High precision comet trajectory estimates: the Mars flyby of C/2013 A1 (Siding Spring)

D. Farnocchia[a], S. R. Chesley[a], M. Micheli[b,c,d], A. Delamere[e], R. S. Heyd[f], D. J. Tholen[g], J. D. Giorgini[a], W. M. Owen[a], L. K. Tamppari[a]

[a] *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA*
[b] *ESA NEO Coordination Centre, 00044 Frascati (RM), Italy*
[c] *SpaceDyS s.r.l., 56023 Cascina (PI), Italy*
[d] *INAF-IAPS, 00133 Roma (RM), Italy*
[e] *Delamere Support Services, Boulder, CO 80304, USA*
[f] *Planetary Image Research Laboratory, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA*
[g] *Institute for Astronomy, University of Hawaii, Honolulu, HI 96822, USA*

Abstract

The Mars flyby of C/2013 A1 (Siding Spring) represented a unique opportunity for imaging a long-period comet and resolving its nucleus and rotation period. Because of the small encounter distance and the high relative velocity, the goal of successfully observing C/2013 A1 from the Mars orbiting spacecrafts posed strict accuracy requirements on the comet's ephemerides. These requirements were hard to meet, as comets are known for being highly unpredictable: astrometric observations can be significantly biased and non-gravitational perturbations affect comet trajectories. Therefore, even prior to the encounter, we remeasured a couple of hundred astrometric images obtained with ground-based and Earth-orbiting telescopes. We also observed

Email address: Davide.Farnocchia@jpl.nasa.gov (D. Farnocchia)

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