EPSC Abstracts
Vol. 8, EPSC2013-903, 2013
European Planetary Science Congress 2013

Mass Determination of Pluto and Charon from New Horizon REX Radio Science Observations

M. Pätzold (1), T.P. Andert (2), G.L. Tyler (3), M.K. Bird (1), D.H. Hinson (3), I.R. Linscott (3)
(1) Rheinisches Institut für Umweltforschung, Abteilung Planetenforschung (RIU-PF), an der Universität zu Köln, Köln, Germany
(2) Institut für Raumfahrttechnik und Weltraumnutzung, Universität der Bundeswehr München, Neubiberg, Germany
(3) Department of Electrical Engineering, Stanford University, Stanford, CA, USA

Abstract

The anticipated 14 July 2015 New Horizons fly-through of the Pluto system provides the first opportunity to determine both the total system mass and the individual masses of Pluto and Charon by direct observation. This will be accomplished by use of: i) two-way Doppler radio frequency tracking data during intervals along the fly-in and -out trajectory, and ii) one-way uplink Doppler frequency recorded by the on-board radio science instrument, REX, during the day of closest approaches to Pluto and Charon. Continuous tracking is not feasible as a result of pointing sharing with the instruments during the encounter phase. Needed radio tracking will be obtained during time slots shared with i) two-way Doppler tracking for navigation, ii) 'plasma rolls' with the spacecraft antenna pointing to Earth, and iii) during the ingress and egress phases of the occultations. Simulations of the NH encounter indicate the potential accuracies of the combined and individual mass determinations of Pluto and Charon in the order of 0.1%.