

Characterizing GEO Titan Transtage Fragmentations using Ground-based Measurements

Abstract

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In a continued effort to better characterize the Geosynchronous Orbit (GEO) environment, NASA's Orbital Debris Program Office (ODPO) utilizes various ground-based optical assets to acquire photometric and spectral data of known debris associated with fragmentations in or near GEO. The Titan IIIC Transtage upper stage is known to have fragmented four times. Two of the four fragmentations were in GEO while a third Transtage fragmented in GEO transfer orbit. The fourth fragmentation occurred in Low Earth Orbit.

In order to better assess what may be causing these fragmentations, the NASA ODPO recently acquired a Titan Transtage test and display article that was previously in the custody of the 309th Aerospace Maintenance and Regeneration Group (AMARG) in Tucson, Arizona. After initial inspections at AMARG demonstrated that the test article was of sufficient fidelity to be of interest, the test article was brought to JSC to continue material analysis and historical documentation of the Titan Transtage. The Transtage will be a subject of forensic analysis using spectral measurements to compare with telescopic data; as well, a scale model will be created to use in the Optical Measurement Center for photometric analysis of an intact Transtage, including a BRDF.

The following presentation will provide a review of the Titan Transtage, the current analysis that has been done to date, and the future work to be completed in support of characterizing the GEO and near GEO orbital debris environment.