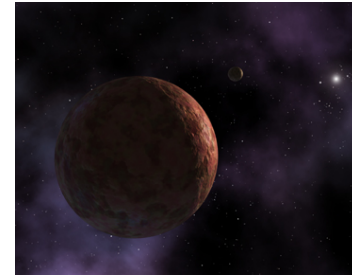


Pluto, Eris, and the Dwarf Planets of the Outer Solar System

Michael E. Brown

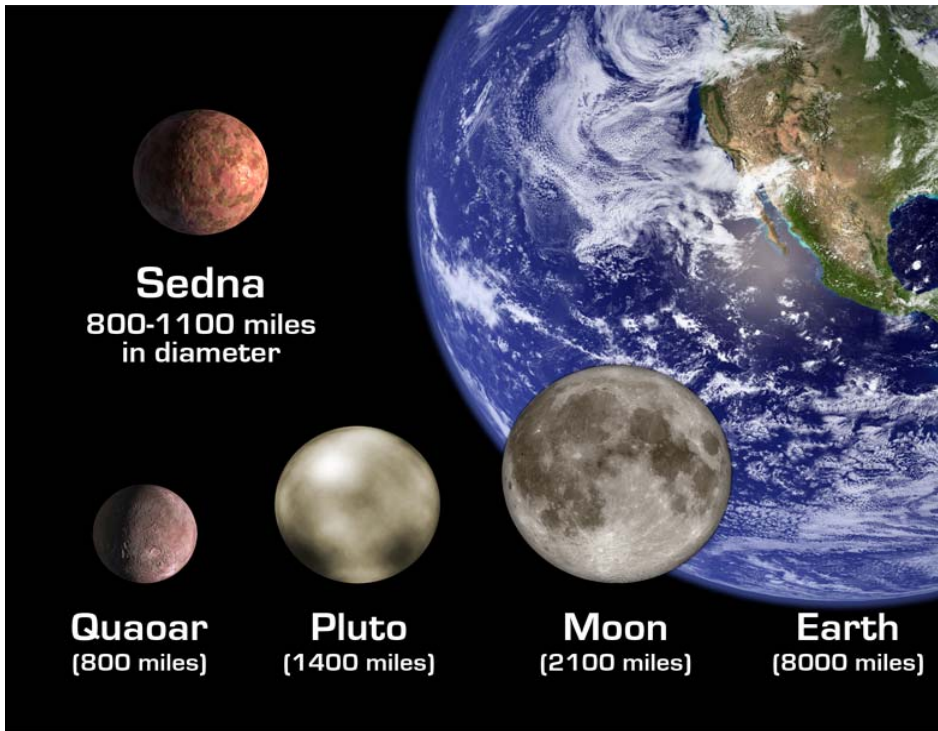
March 20, 2007



Sedna (artist's conception)

Five planets in our Solar System are bright enough, at times, to be easily seen without a telescope, and were, hence, well-known to ancient peoples. William Herschel's chance discovery in 1781 of an entirely new planet, Uranus, during a routine scanning of the sky with one of the best telescopes then in existence, was very big news. Trying to predict the position of Uranus in the sky over time led to the realization that there was another planet, as yet undiscovered, farther out. Mathematical calculations (and intrigue) led to the discovery of Neptune in 1846. But Neptune also deviated from its calculated movements ever-so-slightly, too. Percival Lowell and others attempted to make the same kinds of calculations that led to the discovery of Neptune. Years later, in 1930, Clyde Tombaugh, an astronomer in the employ of Lowell Observatory, found a planet-sized object beyond Neptune, which was named Pluto. For decades the Solar System was regarded as "complete," at least in terms of planet-sized objects.

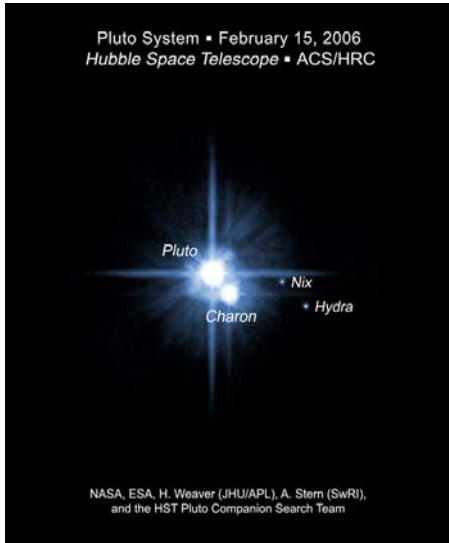
Observation technology has improved over the last decade. We now have the capability of detecting Kuiper Belt Objects (KBO's, see sidebars below), at least the larger ones, directly, using Earth-based telescopes. *Speaker Brown and colleagues have discovered several of them, including Sedna, Quaoar, and Eris.* Pluto has lots of company! But are these really "planets," or was Pluto merely the first discovery of an entirely new class of objects? In 2006, the International Astronomical Union, the gatekeepers of astronomical nomenclature, re-defined the term "planet" to reflect our much-increased knowledge about our Solar System and, in the process, Pluto lost its planetary status. It's not a matter of discrimination; our knowledge growth merely exceeded the limitations of existing terminology.



Kuiper Belt Objects Pluto and Quaoar, Oort Cloud member Sedna, and the Earth and Moon, all to the same scale. Pluto's moon, Charon, is about the size as Quaoar.

- Pluto was the God of the Underworld in Roman mythology.
- Charon was the Boatman who ferried the Dead across the River Styx to Hades.
- Sedna is an Inuit goddess of the Sea
- Quaoar is named for the "mythical creation-force figure of the Tongva tribe of the Los Angeles basin."
- Eris (not shown) is the Greek goddess of Discord (perhaps reflecting naming controversies in general!)
- Eris is about the same size as Pluto, and may be a lot larger

The 2007 Exploring Space Lectures



Almost eighty years of Pluto study: One of Clyde Tombaugh's "discovery" photographic plates from 1930 (above) in NASM's Exploring the Planets Gallery; HST image of Nix and Hydra, two additional Pluto moons discovered in 2005 (left).



Gerard Kuiper
(University of Arizona photo)

Who was Gerard Kuiper and why is there a "Belt" named after him?

We did know that there was a lot of leftover debris from the formation of the Solar System, including comets whose orbits showed they came from far beyond Pluto. Calculations by Jan Oort and others led to the postulate that there is a large body of comets (the "Oort Cloud" of comets) gravitationally-bound to the Sun very loosely (if at all), at the edge of interstellar Space. Similar calculations by Gerard Kuiper (kEYE per; rhymes with "viper") predicted a similar population of comets closer to the Sun (the "Kuiper Belt"), but still well beyond Neptune, extending out to 50 times the Earth-Sun distance. (Sedna never gets that close, and is considered part of the innermost Oort Cloud. Eris, Quaoar, Orcas, and Pluto(!) are part of the Kuiper Belt.)



Our Speaker

Mike Brown is Professor of Astronomy at Caltech and the discoverer, along with colleagues, of Eris (formerly known as 2003 UB313), Sedna, Quaoar, and other TNO's (Trans-Neptunian Objects).

References

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- NASM's Pluto page: <http://www.nasm.si.edu/research/ceps/etp/pluto>
- NASA's Planets website: <http://solarsystem.jpl.nasa.gov/planets/index.cfm>
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