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THE DEGRADATION AND LIFETIME ESTIMATION FOR THE GEO SATELLITES BY ITS
PHOTOMETRIC OBSERVATIONS**Abstract**

A newly launched spacecraft photometric qualities differ from the ones who have spent some time on orbit. Particularly on the Geostationary orbit where the space weather radiation makes a significant contribution to the surface degradation of the spacecraft parts. Plus, the micro- or nano-collisions with space debris particles as small as millimeter in size or less can be a factor to solar panel degradation and make its surface to get out of work earlier than it was designed.

To analyze if there was some kind of a micro collision happened or any other space environment event that can cause the lifetime of an object to be less than planned, the observation technique can help us determine the current condition and estimate the lifetime of the asset. This can be accomplished by multicolor photometry and analyzing color indexes (B-V) and (V-R) of different part of light curve that corresponds to different parts of the object. The variation of color indexes with time provide us with information about the rate of surface degradation. Moreover, each part of a satellite have different surface composition degradation rate. This knowledge may provide us with valuable information about functionality of the satellite. It was shown in previous works that this information is especially important in first three years after the launch.

In this work we present methodology and results of surface degradation evaluation based on multicolor photometric observation of Kazakhstan's satellites KazSat-2 and KazSat-3.