.

In findings presented at a conference in Trieste, Italy, the team led by Daniel Rosenfeld demonstrated that dust dropped into the lower part of Hurricane Katrina would have reduced wind speeds and diverted its course.

The MIT team has now hired a professor of risk management to advise on steps necessary to protect themselves from legal action by communities affected if a hurricane is diverted. It is pressing for changes to US law and for an international treaty to settle possible disputes between neighbouring countries.

Mr Alamaro said: "The social and legal issues are daunting. If a hurricane were coming towards Miami with the potential to cause damage and kill people, and we diverted it, another

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town or village hit by it would sue us. They'll say the hurricane is no longer an act of God, but that we caused it."

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