

19th IAA SYMPOSIUM ON SPACE DEBRIS (A6)  
Space Debris Detection, Tracking and Characterization - SST (1)

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ASTRONOMICAL SEEING IMPACT ON THE SPACE DEBRIS OPTICAL ANALYSIS

**Abstract**

The hazard posed by space debris represents a major problem, not only for the current orbital population of operational satellites, but also for the future sustainability of the space environment (e.g. the planned satellite mega-constellations). To address these issues, many efforts have been made both in terms of theoretical simulations and observational activities. In particular, ground-based optical telescopes are used to provide information on space debris orbital properties (through astrometric analysis) and on the objects' shape or surface composition (e.g. through multi-band photometry). Within this framework, the SPADE (SPAcE DEbris) telescope, located at the Space Geodesy Center of the Italian Space Agency (CGS-ASI), near the town of Matera in southern Italy (Lat=40d 38m 57s, Long= 16d 42m 12s), is fully devoted to space debris observations. SPADE has a FoV of 83 arcminutes and a resolution of 1.22 arcsec/pixel which allows observations of LEO, MEO and GEO regions; providing astronomical solutions by using an appropriate data-analysis pipeline. Ground-based optical observations are mainly affected by weather conditions, sky-brightness and by the astronomical seeing of the observational site. To address the latter issue, by using an in-situ seeing monitor we have collected a large dataset of almost 300,000 seeing measurements, spanning from 2017 to 2021. We analyzed this dataset by evaluating the mean annual seeing of the CGS site. We have also collected, simultaneously to the seeing measurements, several images of satellites taken with the SPADE telescope. We have then performed a photometric and astrometric analysis of these images, evaluating the impact of the seeing values on the quality of the obtained results. We hereby present the analysis carried out so far and summarize the most relevant findings. This study aims also to support the evaluation of the CGS site as candidate for the further installation of new-generation optical telescopes.