

Characterization of Hayabusa II Target Asteroid (162173) 1999 JU3.

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The Japanese Hayabusa II mission is planned to rendezvous with and return a sample from the near-Earth asteroid (162173) 1999 JU3. Previous mid-infrared studies have constrained the albedo and thermal properties of this object (Muller et al. 2011; Campins et al. 2011; Hasegawa et al. 2008). Visible wavelength spectra from 1999 and 2007 reveal a C-type asteroid that displays pronounced spectroscopic variability around 0.7 microns. Variability in the strength of a 0.7 micron band could be due to heterogeneous concentrations of iron-bearing phyllosilicates across its surface (Vilas 2008). We will present new observations from the favorable 2012 apparition to further characterize this object. In June of 2012 spectroscopic observations were conducted with the LDSS3 and FIRE instruments on the Magellan telescopes at Las Campanas Observatory in Chile. Between April and July of 2012 broadband visible-wavelength photometry was obtained with the Tenagra II telescope in Arizona and with the IMACS, Megacam and LDSS3 instruments on the Magellan telescopes. Our visible and near-infrared spectra confirm a C-type taxonomic classification, but do not show evidence for the presence of a 0.7 micron phyllosilicate band. Our time series of visible spectra cover approximately 60% of the rotational phases of 1999 JU3, but do not display any pronounced variability. We use our new optical light curves, combined with photometry from 2007, to refine a shape model of the asteroid. This shape model provides a means for mapping surface regions accessed by the spectroscopic observations from both 2007 and 2012, and thus to directly address the possibility of surface heterogeneity. This surface map, in conjunction with the newly measured photometric phase curve of the asteroid, will be used to make predictions regarding composition and surface properties that will ultimately be tested upon arrival of the Hayabusa II spacecraft.