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CROWN: Constellation of heterogeneous wide-field NEO surveyors

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ABSTRACT

A constellation of heterogenous wide-field NEO surveyors (CROWN) is introduced in this paper. Near-Earth Objects (NEOs) survey is interesting in planetary science and is vital for planet defence. It helps characterize the small objects population of the solar system. It's believed small objects such as asteroids, comets and meteorites are leftovers of the planet formation process. Habitable condition and geological history of the Earth might have been shaped by incoming NEOs during the bombardment era. NEOs survey is necessary to identify potentially hazardous objects (PHOs), which is a prerequisite for NEO alert and response. Space-based NEO surveyor is more efficient and more economic than ground-based large telescopes. With a constellation of heterogenous surveyors in a heliocentric orbit, 90% of NEOs of ~10m or larger could be detected in 3 to 5 years. The proposed constellation consists of one satellite with a high-resolution telescope on-board in Sun-Earth L1 orbit and several miniatured satellites with wide-field cameras on-board. This constellation also makes a panoramic observatory which is competitive in astronomical transients monitoring, such as super novae, microlensing, etc.