Earth-Size Planet Beyond Pluto and Kuiper Belt?

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- Prof. Mark V. Sykes, Ph.D., Planetary Science Institute

Illustration of possible Earth-size planet beyond Pluto and Kuiper Belt at 100 Astronomical Units (A. U.) from our sun (upper right). Theorized by Kobe University Japanese scientists because of perturbations in the orbits of other bodies in that region of solar system. Illustration courtesy Kobe University, Japan.

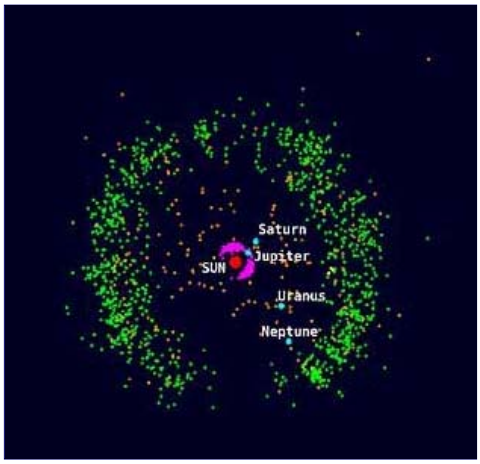

Illustration of Kuiper Belt objects (green) ranging from 42 to 47 Astronomical Units (A. U.) from the sun beyond Pluto. Illustration courtesy Kobe University, Japan.

March 28, 2008 Tucson, Arizona - The upcoming April 2008 printed issue of *The Astronomical Journal* will have this intriguing paper: "An Outer Planet Beyond Pluto and the Origin of the Trans-Neptunian Belt Architecture." The authors are Patryk Lykawka and Tadashi Mukai from the Graduate School of Science, Earth and Planetary Sciences, Kobe University, Japan. After studying perturbations and highly angled inclinations to the plane of the inner solar system among objects in a region 100 Astronomical Units (A. U.) from our sun far beyond Pluto, the Japanese scientists propose the discovery of a nearly Earth-size planet out there that takes 1,000 years to orbit the sun. Prof. Tadashi Mukai says, "We have been able to identify more than 1,100 objects beyond Neptune since 1992, and a huge number of objects are showing large orbital eccentricities and elliptical orbits."

Recently I asked Mark Sykes, Ph.D., Director of the Planetary Science Institute in Tucson, Arizona, that collaborates with the University of Arizona Astronomy Department, NASA and other institutions around the world: How can something be nearly the size of the Earth and not have been detected before now?

Interview:

Mark V. Sykes, Ph.D., Director, Planetary Science Institute, Tucson, Arizona: "Well, space is a pretty big place. A lot of our surveys to date have clustered primarily around that average plane. But when you start deviating from that plane, the volume of sky you have to search is very large. If you are just looking for one object within that large volume, it can take a very long time.

HOW WOULD YOU GO ABOUT LOOKING FOR THIS EARTH-SIZED OBJECT OUT 100 ASTRONOMICAL UNITS?

Fortunately, in modern times, our detector technology has gotten more sophisticated. Our ability to scan large areas of the sky has improved substantially. There are some facilities being built, such as the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) over in Hawaii and the Large Synoptic Survey Telescope (LSST) is on the drawing board to map out the entire sky on weekly time scales using very large telescopes.

With that type of technology – even though this object (Planet X) might be at 100 A. U., if it's a bright object, if its surface reflects light sufficiently, then it might be easily be picked up and perhaps other objects like it by these new surveys coming on line even next year (2009) and in the next several years.

ARE THE SURVEYS IN INFRARED?

No, they are visible. They are operating in wavelengths that we detect with our eye.

WOULD YOU EXPECT A BODY THIS SIZE TO BE GIVING OFF HEAT THAT COULD BE PICKED UP BY INFRARED?

Sure, but the wavelength would be very long. The colder you get, the longer the wavelength of the thermal radiation it is emitting. Something out at 100 A. U., and if it's bright in the visible, that means it's even colder in the infrared. So, it's giving off even less energy at a longer wavelength. So, you'd have to look for wavelengths in the sub-millimeter in hundreds of microns in order to detect this object (Planet X). And we don't have a lot of big surveys planned to look at objects at those wavelengths.

HOW LONG DO YOU THINK IT WILL TAKE WITH ALL THE VARIOUS SURVEYS TO FIND THIS PLANET X?

Once the surveys are up and operational, it might happen quickly.

WHEN DO YOU THINK THAT EVERYTHING WILL REALISTICALLY BE OPERATING?

PanSTARRS is going to be taking data on its first telescope – it's going to be an array of telescopes ultimately – within about a year (2009). And so, we'll see what it finds. As they add more telescopes to that array, then they'll be able to go fainter. LSST hasn't been built yet. It's probably ten years away.

IF THERE IS A NEAR EARTH-SIZE BODY ORBITING AT AN INCLINE TO THE FLAT PLANE OF THE INNER SOLAR SYSTEM BY 20 TO 40 DEGREES, WHAT WOULD BE THE LENGTH OF TIME IT WOULD TAKE FOR THAT PLANET TO GO AROUND THE SUN?

