Development of the NASA MCAT Auxiliary Telescope for Orbital Debris Research

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The National Aeronautical Space Administration has deployed the Meter Class Autonomous Telescope (MCAT) to Ascension Island with plans for it to become fully operational by summer 2016. This telescope will be providing data in support of research being conducted by the Orbital Debris Program Office at the Johnson Space Center. In addition to the main observatory, a smaller, auxiliary telescope is being deployed to the same location to augment and support observations generated by MCAT. It will provide near-simultaneous photometry and astrometry of debris objects, independent measurements of the seeing conditions, and offload low priority targets from MCAT's observing queue. Its hardware and software designs are presented here.

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The National Aeronautical and Space Administration (NASA) has recently deployed the Meter Class Autonomous Telescope (MCAT) to Ascension Island. MCAT will provide NASA with a dedicated optical sensor for observations of orbital debris with the goal of statistically sampling the orbital and photometric characteristics of the population from low Earth to Geosynchronous orbits. Additionally, a small auxiliary telescope, co-located with MCAT, is being deployed to augment its observations by providing near-simultaneous photometry and astrometry, as well as offloading low priority targets from MCAT's observing queue. It will also serve to provide an independent measurement of the seeing conditions to help monitor the quality of the data being produced by the larger telescope.

Comprised of off-the-shelf-components, the MCAT Auxiliary Telescope will have a 16-inch optical tube assembly, Sloan g'r'i'z' and Johnson/Cousins BVRI filters, and a fast tracking mount to help facilitate the tracking of objects in low Earth orbit. Tracking modes and tasking will be similar to MCAT except an emphasis will be placed on observations that provide more accurate initial orbit determination for the objects detected by MCAT. The near-simultaneous observations will also provide the opportunity for multi-filter color information of the debris objects to be obtained. Color information can further distinguish the individual objects within the population and provide insight into the reflectance properties of their surface material. The specific hardware, software, and tasking methodology of the MCAT Auxiliary Telescope is presented here.