Geophysical Research Abstracts
Vol. 17, EGU2015-14408, 2015
EGU General Assembly 2015

Determination of an upper limit for the water outgassing rate of main-belt comet P/2012 T1 (PANSTARRS)

Laurence O'Rourke (1), Colin Snodgrass (2,3), Miguel de Val-Borro (3,4), Nicolas Biver (5), Dominique Bockelée-Morvan (5), Henry Hsieh (6), David Teyssier (1), Yan Fernandez (7), Michael Küppers (1), Marco Micheli (6), and Paul Hartogh (3)

(1) European Space Agency, Villanueva de la Canada, Madrid, Spain (lorourke@esa.int, dteyssier@sciops.esa.int, michael.kueppers@sciops.esa.int), (2) Planetary and Space Sciences, Department of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK (c.d.b.snodgrass@gmail.com), (3) Max Planck Institute for Solar System Research, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany (hartogh@mps.mpg.de), (4) Department of Astrophysical Sciences, Princeton University, Princeton, NJ 08544, USA (mdevalbo@astro.princeton.edu), (5) Lesia, Observatoire de Paris, CNRS, Meudon, France (nicolas.biver@obspm.fr, Dominique.Bockelee@obspm.fr), (6) Institute for Astronomy, University of Hawaii, 2680 Woodlawn Drive, Honolulu, HI 96822, USA (hsieh@IfA.Hawaii.Edu, micheli@IfA.Hawaii.Edu), (7) Department of Physics, University of Central Florida, 4000 Central Florida Blvd, Orlando, FL 32816-2385, USA (yrf@me.com)

A new Main-Belt Comet (MBC) P/2012 T1 (PANSTARRS) was discovered on 2012 October 6, approximately one month after its perihelion, by the Pan-STARRS1 survey based in Hawaii (Wainscoat et al. 2012). It displayed cometary activity upon its discovery with one hypothesis being that the activity was driven by sublimation of ices; as a result, we searched for emission assumed to be driven by the sublimation of subsurface ices. Our search was of the H2O 110–101 ground state rotational line at 557 GHz from P/2012 T1 (PANSTARRS) with the Heterodyne Instrument for the Far Infrared (HIFI; de Graauw et al. 2010) on board the Herschel Space Observatory (Pilbratt et al, 2010) on 2013 January 16, when the object was at a heliocentric distance of 2.504 AU and a distance from Herschel of 2.059 AU. Perihelion was in early 2012 September at a heliocentric distance of 2.411 AU. To analyse the data we used a molecular excitation model equivalent to that utilized to analyze both Herschel and ground-based cometary observations (Hartogh et al. 2010, 2011; de Val-Borro et al. 2010, 2012a, 2012b). While no H2O line emission was detected in our observations, we were able to derive sensitive 3sigma upper limits for the water production rate and column density of $<7.63 \times 10^{25}$ molecules s^{-1} and of $<1.61 \times 10^{11}$ cm^{-2}, respectively.

An observation taken on 2013 January 15 using the Very Large Telescope found the MBC to be active during the Herschel observation, suggesting that any ongoing sublimation due to subsurface ice was lower than our upper limit.

Acknowledgements: We thank the Herschel Project Scientist and Time Allocation Committee for awarding five hours of Director Discretionary Time for this observation. M.d.V.B. acknowledges support from grants NSF AST-1108686 and NASA NNX12AH91H. Based in part on observations collected at the European Southern Observatory, Paranal, Chile, under programme 290.C-5028. C.S. received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement No. 268421.

References: * de Graauw, T., Helmich, F. P., Phillips, T. G., et al. 2010, AA, 518, L6 * de Val-Borro, M., Hartogh, P., Crovisier, J., et al. 2010, AA, 521, L50 * de Val-Borro, M., Hartogh, P., Jarchow, C., et al. 2012a, AA, 545, A2 * de Val-Borro, M., Rezac, L., Hartogh, P., et al. 2012b, AA, 546, L4 * Hartogh, P., Crovisier, J., de Val-Borro, M., et al. 2010, AA, 518, L150 * Hartogh, P., Lis, D. C., Bockelee-Morvan, D., et al. 2011, Nature, 478, 218 * Pilbratt, G. L., Riedinger, J. R., Passvogel, T., et al. 2010, AA, 518, L1 * Wainscoat, R., Hsieh, H., Denneau, L., et al. 2012, CBET, 3252, 1