

## Is Venus Our Future?

Scientists Seeking to Learn More About Earth Through Its 'Twin'

By Amanda Onion

April 22 . Anyone curious about what a worst-case global warming scenario might look like could peer through space to Earth's closest cousin: Venus.

Although Earth and Venus are very similar in size, mass and density, Venus is enshrouded in a thick layer of carbon dioxide and sulfuric acid that traps heat in and leads to extreme warming.

This has made the planet hotter, much hotter.

Average temperatures on the cloud-choked planet average about 800 degrees Fahrenheit. The inferno-like conditions on Venus have led some to call it "Earth's evil twin." Researchers believe there is much we might learn about our own planet through Earth's darker, hotter twin, and this week scientists from the European Union and NASA are meeting to discuss possible missions to Venus in 2005.

"Venus and Earth have taken different paths," said Larry Esposito, a planetary astronomer at the University of Colorado at Boulder. "But human activity is leading Earth in the same direction [as Venus]. If we can understand Venus history better, we can fine tune our models for Earth."

### Hot Model Needed

Scientists have become increasingly concerned that global warming may be occurring on Earth due to man-made emissions including carbon dioxide, methane and other gasses into the atmosphere. As on Venus, this layer of gases allows radiation to shine through to Earth, but then blocks its reflection back to space. The so-called Greenhouse Effect insulates the planet and leads to warming.

So far efforts to predict global warming for Earth have been inconsistent and uncertain. Last year, a United Nations group predicted world temperatures could rise by as much as 10.5 degrees or as little as 3 degrees Fahrenheit by the end of the century. A British study released last week predicted a 12.4-degree rise by 2100. A Swiss study, meanwhile, estimated a 7.7-degree rise in the same time frame.

The different predictions could find more agreement, some suggest, with a little more detail from Venus. By using Venus as a model of extreme warming and adding detail about the planet into climate models, predictions about Earth's warming could become more accurate.

"We need to visit Venus and get more information on the atmospheric and surface composition," said Esposito. "With this fine tuning, we could predict possible feedbacks

and extremes which are not evident from what we now know from Earth's present climate."

### The Veiled Planet

What scientists do know is the second planet from the sun rotates very slowly: one Venus days equals about 243 Earth days. Its atmosphere, which contains the only known traces of water at the planet, is made up of mostly carbon dioxide and whips around the planet about 30 miles above its surface at speeds of up to 220 miles an hour.

Explorations of Venus in the 1970s and '80s were the first to reveal that Earth's twin wasn't quite as similar to our planet as it had seemed to be. The early orbiters detected the shockingly hot temperatures and pervasive, active volcanoes at the planet's surface. A more recent mission to the planet, NASA's Magellan mission, then revealed the whole face of Venus had recently undergone a dramatic geological change.

The Magellan mission ended in 1994 when the probe was directed to crash into the planet, and ultimately provided only hints about the veiled planet.

"The more we found out the less we understood," said Donald Turcotte, a geophysicist at Cornell University in New York.

Among Venus' remaining mysteries is why it's not hotter. Although Venus is slightly closer to the sun than Earth, orbits more slowly and has a thicker layer of clouds trapping heat in, the planet's atmosphere also reflects about 75 percent of the sun's radiation. (Earth's atmosphere reflects about 30 percent.) According to current climate models, these factors should make Venus even hotter than it is.

"The climate on its surface is completely out of line if you extrapolated the conditions as if they were Earth," said Fred Taylor, a planetary physicist at the University of Oxford, England. "There's something very wrong with our modeling."

Investigators from the United States and the European Union are gathering in Nice, France to discuss the European Union's hopes to launch an orbiter in a "Venus Express" mission in 2005. Esposito is also urging NASA to compliment the mission by landing a robotic craft at the same time.

Landing a craft on Venus could be especially challenging since its surface is hot enough to melt lead. Any lander craft would need to be constructed of highly heat-resistant material.

"Venus is so hot that if we had the same run away Greenhouse Effect on Earth it would snuff out all life," said Andrew Ingersoll, a planetary scientists at California Institute of Technology. "This isn't going to happen on Earth any time soon, but the planet gives us the big picture on long term climate change."