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THE VALUE OF ENHANCED NEO SURVEYS

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ABSTRACT

NEO surveys have now achieved, more or less, the “Spaceguard Goal” of cataloging 90% of NEAs larger than 1 km in diameter, and thereby have reduced the short-term hazard from cosmic impacts by about an order of magnitude, from an actuarial estimate of ~1,000 deaths per year (actually about a billion every million years, with very little in between), to about 100 deaths per year, with a shift toward smaller but more frequent events accounting for much of the remaining risk. It is fair to ask, then, what is the value of a next-generation accelerated survey to “retire” much of the remaining risk. The curve of completion of survey versus size of NEA is remarkably similar for any survey, ground or space based, visible light or thermal IR, so it is possible to integrate risk over all sizes, with a time variable curve of completion to evaluate the actuarial value of speeding up survey completion. Using my latest estimate of population and survey completion, I estimate the “value” of accelerated surveys such as Pan-STARRS, LSST, or space-based surveys, versus continuing with current surveys. My tentative conclusion is that accelerating surveys to achieve the next generation goal of 90% completion down to 140 m diameter in 15 years will reduce integrated risk over that time by about 600 lives. Again it must be emphasized that this number is not literally “lives saved”, as in the case of reducing automobile accident rates, but rather a very small reduction in the probability of even a single event going undiscovered and occurring in the 15 year period. I note, however, that the surveys, which find and catalog main-belt and other classes of small bodies as well as NEOs, have provided a gold mine of good science. The scientific value of continued or accelerated surveys needs to be emphasized as the impact risk is increasingly “retired.”