# Astronomers: We could find Earth-like planets soon

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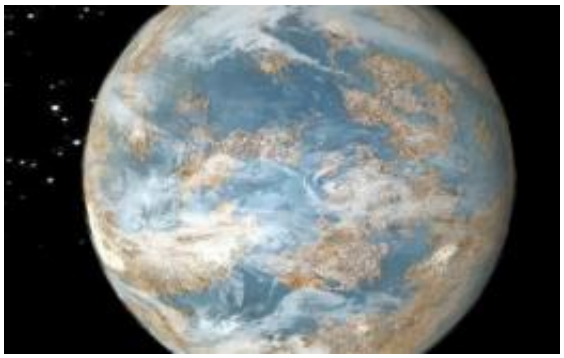

This image made from video provided by NASA shows an artist's rendition of what an Earth-like planet might look like. A top NASA official and other leading scientists say that within four or five years they should discover the first Earth-like planet located in a spot outside our solar system where life could develop, or may have already. (AP Photo/NASA)

(AP) -- Astronomers say they are on the verge of finding planets like Earth orbiting other stars, a key step in determining if we are alone in the universe.

A top NASA official and other leading scientists say that within four or five years they should discover the first Earth-like planet where life could develop, or may have already. A planet close to the size of Earth could even be found sometime this year if preliminary hints from a new space telescope pan out.

At the annual American Astronomical Society conference this week, each discovery involving so-called "exoplanets" - those outside our solar system - pointed to the same conclusion: Quiet planets like Earth where life could develop probably are plentiful, despite a violent universe of exploding stars, crushing black holes and colliding galaxies.

NASA's new Kepler telescope and a wealth of new research from the suddenly hot and competitive exoplanet field generated noticeable buzz at the convention. Scientists are talking about being at "an incredible special place in history" and closer to answering a question that has dogged humanity since the beginning of civilization.

"The fundamental question is: Are we alone? For the first time, there's an optimism that sometime in our lifetimes we're going to get to the bottom of that," said Simon "Pete" Worden, an astronomer who heads NASA's Ames Research Center. "If I were a betting man, which I am, I would bet we're not alone - there is a lot of life."

Even the Roman Catholic Church has held scientific conferences about the prospect of extraterrestrial life, including a meeting last November.

"These are big questions that reflect upon the meaning of the human race in the universe," the director of the Vatican Observatory, the Rev. Jose Funes, said Wednesday in an interview at this week's conference.

Worden told The Associated Press: "I would certainly expect in the next four or five years we'd have an Earth-sized planet in the habitable zone."

Worden's center runs the Kepler telescope, which is making an intense planetary census of a small portion of the galaxy.

Unlike the Hubble Space Telescope, which is a general instrument, Kepler is a specialized telescope just for planet-hunting. Its sole instrument is a light meter that measures the brightness of more than 100,000 stars simultaneously, watching for anything that causes a star to dim. That dimming is often a planet passing in front of the star.

Any planet that could support life would almost certainly need to be rocky rather than gaseous. And

it would need to be in just the right location. Planets that are too close to their star will be too hot, and those too far away are too cold.

"Every single rock we turn over, we find a planet," said Ohio State University astronomer Scott Gaudi. "They occur in all sorts of environments, all sorts of places."

Researchers are finding exoplanets at a dizzying pace. In the 1990s, astronomers found a couple of new planets a year. For most of the last decade, it was up to a couple of planets every month.

This year, planets are being found on about a daily basis, thanks to the Kepler telescope. The number of discovered exoplanets is now well past 400. But none of those has the right components for life.

That's about to change, say the experts.

"From Kepler, we have strong indications of smaller planets in large numbers, but they aren't verified yet," said Geoff Marcy of the University of California at Berkeley. He is one of the founding fathers of the field of planet-hunting and a Kepler scientist.

But there is a big caveat. Most of the early exoplanet candidates found by Kepler are turning out to be something other than a planet, such as another star crossing the telescope's point of view, when double- and triple-checked, said top Kepler scientist Bill Borucki.

Kepler is concentrating on about one-four hundredth of the nighttime sky, scanning more than 100,000 stars, ranging from a few hundred to a few thousand light years away. A light year is about 5.9 trillion miles. So such planets are too far to travel to, and they cannot be viewed directly like the planets in our solar system.

If there were an Earth-like body in the area Kepler is searching, the telescope would find it, Marcy said. But it can take three years to confirm a planet's orbital path.

What Kepler has confirmed so far keeps pointing to the idea that there are many other Earths. Before Kepler, those bodies were too small to be seen. Borucki this week announced the finding of five new exoplanets - all discovered in just the first six weeks of planet-hunting. But all those planets were too large and in the wrong place to be like Earth.

When Kepler looked at 43,000 stars that are about the same size as our sun, it found that about two-thirds of them appeared to be as life-friendly and nonviolent as our nearest star.

Marcy, who this week announced finding a planet just four times larger than Earth, does not like to speculate how many stars have Earth-like planets. But when pressed, he said Thursday: "70 percent of all stars have rocky planets."

"If you are in the kitchen and are trying to cook up a habitable planet, we already know that in the cosmos, all the ingredients are there," he said.

While astronomers at the convention are excited about exoplanets, Marcy is more skeptical, as is Jill Tarter, director of the SETI Institute, which seeks out intelligent life by monitoring for electromagnetic transmissions. They said there is still the chance that the searches can come up empty.

Marcy said there is the small possibility that planets do not form easily at Earth's size, and that most are bigger.

Tarter - who was the basis for a character portrayed in the movie "Contact" by Jodie Foster - said: "I always worry that we talk ourselves into thinking we know more than we know."

Once an Earth-like planet is found in the right place, determining if there are the ingredients for life there will pose another hurdle.

It will require costly new telescopes. A massive space telescope to scan Earth-like planets for oxygen, water, carbon dioxide - and even faint signs of industrial emissions from civilization - would cost about $5 billion.

For now, such a high price is a budget-buster, but that could change. Cornell University astronomer Martha Haynes said: "We are at a very special moment in the history of mankind."

**More information:** NASA's Kepler Telescope: http://kepler.nasa.gov/

NASA's Exoplanet Exploration Program: http://exep.jpl.nasa.gov/

The Extrasolar Planets Encyclopaedia: http://www.exoplanet.eu/

American Astronomical Society: http://aas.org/

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