



The D/H ratio in comet 103P/Hartley 2

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Abstract

Water is a key ingredient for the development of life. For decades, the source of Earth volatiles, especially water, has been a subject of debate. Proposed explanations include accretion of material in the vicinity of the Earth orbit or delivery by impacts of asteroids or comets during the late heavy bombardment (LHB). The source of water reservoirs can be accurately traced by measurements of the deuterium-to-hydrogen isotopic ratio (D/H). Previous measurements of this ratio in several Oort cloud comets resulted in a value twice as high as that in the Earth oceans, leading to the generally accepted conclusion that comets are unlikely to be the primary source of ocean water. Together with orbital modelling, these measurements suggested instead that asteroids with composition similar to that of CI meteoroids were the main water source. As part of our solar system observation programme [1], using the HIFI instrument [2] on the Herschel Space Observatory [3], we have obtained the first measurement of the D/H ratio in a Jupiter-Family comet (103P/Hartley 2). We discuss the implications of these observations for the origin of ocean water.

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