



International Astronomical Union (IAU) members vote on a new planet definition during a meeting in Prague Aug. 24, 2006. The vote redefined Pluto as a dwarf planet.

MICHAL CIZEK/AFP/GETTY IMAGES

# DEFINITION: PLANET

11,000 scientists around the world have the final say on what's a planet — **or not**

By Mary Helen Berg

**T**HE NUMBER OF PLANETS IN OUR solar system is ... well, it depends on who you ask. Pluto fans, sporting T-shirts that read "Never Forget," still say there are nine. Meanwhile, some astronomers say the tally should be 13. But the arbiter on all things astronomical, the International Astronomical Union (IAU), recognizes only eight planets.

As the world's largest professional organization for astronomers, the IAU represents 11,000 scientists from 95 countries and has the final say on whether

a planet is a planet or just an orbiting ice ball. Right now, the worlds that make the cut are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

The IAU is "responsible for managing the astronomical world," said Gareth Williams, associate director of the NASA-funded IAU Minor Planet Center (MPC). "They define everything that astronomers need to talk about objects in a consistent way. So, if I'm talking about an object at a certain point in the sky, some other astronomer knows exactly what I am talking about."

In other words, the IAU controls cosmic chaos on Earth. Volunteer committees

of planetary scientists, academics and historians support research, confirm celestial discoveries, document and preserve data and even track potentially dangerous asteroids.

## PLUTO OUT

Most of these working groups fly under the radar. But in 2006, one committee found itself under global scrutiny when, for the first time, the astronomy community demanded an official definition of "planet." The seven-member Planet Definition

**CONTINUED »**

# IN THE SHADOWS

Orbital analysis of 2012 VP113, a tiny planetoid beyond Pluto, and other dwarf planets like Sedna indicates an undetected planet, a giant Super Earth, lurking on the outer edge of our solar system. Here's how 2012 VP113 and Super Earth compare with some of their neighbors:

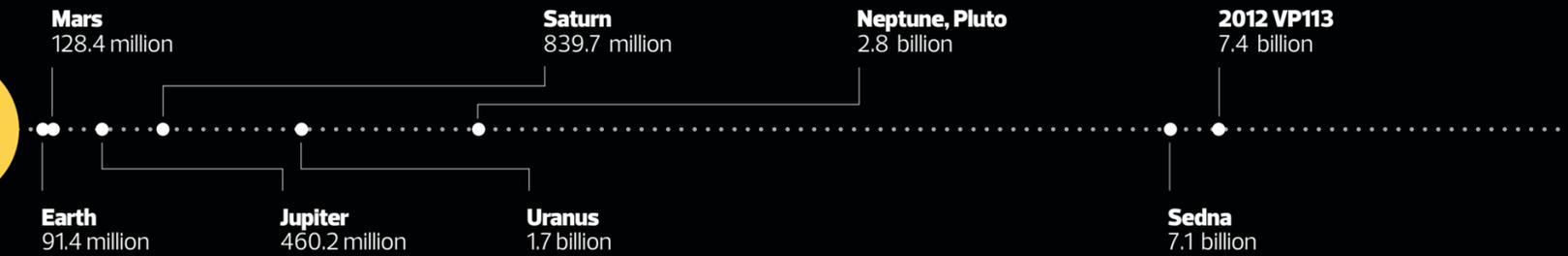
## SIZES

(Diameters in miles)

