Geophysical Research Abstracts
Vol. 18, EGU2016-9490, 2016
EGU General Assembly 2016

Orbital and Rotational Dynamics of Pluto's Small Moons

Mark Showalter (1), Harold Weaver (2), John Spencer (3), Simon Porter (3), Douglas Hamilton (4), Richard Binzel (5), Marc Buie (3), William Grundy (6), Francis Nimmo (7), Robert Jacobson (8), Marina Brozovic (8), S. Alan Stern (3), Cathy Olkin (3), Leslie Young (3), Kimberly Ennico (9), and the The New Horizons Science Team

(1) SETI Institute, Carl Sagan Center, Mountain View, CA, United States (mshowalter@seti.org), (2) Applied Physics Lab, Laurel, MD, United States, (3) Southwest Research Institute, Boulder, CO, United States, (4) University of Maryland, College Park, MD, United States, (5) Massachusetts Institute of Technology, Cambridge, MA, United States, (6) Lowell Observatory, Flagstaff, AZ, United States, (7) University of California, Santa Cruz, CA, United States, (8) Jet Propulsion Laboratory, Pasadena, CA, United States, (9) NASA Ames Research Center, Moffett Field, CA, United States

Four small moons, Styx, Nix, Kerberos and Hydra, orbit the central binary planet comprising Pluto and Charon. Showalter and Hamilton (Nature 522, 45-49, 2015) analyzed Hubble Space Telescope (HST) data from 2010-2012 to explore some of the dynamical consequences of orbiting a binary planet. They noted evidence for a chaotic rotation of Nix and Hydra, and identified a possible three-body resonance between Styx, Nix and Hydra. We revisit the dynamics of the outer moons based on the data from the New Horizons flyby of July 2015, combined with three more years of HST data. As New Horizons was approaching Pluto, the LORRI camera regularly imaged the moons over a period of $\sim$100 days. It also resolved the moons in closeup images, revealing details about the moons' sizes, shapes and surface properties. The LORRI data set has made it possible to derive light curves, rotation rates and pole orientations unambiguously. The moons rotate much faster than they orbit and have high obliquities, suggesting that tidal de-spinning has not played a dominant role in their rotational evolution. We will discuss the latest conclusions from a joint analysis of the LORRI and HST data sets, combined with new dynamical simulations. This work was supported by NASA's New Horizons project and by Space Telescope Science Institute.