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STREAMLINING GEO SSA DATA ACQUISITION, PROCESSING, AND CONTRIBUTION FROM AN AMATEUR ASTRONOMERS' PERSPECTIVE USING < 1M APERTURE TELESCOPES

Abstract

The current space environment is rapidly evolving to become highly sophisticated medium with enhanced complexity than ever before due to thousands of Resident Space Objects (RSOs) traveling at astronomical speeds. Moreover, the number of these RSOs is constantly increasing due to recent ASAT experiments, satellite collisions, on-board explosions, rocket bodies and fragments, and ever-increasing number of active satellites. The idea of crowd sourcing astronomy observatories is not novel and has been published several times before; however, due to lack of procedures and standards, it has not yet been implemented. Moreover, due to standardization issues in data collection and catalogue building between different organizations/agencies, data fusion presents its own challenges. Instead of revisiting the idea of crowd sourcing SDA data acquisition from Organization/Agency's perspective, this paper explores the idea of GEO SSA data acquisition, processing, and contribution from the perspective of an amateur astronomer using open-source commercially-off-the-shelf (COTS) equipment and software packages. The methodology is explained using results from a test case scenario that employed telescope of 0.4 m aperture with GoTo mount and CCD. Moreover, this paper sets nominal technical criteria for equipment that can be qualified for GEO SSA data collection. Furthermore, the paper explores the fundamentals of data processing using commercial software/algorithms and the subsequent contribution towards SSA data network for GEO RSOs. Lastly, the paper verifies the improved accuracy of the RSO in the test case with the help of amateur optical observations.