

Asymmetric cratering due to a steady-state NEA flux on the Moon

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Recent lunar explorations have revealed that there is a signature of asymmetric crater distribution on the lunar surface, probably caused by the synchronous rotation of the Moon. In order to obtain the information about dynamical origin of the projectiles that created the asymmetry, we carried out a series of numerical integrations to reproduce the impact distribution on the Moon with a large number of test particles that follow a steady-state NEA flux. We find that the near-Earth asteroids do have an asymmetry in their impact flux on the Moon: apex-to-antapex ratio of 1.3–1.4. However, the observed rayed crater distribution’s asymmetry is significantly more pronounced. Hence our simulations suggest the existence of an undetected population of slower (low impact velocity) projectiles, such as a population of objects coorbiting with Earth.