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Cratering chronology models for the near-Earth asteroid 1999 JU3

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The Japanese asteroid explorer Hayabusa-2, that is scheduled for launch in 2014, will be observe a near Earth C-type asteroid 1999 JU3 and will return to Earth with its samples. In this study, we model cratering and crater erasure processes on 1999 JU3 to provide an age estimate for 1999 JU3 based on high-resolution images that will be obtained by Hayabusa-2. The impact rate on 1999 JU3 is calculated from population models of main-belt asteroids (MBAs) and near-Earth asteroids (NEAs) and the average collision probabilities for the main belt and for NEAs. By converting the impactor size to the size of consequent crater based on crater scaling law and the average collision velosities for the main belt and for NEAs, the cratering rate on 1999 JU3 is calculated. For comparison, we use two population models of asteroids, two crater scaling laws and five conditions of surface of 1999JU3. In addition, two crater erasure processes, seismic shaking and saturation of craters, are considered in our model. As a result, our models indicate that age estimate of 1999 JU3 primary depends on crater scaling laws used and assumptions of surface conditions of 1999 JU3 rather than population models of asteroids.