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The Earth-Impact Risk From Manx Comets

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ABSTRACT

Much of the contemporary work on Near-Earth Object (NEO) detection is focused on discovery of Near-Earth Asteroids. Near-Earth Comets also pose a risk to life on Earth. After a few more decades of NEO searches, a larger fraction of the remaining risk will lie with Near-Earth Comets, which are difficult to detect well in advance.

Pan-STARRS has detected a new class of comets, which have been referred to as “Manx comets,” named after the Manx cat that has no tail. These objects have comet-like (parabolic or near-parabolic) orbits, but have low or no activity, displaying little or no tail. The first such object, C/2014 S3 (PANSTARRS), has a spectral reflectivity similar to inner solar system S-type asteroids, suggesting that these objects may represent asteroidal material ejected into the Oort cloud, and that these find their way into the inner solar system via the same mechanisms as long-period comets. Due to their very low volatile activity, the Manx comets are much fainter than normal long-period comets of similar size.

The Earth-impact risk from Manx-type comets will be evaluated based on our current knowledge of these objects, and compared to the risk from other comets and Near-Earth Asteroids. Since the Manx comets appear to be made of rocky material like asteroids, they have higher densities than long-period comets. Earth impact velocities from Manx comets are similar to those from long-period comets, and significantly faster than from asteroids. Earth-impacting orbits will be simulated to show the evolution of brightness and motion of Manx comets as they approach (with their anomalous motion, rather than cometary nature, leading to discovery). The simulations will demonstrate the relatively short warning times that are likely for this type of Earth-impactor.
