

PLANETARY SCIENCE

Mission to Probe Venus's Curious Winds And Test Solar Sail for Propulsion

TOKYO—Venus is considered Earth's twin because of its similar size and composition. But Venus's carbon dioxide-laden atmosphere and thick sulfuric clouds are nothing like Earth's. And most puzzlingly, venusian winds move at up to 60 times the speed of the planet's rotation; Earth's fastest winds clock in at just 10% to 20% of the rotation speed.

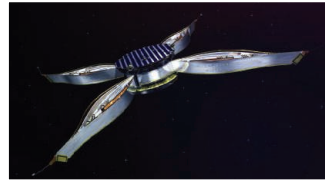
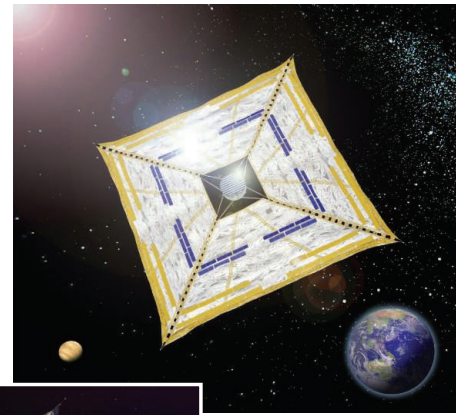
The force behind this superrotation is "one of the most outstanding problems in planetary geofluid dynamics," says Kevin Baines, a planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena, California, and the University of Wisconsin, Madison. The Japan Aerospace Exploration Agency (JAXA) is out to solve this problem with its Akatsuki mission, slated for launch on 18 May. Akatsuki will train four cameras at ultraviolet and infrared wavelengths on the planet to track clouds at different altitudes. The craft also has a high-speed camera that aims to capture venusian lightning, presumed to occur but never directly observed.

The superfast winds might result from thermal waves generated in the solar-heated clouds or from a complex interaction of atmospheric circulation patterns, says

Takeshi Imamura, a planetary scientist at JAXA's Institute of Space and Astronautical Science in Sagami-hara. "It is also possible that our observations [will eliminate] both of these theories and find new mysteries," he says.

Akatsuki, to be placed in an equatorial orbit, will complement the European Space Agency's Venus Express, which has been in a polar orbit around the planet since 2006. The two teams are planning coordinated observations using different instruments. Baines, a member of the Venus Express science team, expects the findings to provide clues to understanding the evolution of Earth's atmosphere and the effects of greenhouse gases. "There is a lot Venus can teach us" about Earth, he says.

In addition to sending Akatsuki on its way, JAXA's H-IIA rocket is carrying what will become, if all goes well, the first spacecraft that uses the pressure of photons from the sun for propulsion. Two previous attempts floundered on rocket failures. The Interplanetary Kite-craft Accelerated by Radiation Of



Sail away. An innovative ribless design will use centrifugal force to unfurl the solar sail of the IKAROS spacecraft (inset).

the Sun (IKAROS) mission will use a square polyimide sail 20 meters across diagonally and a mere 0.0075 mm thick. "The most important point is the deployment," says Jun'ichiro Kawaguchi, a JAXA scientist who conceived IKAROS. Other designs have used struts to keep the sail taut. IKAROS relies on centrifugal force to spin out its sail. If the mission succeeds, Kawaguchi says, a solar sail could be paired with ion engines, used in JAXA's Hayabusa mission (*Science*, 30 April, p. 565), to speed spacecraft to the solar system's outer reaches. —DENNIS NORMILE

ScienceNOW

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Bald Eagle Comeback Could Come at Expense of Other Species

Fishing, farming, and pesticides have decimated the bald eagle population of California's Channel Islands. But current efforts to reintroduce the birds could likewise threaten some of the islands' other endangered species, including foxes, according to a new study. <http://bit.ly/baldeagle-comeback>



Scientists Resurrect Mammoth Hemoglobin

By inserting a 43,000-year-old woolly mammoth gene into *Escherichia coli* bacteria, scientists have figured out how these ancient beasts adapted to the subzero temperatures of prehistoric Siberia and North America. The gene, which codes for the oxygen-transporting protein hemoglobin, allowed the animals to keep their tissues supplied with oxygen even at very low temperatures. <http://bit.ly/mammoth-hemoglobin>

New Madrid Quakes May Not Have Been So Colossal

In the winter of 1811–12, four major earthquakes shook what is today southeastern Missouri. The first of the temblors flattened the small town of New Madrid and, according to some eyewitness accounts, temporarily reversed the course of the Mississippi River. Other reports over the years have claimed that the quakes could be felt as far away as the U.S. East Coast, where they rattled furniture in Washington, D.C., and rang church bells in Charleston, South

Carolina. Together, the New Madrid quakes have become known as one of the most powerful natural events in U.S. history. But were they? <http://bit.ly/newmadridquakes>

Island Reptiles Buck an Evolutionary Trend

The Caribbean island of Martinique has a lot to offer: beautiful beaches, tropical weather, and a perfect place to challenge notions about how new species arise. When anole lizards arrived on Martinique more than 8 million years ago, there were four separate, smaller islands. Over time, this physical isolation should have allowed the lizards to evolve into different species, according to conventional evolutionary wisdom. But that's not what happened. <http://bit.ly/lizard-evolution>



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