It would take about 1,000 years to orbit the sun.

THROUGHOUT HISTORY, THERE HAVE BEEN SUMERIAN CUNEIFORMS AND LATER BOOKS THAT TALK ABOUT A WANDERING STAR, MAYBE CALLED NEBIRU. IS THERE ANYTHING ABOUT THIS PLANET X THAT COULD FIT INTO A MESOPOTAMIAN CONCEPT ABOUT OUR SOLAR SYSTEM?

Not at all. The ancient peoples were looking at the sky with their eyes.

THIS LARGE OBJECT HAS BEEN OUT THERE AT 100 A. U. SINCE THE BEGINNING OF THE SOLAR SYSTEM?

Probably since some time in the early solar system. It probably formed much closer to the

sun and then was scattered out there. In the early solar system, it was a pretty dynamic place. We know that the Earth was impacted by a Mars-sized object early in the solar system and created the Earth's moon. So, it was not a quiescent time back then and it would not be a surprise to find a number of Mars-sized, or bigger, out in the distant regions of our solar system today.

IS THERE ANY POSSIBILITY THAT AN OBJECT LIKE THIS ONE COULD HAVE BEEN THE OBJECT THAT CAME THROUGH OUR SOLAR SYSTEM AND CAUSED THE BIG IMPACTS ON MARS AND EARTH AND THAT'S HOW IT ENDED OUT AT 100 A.U.?

Yes, it could be one of the scattered objects from the solar system that went through a series of interactions with other objects to end up in the orbit it is today.

HOW WILL WE HANDLE NAMING THIS IF IT IS ABOUT THE SIZE OF THE EARTH, WHICH IS PLANETARY. WILL THERE BE A WHOLE NEW REALM OF PLANETS BEYOND THE KUIPER BELT?

Our thinking about planets has been undergoing some evolution and there is disagreement right now about how we should classify these objects. The IAU wanted to restrict planets to objects orbiting the sun that go out to include Neptune and that's about it. From a geophysical perspective, planets could be round objects that orbit a star that are massive enough to crush themselves into what is called a hydrostatic equilibrium shape = round. In that case, we would have twelve planets right now and this new object would be the thirteenth if it were discovered.

HERE IS HIS LIST OF PLANETS AT: 34:55

Here, I'll count off the thirteen planets as I see them. You start off with
1) Mercury
2) Venus
3) Earth
4) Mars
5) Ceres – which is between Mars and Jupiter - very round and smooth surface, as seen in recent Hubble Telescope image.

Hubble Telescope image of Ceres, largest body
of asteroid belt between Mars and Jupiter.
Image provided by Mark Sykes.

6) Jupiter
7) Saturn
8) Uranus
9) Neptune
10) Pluto and
11) Charon as a double planet because Charon is large enough to be round and massive enough that Pluto and Charon orbit a point in between the two of them. Imagine a dumbbell spinning in space. It's that point that is orbiting the sun and those two objects are orbiting each other. So, it is truly a double planet, which is very neat.

Pluto and its "moon" Charon are considered
by Prof. Sykes to be a double planet orbiting around a point
in between the two round bodies. Nix and Hydra are two other Plutonian moons.

12) Eris

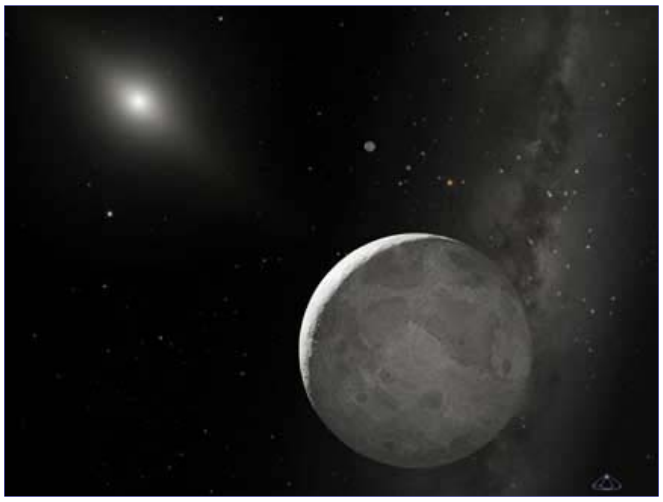

Illustration of Eris, a dwarf planet that is the 9th largest body to orbit the sun (upper left) , was first spotted in 2003 by a Palomar Observatory-based tteam led by Mike Brown, Ph.D. Eris is approximately 2500 miles in diamet5er, 27% more massive than Pluto, and is about 98 Astronomical Units from the sun - in the region of the Kobe University hypothesized Planet X at 100 A. U.

13) And then this new planet.

PLANET X!

Planet X!

