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Commentary

Geological Facts about Neptune

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ABOUT THE STUDY

Neptune is the eighth planet from the Sun in our solar system and is invisible to the bare eye. The planet is nearly four times the size of Earth, and because of its composition, is nearly 17 times heavier. It takes Neptune a hundred sixty-five Earth years to orbit the Sun and a day on the planet lasts around sixteen hours.

Neptune is classified as one of our solar system's "gas giant" planets, which means it does not have a solid surface and is largely a collection of swirling clouds and gas [1]. The blue "surface" of Neptune is in reality the top of an everlasting cloud cover. Below Neptune's clouds lies an environment of hydrogen, helium, and methane, this sits above an icy "mantle" layer.

Neptune's mantle is a layer of water, ammonia, silica, and methane ices and perhaps the nearest component Neptune has to a surface [2]. There are differing theories as to whether water is ample enough there to produce an ocean or whether the mantle is only a deep layer of compressed gas extending to Neptune's core [3]. Neptune was the first planet to be "discovered" through mathematics.

The gas giant Neptune was named the Roman god of the ocean because of its vibrant blue color. Although this colour was later discovered to be an artifact of the methane in the outer environment rather than water, Neptune possesses an environment and mantle appropriately rich in water. However, Neptune's water do not acquire in the forms of lakes, rivers, and oceans that we're familiar with right here on Earth [4]. The combination of Neptune's splendid mass, its notable distance from the sun, and its lack of anything like a solid surface have a few exciting results for water. The gaseous environment of Neptune occupies the outer third of the planet's radius. Water exists in the environment in the form of vapor and microscopic droplets or ice crystals [5]. At a point of about one-third the distance between the outer environment and the core, the gaseous environment becomes the mantle [6]. Most of the identical elements present in the environment-hydrogen, methane, ammonia, and water-make up the mantle however exist at higher temperatures and pressures. The pressures in the mantle prevent water from vaporizing or freezing, so much of the water exists as a liquid. However, deep in the mantle, something strange happens: the water is compressed into a theoretical state called superionic water, which acts relatively like a liquid, particularly like a crystal, and fairly like a metal. Although scientists have never directly observed superionic water, experiments are underway to create tiny samples in laboratories using particle beams.

Scientists theorize the core of Neptune to be approximately the mass of Earth and composed largely of rock and superionic water. Although the temperature of the core is even higher than that of the mantle, the pressure exerted on the water should force the water to act more like ice than liquid water, even though the pressure and temperature are far too high to allow the water to freeze.

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