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Drone Video

## Nasa drone embarks on science flights

By Peter Bowes

BBC News, Mojave Desert, California

### **An unmanned aircraft, operated by Nasa, has successfully started flying scientific research missions over the Pacific Ocean.**

The Global Hawk drone is a robotic plane that is designed to stay up in the air at very high altitudes for an extended period of time.

Nasa has acquired three of the aircraft from the United States Air Force, which used the planes for military surveillance work.

"When they told us about this our scientific lust when through the roof," says Dr Paul Newman, a project scientist and atmospheric physicist.

"We knew that this was the plane that would enable us to do things that we could only dream about."

The Global Hawk can fly at altitudes above 60,000 feet (18.3km), which is roughly twice as high as a commercial aircraft. It can stay in the air for up to 30 hours and can travel up to 20,000km, half the circumference of the Earth.

"It has many advantages," says Dr Ken Jucks, programme manager for the Upper Atmosphere Research Programme.

"We can observe something for a very long period of time, which is unique for an aeroplane that we use to observe the Earth.

The plane will be used to measure and sample greenhouse gases, ozone depleting substances and other air components in the upper troposphere and lower stratosphere.

Scientists want to gather data to help them understand the processes that control both weather and climate. The plane will allow them to travel to parts of the world that have previously been off limits.

"You can't fly from California up to the arctic but with the Global Hawk you can," explains Dr Newman.

"It just opened up a whole new realm of things. You can fly to hurricanes and you can orbit those hurricanes for tens of hours. Right now we just have planes that can fly there, probe it and come straight back home."

### **Spy plane**

The Global Hawk was developed by the US government for reconnaissance and surveillance purposes and has been used in war zones such as Afghanistan.

It is typically used in situations that are too dangerous to fly with pilots.



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Paul Newman, project scientist

Now retired from military operations, the planes in use by Nasa have been fitted out with a vast array of Earth observation tools, including high definition cameras. They have been described as a hybrid of an aircraft and a satellite.

"We can dip our science toes into more interesting phenomena with this plane," says Dr Newman. The drone is piloted from a master control room on the ground. In effect, it mirrors a plane's cockpit with the joystick being replaced by a computer, mouse and keypad.

The flight is entirely pre-programmed, although it can be tweaked mid-flight according to the progress of the research and the prevailing weather conditions. There are at least two pilots monitoring the flight at all times and other technicians who send commands to the computerised instruments on board the plane.

The flights are tightly regulated by the Federal Aviation Administration (FAA).

"They have a certain relationship with the military but the military tend not to fly these in our own airspace so we're developing our own relationship with the FAA in order to be able to fly these in our own airspace," explains Dr Jucks.

"We're hoping as we get more comfortable with the plane, as the FAA gets more comfortable with us flying the plane, we'll get clearances to fly over more populated areas," he adds.

Nasa says it has as much control over the drones as pilots have on regular planes.

"The only difference is that there might be a little bit of a lag time between noticing something going on with the plane versus us making the command," says Dr Jucks.

The Global Hawk's first scientific flight, over the Pacific, took place last week from NASA's Dryden Flight Research Center at Edwards Air Force Base in California.

It lasted just over 14 hours and travelled a path from Dryden to just south of Alaska's Kodiak Island. A follow up flight on Tuesday was due to stay in the air for a record-breaking 24 hours. The project scientists expect to launch at least one flight a week from Dryden and a portable ground control station is being developed, which will make possible deployments and missions around the world.

Overseeing the Global Hawk's second scientific flight, Dr Jucks said Nasa scientists were in a "jubilant" mood.

"People are very excited about this," he says.

"We're getting confident now. We're attacking real science questions and this is the moment we've all really been waiting for."