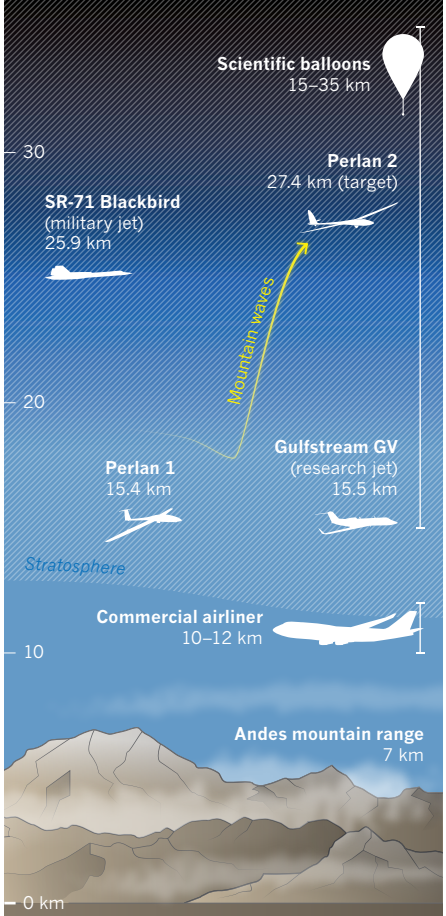
Einar Enevoldson, founded the Perlan Project with the aim of creating a glider that could surf these waves up to the stratosphere. And in 2006, he and the US adventurer Steve Fossett proved the concept with their record-breaking flight on Perlan 1, a modified conventional glider.

But Fossett's death the following year in a light-aircraft accident set the project back until July 2014, when European aerospace group Airbus became a major sponsor and contributed its research expertise. The Perlan 2 craft made its maiden flight last year in Oregon, and in March surfed its first mountain waves above the Sierra Nevada range in California.

Its next flights will be over El Calafate on the eastern and southern fringes of the Andes range in Argentina. There, during the South Pole's winter, a fast-moving, high-altitude jet stream called the polar-night jet extends from the troposphere into the upper atmospheric layers — helping the Andes mountain waves (and the glider) to reach the stratosphere (see 'Science on a glider').

Besides its atmospheric chemistry, Perlan 2 will carry instruments to study turbulence in stratospheric mountain waves, and to explore the microphysics of interactions between mountain waves and polar meteorology, which ultimately affect weather variability. Information on how mountain waves break in the stratosphere is "extremely limited", says Gong, and requires detailed, fine-scale data on temperature, humidity and wind, which the glider is uniquely placed to measure. Airbus says that many of the weather phenomena Perlan 2 will encounter will provide useful information for it and other aircraft makers that are contemplating operating aeroplanes at higher altitudes.



SCIENCE ON A GLIDER
The Perlan glider aims to fly higher than any other piloted aircraft, and to conduct unique stratospheric research.

PAUL JACKMAN/*NATURE*

Once Perlan is fully tested, says Austin, she hopes to get funding to use the glider as a long-term scientific platform that would examine how hourly, seasonal or even decadal changes in the stratosphere affect weather and climate.

A drone that could carry more instruments is a future possibility — but for now, a piloted craft is preferable and simpler, says Ed Warnock, the project's chief executive. Machines cannot yet match the best human pilots when it comes to climbing waves in such demanding flight conditions, he says.

Perlan's backers hope that it can surpass 27,000 metres in 2017 — and, ultimately, they intend another version of the glider to fly higher than 30,000 metres, where the air density is almost identical to that on Mars's surface. That might provide insight into how winged aircraft could fly on the red planet.

For now, engineers and scientists alike are just hoping to see the glider soar into the stratosphere above the Andes and take data. "Everything in the aircraft is experimental. It's a very difficult mission to do right, and to do it safely is not easy," Austin says. ■

BIOMEDICINE

US to lift ban on funding for human–animal hybrids

Researchers in the United States will soon be able to resume chimaera-based projects.

BY SARA REARDON

Since September 2015, researchers have been banned from receiving funding from the US National Institutes of Health (NIH) for adding human stem cells to animal embryos, creating blends called chimaeras. But an NIH proposal released on 4 August lifts that moratorium, with certain exceptions. It also sets up a panel to review the ethics and oversight of grant applications.

The proposal shortens the window during which human cells can be introduced into non-human primate embryos, disallowing it before the central nervous system begins to form. This limits the number of human cells incorporated into a chimaera's brain. It also prohibits breeding animals containing human cells, preventing growth of a chimaeric embryo in a non-human womb or the birth of an animal more humanized than its parents. Grant applications that fall into a grey area would undergo a panel review.

The panel will pay particular attention to projects involving primates, mammals at very early developmental stages or those in which human cells could affect an animal's brain. Past a certain point, rodent embryos with human cells that could affect brain development are exempt from panel review, because there is little chance they would become human-like, says Carrie Wolinetz, NIH's associate director for science policy in Washington DC.

Currently, researchers use chimaeras to study early embryonic development and human diseases. But a major goal is to engineer animals to grow human organs that could then be transplanted into patients.

Unlike in the United States, it is illegal to perform such research without approval in the United Kingdom, even with private funding.

Steven Goldman, a neuroscientist at the University of Rochester in New York, says that the 2015 ban was overkill and is relieved that it will be lifted.

But Ali Brivanlou, a developmental biologist at Rockefeller University in New York City, says that the new rules should focus on limiting the percentage of the animal that becomes human instead of restricting the timing of modifications.

Bioethicist Françoise Baylis, at Dalhousie University in Halifax, Canada, worries that there are no clear guidelines on how chimaeras should be treated when used as research subjects.

These are the kinds of questions that the oversight panel will discuss when reviewing grant applications, says Wolinetz. The NIH proposal is open for public comment for 30 days, after which the agency will issue a final rule. Wolinetz hopes that it will be ready for the January 2017 grant cycle. ■