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Author: Dr. Alessandra Di Cecco  
Agenzia Spaziale Italiana (ASI), Italy

Dr. Fiore De Luise  
INAF, Italy

Dr. Gaetano Valentini  
INAF, Italy

Mr. Cosimo Marzo  
Italian Space Agency (ASI), Italy

Dr. Ettore Perozzi  
Agenzia Spaziale Italiana (ASI), Italy

Dr. giuseppe bianco  
ASI, Italy

ON THE MULTI-COLOR LIGHTCURVES OF GEO SATELLITES

**Abstract**

Photometric studies of space debris have provided fundamental information on both the object shape and the surface materials. The comparison between optical observations and laboratory results represents a powerful method for investigating the physical characteristics of a space object. In particular, multi-band optical observations allow to combine different wavelengths and, consequently, independent information through the reconstruction of magnitudes, lightcurves and color indexes. In this context, we carried out an observational campaign with a 1-meter class telescope equipped with a Johnson photometric filter-wheel. By using three standard Johnson bands (VRI) and a small Field-of-View (FoV = approx 5'x5') we observed several satellites belonging to GEO constellations, such as ASTRA, Express, Turksat and Eutelsat. The observational strategy we adopted is based on the repeating sequence of V, R and I filters, by using an exposure time of 60 s for each frame, which allowed to collect hundreds of images. We analysed these images by applying the standard pre-processing techniques (i.e. taking into account the bias and flat-field contributions) and providing the aperture photometry, in order to obtain instrumental magnitudes. We calibrated to the standard reference by observing Landolt standard fields. Considering two-by-two continuous acquisitions in different bands we reconstructed the color-indexes and the multi-color lightcurves of our targets. We present our observational results confirming that multi-color lightcurves are good diagnostics to investigate the photometric features of space debris.