Study shows proportionally large moons around other planets not as rare as thought

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The image of the moon is courtesy of NASA.

(PhysOrg.com) -- Working with computer simulations to recreate what scientists believe to be the conditions that led to the formation of Earth's moon, which up to now has been considered quite large, a team of researchers from Switzerland and the United States, in a paper published on *arXiv*, have shown the likelihood of other planets having proportionally large moons is much higher than was previously thought.

Earth's moon is believed to have come into existence as a result of a collision with another planet, causing massive amounts of debris to be knocked into orbit, and over time coalescing into the single round entity

we know and love today. Such an occurrence has generally been thought to be a rare event though, and as such, most scientists have believed that the proportional size of our moon, to Earth, was much larger than that found with most other moons orbiting other rocky planets.

Tossing that notion on its head, the new simulations indicate that the odds of such an occurrence range from 1 in 6, to 1 in 45, which in either case, would mean a lot more planet/moon pairs out there are much closer in size than most anyone thought. The reason this is important is because a large moon such as the one circling our planet tends to stabilize the tilt of the planet which in turn helps stabilize heat the distribution from sun, making life much more possible. This is good news for those spending their careers tying to find such planets, insomuch as it makes the probability of their being other planets out there supporting some form of life form, much more likely; but not so good is that it means there are likely far more planets that must now be sifted through.

The simulations were based on the way that planets are believed to form from smaller bits of rock called planetesimals and gas and were run using data previously obtained from simulations run on systems that very closely related those with Earth-like planet systems.

Not everyone is ready to jump on board with the new results however; some such as Eiichiro Kokubo, an authority on planet formation, while speaking to the BBC, cautioned that there are still too many variables in the equations used in the simulated results to draw any definite conclusions, and thus believes more research must be done before accepting the new conclusions as truth.

More information: How common are Earth-Moon planetary systems? arXiv:1105.4616v1 [astro-ph.EP]

Abstract

The Earth's comparatively massive moon, formed via a giant impact on the proto-Earth, has played an important role in the development of life on our planet, both in the history and strength of the ocean tides and in stabilizing the chaotic spin of our planet. Here we show that massive moons orbiting terrestrial planets are not rare. A large set of simulations by Morishima et al., 2010, where Earth-like planets in the habitable zone form, provides the raw simulation data for our study. We use limits on the collision parameters that may guarantee the formation of a circumplanetary disk after a protoplanet collision that could form a satellite and study the collision history and the long term evolution of the satellites qualitatively. In addition, we estimate and quantify the uncertainties in each step of our study. We find that giant impacts with the required energy and orbital parameters for producing a binary planetary system do occur with more than 1 in 12 terrestrial planets hosting a massive moon, with a low-end estimate of 1 in 45 and a high-end estimate of 1 in 4.