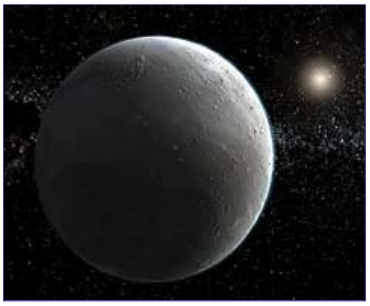

Illustration of hypothetical Planet X in foreground at 100 A. U. , taking 1,000 years to orbit our sun (upper right).

THAT WOULD MAKE A SOLAR SYSTEM OF 13 ROUND BODIES OF WHICH THIS LATEST IS 100 ASTRONOMICAL UNITS FROM THE SUN.

Yes, and there might be many more out there.

WOULD YOU BE SURPRISED IF THERE WERE A LOT MORE EARTH-SIZED OBJECTS OUT BEYOND THE KUIPER BELT?

No, I would not. Like I said before, the early solar system was a pretty dynamic place. I'm not sure how many Earth-sized objects could have been formed in the interior of the solar system and then scattered out. Certainly there could be more Mars-sized objects out there. I would not find that surprising at all.

MOST OF US GREW UP BEING TAUGHT THERE WERE 9 PLANETS IN THE SOLAR SYSTEM THAT INCLUDED PLUTO AS THE LAST ONE OUT THERE. AND THEN WE WERE TOLD THAT PLUTO WAS REDUCED TO A DWARF PLANET AND THAT'S HOW THE I.A.U. COMES UP WITH 8 PLANETS, CORRECT?

That's correct. But from my perspective, maybe our grand kids will have 20 planets. And the New York Times wrote an editorial saying that if there get to be too many planets, this will be a problem for kids. How are they going to memorize them? My gosh, then we should have only 10 cities in the world. We should have only 9 rivers in the world. How many mountains should we have? Kids can deal with things!

WITH THE PANSTARR MISSION IN 2009, WE MIGHT FINALLY BE ABLE TO CONFIRM PLANET X OUT THERE AND IT COULD BECOME THE 13TH PLANET IN 2009.

Yes, I think it becomes very difficult for the I. A. U. once an object like that is discovered because people will be scratching their heads – people are used to categorizing things on

the basis of like characteristics. If you have something bigger than Mars out there and Mars is a planet, then why would you say that it (Planet X) is something different?

So, I think that ultimately there will be a convergence of opinion. The nice thing about our perspective is that the I. A. U. planets – the dynamical giants, if you will – the gravitational giants – they are a subset of geophysical planets. In our case, if you put an adjective in front of the noun, it means you are dealing with a subset, whereas when the I. A. U. puts an adjective like 'dwarf' in front of the noun, it's not a subset. It's something completely different. It's like, 'I'm sorry, but a Chihuahua dog is not a dog because it's too small.'"

More Information:

For further reports about Planet X and other solar system discoveries, please see reports below in the **Earthfiles Archive:**

- 02/13/2008 — Saturn's Titan Moon Has Greater Oil Reserves Than Earth
- 01/12/2008 — Our Milky Way Galaxy On Collision Course with Huge Gas Cloud - 40 Million Years from Now
- 11/01/2007 — Gas Eruptions from Comet Holmes?
- 10/11/2007 — Carancas, Peru Meteorite Could Be 10 Tons
- 09/26/2007 — Meteorite Fell in Carancas, Peru - Not Satellite
- 08/10/2007 — Levitation Possible by Reversing Casimir Force
- 08/03/2007 — The Milky Way Is Devouring the Alien Sagittarius Dwarf Galaxy
- 06/20/2007 — Update: What Is the Moving Light in Saturn's Rings? Answer: Opposition Effect
- 05/08/2007 — Exploded Star 5 Times Brighter Than Any Supernova Seen Before
- 01/06/2007 — Liquid Methane Lakes on Saturn's Titan Moon
- 12/19/2006 — First Stars - Or First Black Holes - in Universe?
- 11/27/2006 — Namibia Telescopes Find First "Gamma Clock" in Milky Way Galaxy
- 10/23/2006 — One, Maybe Two, More Mysterious Radio Bursts from Galactic Center
- 07/25/2006 — Giant Hydrocarbon Lakes Found On Saturn Moon, Titan
- 05/05/2006 — Saturn's Titan Moon Has Puzzling Dunes
- 11/09/2005 — Dust Storm On Mars, Cosmic First Light and Black Hole At Our Galaxy's Center
- 09/16/2005 — "Planet X" and the Kuiper Belt's Oddballs, "Santa" and "Easterbunny"
- 05/17/2004 — Unidentified Lights in Sunrise Photograph from Long Island, N. Y.
- 10/07/2002 — Large Kuiper Belt Planetoid Found Beyond Pluto

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Websites:

Kobe University: http://www.planet.sci.kobe-u.ac.jp/study/list/solar/mukai_e.html

Pan-STARRS, Hawaii: http://www.jhu.edu/news/home06/oct06/panstarr.html

Large Synoptic Survey Telescope (LSST): http://www.lsst.org/lsst_home.shtml

Planetary Science Institute: http://www.psi.edu/

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