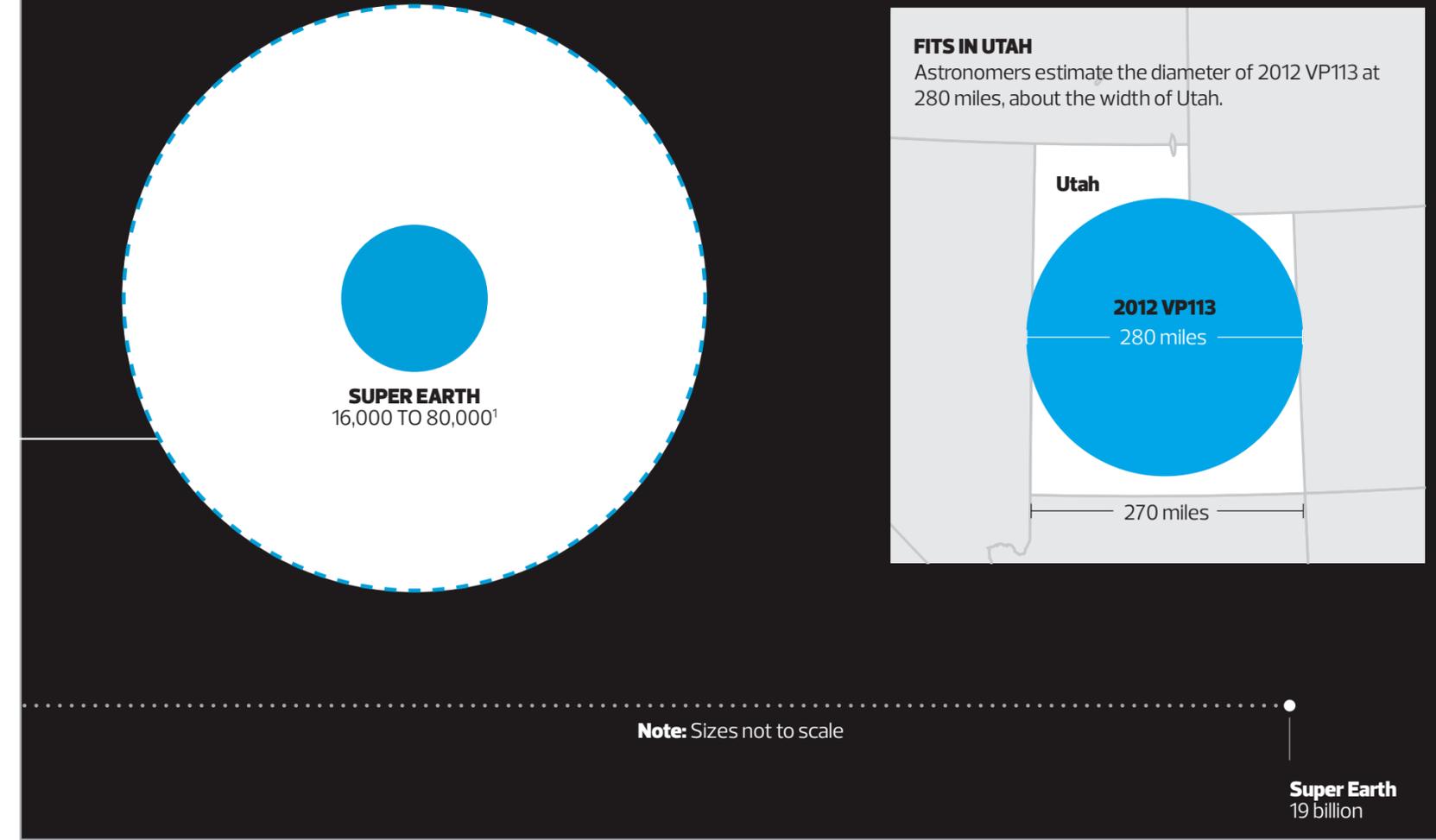


## DISTANCE FROM SUN

Positions at perihelion, closest position to sun (In miles)



<sup>1</sup>— estimates. SOURCES: SPACE.COM; NASA; GEORGE PETRAS AND TRACI WATSON, USA TODAY



KARL GELLES/USA TODAY

## HOW PLANETS ARE NAMED

The International Astronomical Union (IAU) has been responsible for approving the names of heavenly bodies since 1919. The IAU lists more than 300 sources for planetary names, from mythologies, legends and folktales to famous women and scientists.

The 15-member Committee for Small Body Nomenclature (CSBN), a global group of astronomers, votes to approve proposed names. They become official when published in a journal of the Minor Planets Center (MPC).

For example, planetary scientist Mike Brown nicknamed his 2003 discovery Xena. The MPC assigned the object a provisional designation, 2003 UB313. The number includes the year the object was discovered (2003), which half of the month it was discovered in (U) and the order in which it was found during the month (B313). When the object's orbit was confirmed, the IAU assigned it a permanent number (136,199), and Brown proposed a permanent name: Eris.

Now, the world can join the name game by participating in the first IAU-sponsored NameExoWorlds contest. After nonprofit organizations and astronomy clubs suggest names for more than 300 exoplanets, the public can vote online for their favorites. New names will be announced at the IAU General Assembly in August 2015.

