Small solar system

Small solar system

A small Solar System body (SSSB) is an object in the Solar System that is neither a planet, a dwarf planet, nor a natural satellite. The term was first defined in 2006 by the International Astronomical Union (IAU) as follows: "All other objects, except satellites, orbiting the Sun shall be referred to collectively as "Small Solar System Bodies"".[1]

This encompasses all comets and all minor planets other than those that are dwarf planets. Thus SSSBs are: the comets; the classical asteroids, with the exception of the dwarf planet Ceres; the trojans; and the centaurs and trans-Neptunian objects, with the exception of the dwarf planets Pluto, Haumea, Makemake, Quaoar, Orcus, Sedna, Gonggong and Eris and others that may turn out to be dwarf planets.

The current definition was included in the 2006 IAU resolution that defined the term planet, demoting the status of Pluto to that of dwarf planet. In the context, it should be interpreted as, "All objects other than planets and dwarf planets orbiting the Sun shall be referred to collectively as "Small Solar System Bodies". The definition excludes interstellar objects traveling through the Solar System, such as the interstellar interlopers 1I/?Oumuamua and 2I/Borisov.

It is not presently clear whether a lower size bound will be established as part of the definition of small Solar System bodies in the future, or if it will encompass all material down to the level of meteoroids, the smallest macroscopic bodies in orbit around the Sun. (On a microscopic level there are even smaller objects such as interplanetary dust, particles of solar wind and free particles of hydrogen.)

Except for the largest, which are in hydrostatic equilibrium, natural satellites (moons) differ from small Solar System bodies not in size, but in their orbits. The orbits of natural satellites are not centered on the Sun, but around other Solar System objects such as planets, dwarf planets, and small Solar System bodies.

Some of the larger small Solar System bodies may be reclassified in future as dwarf planets, pending further examination to determine whether or not they are in hydrostatic equilibrium.

The orbits of the vast majority of small Solar System bodies are located in two distinct areas, namely the asteroid belt and the Kuiper belt. These two belts possess some internal structure related to perturbations by the major planets (particularly Jupiter and Neptune, respectively), and have fairly loosely defined boundaries. Other areas of the Solar System also encompass small bodies in smaller concentrations. These include the near-Earth asteroids, centaurs, comets, and scattered disc objects.

Solar System -> Local Interstellar Cloud -> Local Bubble -> Gould Belt -> Orion Arm -> Milky Way -> Milky Way subgroup -> Local Group -> Local Sheet -> Virgo Supercluster -> Laniakea Supercluster -> Local Hole -> Observable universe ->

UniverseEach arrow (->) may be read as "within" or "part of".

Small solar system bodies--along with the Sun, planets, and dwarf planets--help make up our Solar System. Small solar system bodies include things like comets, asteroids, moons, and the icy objects in the Kuiper Belt and the Oort cloud.

In addition, a critical aspect of small-body research involves maintaining and exporting the high-precision positions for each of the eight planets in the Solar System, 181 natural satellites, and hundreds of thousands of comets, asteroids, and KBOs through the Solar System Dynamics (SSD) group, which currently amounts to about 800,000 objects. SSD group"s HORIZONS ephemeris service has provided more than 190 million predictions from over one million different computers for Solar System object positions to an international community of scientists.

SSD group also runs the Center for Near-Earth Object Studies (CNEOS), which is tasked with computing high-precision orbits for potentially hazardous asteroids and comets and statistical assessments of impact probability in support of NASA"s Planetary Defense Coordination Office. CNEOS maintains two key tools: the Scout system that analyses newly discovered objects in real-time for any near-future hazard they may pose to Earth, and the Sentry system which performs long-term analyses of any potential impact over the next century or more.

Near-Earth Objects (NEOs) are asteroid and comets that have been nudged from their original, stable orbits and have been send on paths that come close to the Earth"s orbit. They are scientifically interesting as nearby targets for observation and exploration, but also can pose a threat to life on Earth if they are on an impact trajectory. The bolide that exploded over Chelyabinsk, Russia in 2013 served as a reminder of the destructive potential of even these smaller NEOs. Searching for new objects and monitoring known ones is a critical component to understanding their risk.