

# Me and my drone: how automatons are changing research

From birds to coastlines, drones take data collection to a whole new level.

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Drones are increasingly making their way into remote locations, violent storms and hazardous habitats for scientific purposes. The technology is so popular that the US Federal Aviation Administration (FAA) is stepping in with new rules governing [how drones are operated](#) for research uses, among others. The rules, which take effect on 29 August, include limitations such as daylight-only operations, weight specifications and line-of-sight restrictions.

It's not necessarily bad news for scientists, though. "The FAA makes things much simpler for us," says Peter Traykovski, an engineer at the Woods Hole Oceanographic Institution in Massachusetts. "You don't need to be a certified pilot — just take an exam of aeronautical knowledge."

The rules shouldn't stifle the creative ways in which researchers employ drones. So in that spirit of imagination, *Nature* takes a look at some of the more unusual ways in which scientists employ these mechanical minions.

## Under the sea

*Phil Samret/MBARI*

Dave Clague at the Monterey Bay Aquarium Research Institute in Moss Landing, California, uses a torpedo-shaped unmanned underwater vehicle (pictured) to [map the sea floor](#) and study underwater volcanoes. Outfitted with sonar and navigation equipment, the drone is programmed to travel 50 metres above the ocean floor. Clague uses the data it gathers to make high-resolution maps of mid-ocean ridges and other features off the Pacific coast of the United States and Mexico. It's an underwater version of taking aerial photographs of volcanoes on land, says Clague. The technology allows scientists to cover large areas of the sea floor that are not easily mapped by other means.

## Feel the burn

*Craig Chandler/Univ. of Nebraska*

To maintain their health, certain forests, shrublands and grasslands need periodic 'controlled burns'. These contained fires, which officials set using equipment such as drip torches, also remove dry foliage that could serve as [fuel for wildfires](#). Dirac Twidwell, an ecologist at the University of Nebraska–Lincoln, uses a drone (pictured) that drops fireballs to ignite controlled burns from the air. The drones give his team access to large areas with rough terrain that would be impractical or too expensive to reach on foot.

## For the birds

*Andy Wilson*

Ornithologist Andy Wilson at Gettysburg College in Pennsylvania hangs a microphone from his aerial drone to eavesdrop on songbirds. Dangling eight metres below a quadcopter (pictured), the microphone picks up audio cues that Wilson uses to count birds of different species. "For the song sparrow, red-winged blackbird and yellow warbler, we got a similar rate of detections from our recordings as from the ground," he says. "That's awesome." The set-up also gives Wilson low-cost access to the interiors of swamps, forests and steep areas.

## Arctic coasts

*Fiamma Straneo/WHOI*

This jet-powered kayak drone, or 'JetYak', can [go where other research ships can't](#). Traykovski and Hanumant Singh at the Woods Hole Oceanographic Institution in Massachusetts developed a drone to monitor areas too shallow for most vessels, conducting coastal surveys and assessing how coastlines respond to storms. The researchers also send the JetYak into areas too hazardous for crewed boats, including the edge of calving glaciers along West Greenland (pictured).

## Super drone

Carla Thomas/NASA

The gigantic Global Hawk (pictured) — complete with a 40-metre wingspan — flies into storms brewing over the Atlantic Ocean to collect data that help forecasters assess incoming weather. The US National Oceanic and Atmospheric Administration (NOAA) and NASA operate the drone. “People need timely, reliable and actionable information,” says Robbie Hood, director of NOAA’s Unmanned Aircraft Systems Program. She describes a recent example, when “real-time data delivered from the NASA Global Hawk to the National Hurricane Center were credited for alerting the hurricane forecasters to the storm’s intensification.”

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