OCEAN-LIKE WATER IN JUPITER-FAMILY COMET 103P/HARTLEY 2. P.Hartogh[1], D.C. Lis[2], D. Bockelée-Morvan[3], M. de Val-Borro[1], N. Biver[3], M. Küppers[4], M. Emprechtinger[2], E.A. Bergin[5], J. Crovisier[3], M. Rengel[1], R. Moreno[3], S. Szutowicz[6], G. A. Blake[2] and the HssO-team, [1]Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany, hartogh@mps.mpg.de, [2]California Institute of Technology, Pasadena, CA, USA, [3]LESIA Observatoire de Paris, CNRS, UPMC, Université Paris-Diderot, France, [4]Rosetta Science Operation Centre, European Space Astronomy Centre, Madrid, Spain, [5]Astronomy Center, University of Michigan, Ann Arbor, USA, [6] Space Research Centre, Polish Academy of Sciences, Warsaw, Poland.

Abstract: 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 modeling, 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) [4]. It turned out that 103P's D/H-ratio is consistent with VSMOW. This result substantially expands the reservoir of Earth ocean-like water to include some comets, and is consistent with the emerging picture of a complex dynamical evolution of the early Solar System. We discuss the implications of these observations for the origin of water and the evolution of its distribution in the solar system.

References:

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