Second Moon For The Earth

written by Anoj Khadka | October 1, 2024

This month, Earth is predicted to undergo a temporary gravitational capture of a second natural satellite, an asteroid designated 2024 PT5. Unlike Earth's primary natural satellite, which has maintained a stable orbit for approximately 4 billion years, this newly captured object will remain in orbit for a brief period of about two months (Sept. 29 to Nov. 25, 2024) before resuming its heliocentric path in the asteroid belt.

The anticipated capture of 2024 PT5 was identified by a group of astronomers who specialize in the observation of short-term satellite events. This particular asteroid displays dynamic orbital characteristics that align with the conditions necessary for gravitational capture by Earth. 2024 PT5 belongs to the Arjuna asteroid group, a subset of near-Earth objects with orbits closely resembling Earth's at an average distance of 150 million kilometres from the Sun.

Objects from the Arjuna group can approach Earth at distances as close as 4.5 million kilometres and at relatively slow velocities of around 3,540 kilometres per hour. Under these conditions, the asteroid's geocentric energy becomes negative, allowing temporary gravitational capture. However, 2024 PT5 will not complete a full orbit around Earth during its short stay, distinguishing it from long-term natural satellites. Instead, the asteroid will only briefly interacting with Earth before continuing its journey.

Past events

Throughout Earth's history, several objects have temporarily been captured as natural satellites, orbiting Earth for limited periods before departing or being destroyed. Most of these temporary moons, often referred to as "mini-moons," are asteroids or space debris that become gravitationally trapped in Earth's orbit.

One of the most notable examples of such a second satellite is 2006 RH120. It was discovered by the Catalina Sky Survey on September 14, 2006. With an estimated diameter of around 2-3 meters, this small object orbited Earth for approximately nine months before escaping in June 2007. It likely originated as an Apollo asteroid before being temporarily captured by Earth's gravity. 2006 RH120's exit from Earth's orbit was a result of gravitational interactions with the Moon and the Sun, which eventually pushed it back into a solar orbit.

Another significant example is 2020 CD3, also discovered by the Mount Lemmon Survey on February 15, 2020. With a diameter between 1-6 meters, it orbited Earth for roughly two years before escaping in March 2020. Similar to other temporary satellites, 2020 CD3 was likely an asteroid briefly caught by Earth's gravity before drifting back into an orbit around the Sun.

These objects are fascinating as they provide insight into gravitational interactions within the Earth-Moon system and between celestial bodies. Further studies on these mini-moons continue, as researchers monitor for new temporary satellites.