— Mary Helen Berg

Among other things, proposed names should be:

- ▶ One word
- ▶ No more than 16 characters
- ▶ Not offensive
- ▶ Different than existing planet names
- ▶ Not the name of a recent military or political leader or event
- ▶ Not a pet animal name

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— Thierry Montmerle, general secretary, International Astronomical Union

Committee (PDC), an international group consisting of astronomers, educators, historians and novelist Dava Sobel, dared to go where no man had gone before. They set criteria that an object must meet to be considered a planet — criteria that excluded Pluto because while it orbits the sun like other planets, it is smaller and can-

not clear objects out of its path. In a controversial vote, IAU members attending the 2006 General Assembly approved the new definition.

Galactic traffic beyond Neptune’s orbit in the icy region called the Kuiper Belt

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“There was no real need for a definition of planet before this,” said PDC member Richard Binzel, a Pluto specialist at the Massachusetts Institute of Technology. “It was more like, ‘You know a dog when you see one.’ You know a planet when you see one.”

Technology has changed that. Increasingly powerful land telescopes and space telescopes such as the one used in NASA’s Kepler mission have revealed a bonanza of celestial objects, causing astronomers to question what they had thought needed no definition.

contains thousands of objects. Even more exoplanets exist outside the solar system. In 2003, one Kuiper Belt object (KBO) appeared so similar in size to Pluto that astronomers thought it had potential as the 10th planet.

Intense interest over the discovery of the KBO, Eris, in 2003 prompted the need for a definition of planet and for a new category of dwarf planets, objects that share some, but not all, of the criteria for a planet, said Thierry Montmerle, IAU general secretary.

“The Pluto case is the only one I’m aware of in which public emotional reaction (call it interest) has forced the IAU to issue a definition,” Montmerle wrote in an e-mail.

Usually, “the IAU decides to give a definition of an object if there is a scientific necessity to do so (like for a catalog), and if it is possible or useful,” he said. “For instance, there is no IAU definition of a star or of a galaxy. A definition has to be quantitative or refer to a specific physical law (like gravity for planets vs. dwarf planets).”

Sooner or later, the discovery of Eris was

certain to influence Pluto’s planet status, said Jack Burns, a vice president of the American Astronomical Society (AAS). “If Eris had been known at the same time that Pluto was named a planet (in 1930), it probably would have had a big impact on the whole original discussion of what are planets and Pluto’s designation as a planet,” Burns said.

The number of planets has been more fluid than one might think. The IAU debated for two years before establishing eight major planets and re-assigning Pluto and Eris to the dwarf category, along with the asteroid Ceres, and KBOs Makemake and Haumea. But an earlier resolution would have named 12 planets — the current eight, plus Pluto, Eris, the asteroid Ceres and Charon, Pluto’s satellite. Ceres was considered a planet for decades after its discovery in 1801.

In fact, early 19th-century astronomers also thought about extending the planets to a dozen, believing that asteroids Ceres, Pallas, Vesta and Juno were all planets, Williams said.

## PICK A NUMBER

So how many planets are there really? “Ask 100 scientists and you’ll get 100 answers,” said MIT’s Binzel.

David Aguilar’s answer is in the title of his middle-school book *13 Planets: The Latest View of the Solar System*. He combines the five dwarf and the eight major planets in a baker’s dozen.

“A planet is a planet is a planet” regardless of nitpicky definitions, said Aguilar, director of science information at the Harvard-Smithsonian Center for Astrophysics.

Far from the debate, planetary scientist Nicole Zellner of Albion College in Michigan, whose lunar research is supported by NASA, among others, suggests that the astronomy community use “a worldwide online poll” of interested scientists to seek more input the next time it debates an important topic like planet status.

And to think that ancient astronomers could simply look up to the inky sky, marvel at a moving light and call it a planet. Ah, the good old days. ●

## WHAT’S A PLANET?

In 2006, the International Astronomical Union (IAU) decided that for a celestial body to be defined as a planet it needed to meet three criteria:

- 1 It must orbit the sun
- 2 Its mass is great enough that its own gravity pulls it into a round or nearly round shape
- 3 It has cleared debris from the neighborhood of its orbit

That same year, the IAU approved the first definition for dwarf planet. It must also orbit the sun and achieve a roundish shape, cannot be a satellite and does not need to clear its neighborhood.

Likewise, the IAU deemed that any other object that orbits the sun, except planetary satellites, should be called “Small Solar System Bodies.”

— Mary Helen Berg