

A new method to trigger rain where water is scarce

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A drone carrying an electric charge is tested in the UK. Credit: University of Bath

A new method to trigger rain in places where water is scarce is being tested in the United Arab Emirates using unmanned drones that were designed and manufactured at the University of Bath. The drones carry an electric charge that is released into a cloud, giving cloud droplets the jolt they need to clump together and fall as rain.

This is one of the first times scientists have used drones in an attempt to stimulate rainfall from clouds. Established techniques for encouraging rainfall in dry countries involve low-flying aircraft or rockets dropping or firing solid particles (such as salt or silver iodide) into clouds. This is known as cloud seeding.

The drones, which are being tested as part of the UAE's [rain](#)-enhancement science-research program, are equipped with a payload of [electric-charge](#) emission instruments and sensors. Human operators on the ground will direct them towards low-hanging clouds, where they will release their charge. Clouds naturally carry positive and negative charges. By altering the balance of these charges, it is hoped that [cloud droplets](#) can be persuaded to grow and merge, eventually producing rain.

The research, which is published in the *Journal of Atmospheric and Oceanic Technology*, is being led by the University of Reading, however both the drones and some of the equipment they carry were developed by researchers from the Department of Electronic and Electrical Engineering at Bath. The first [drone](#) flights in the Emirates are expected to take place in the next few months.

Dr. Keri Nicoll, who coordinated the research at the University of Bath and is now a visiting scientist at Bath, based at the University of Reading, said: "We've done tests in the UK and demonstrated that we can release charge from the aircraft and detect it on the ground. The next step is to repeat these tests in the UAE, where the ambient electrical environment is very different to the UK, due to high levels of dust and aerosol particles."

Water stress is a major problem in much of the Arab world, including the UAE. The [average rainfall](#) in the Emirates is 100mm per year (compared to 885mm in the UK) and the country is expected to get drier and more arid as temperatures rise due to global warming.

"Water scarcity is one of the biggest problems facing humanity, and [climate change](#) is providing more uncertainty around rainfall," said Dr. Nicoll, adding: "In those parts of the world that are really struggling for water, projects to improve rainfall are really important, and there are 50 nations that have established rainfall enhancement programs. They already do cloud-seeding in the United Arab Emirates (using salt particles, released from manned aircraft) but they are eager to come up with other ways to get water to the population."

Dr. Nicoll is hopeful that the technology produced for the project could be used to stimulate [clouds](#) to produce rain in the years to come. "It is likely that charging cloud droplets on its own won't replace established cloud-seeding techniques, but it could work alongside existing techniques to maximize the efficiency of cloud seeding," she said.

His Excellency Dr. Abdulla Al Mandous, Director of the National Center of Meteorology (NCM) funding for the country's rain-enhancement program "are crucial in driving and encouraging innovation in applied scientific research to advance global rain enhancement capacity."

He added that NCM "is committed to mitigating the risk of [water stress](#) on arid and semi-arid regions around the world, while enhancing the country's status as global hub for rain enhancement research."

More information: R. Giles Harrison et al. Demonstration of a Remotely Piloted Atmospheric Measurement and Charge Release Platform for Geoengineering, *Journal of Atmospheric and Oceanic Technology* (2020). [DOI: 10.1175/JTECH-D-20-0092.1](https://doi.org/10.1175/JTECH-D-20-0092.1)

Provided by University of Bath

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