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Space Debris Detection, Tracking and Characterization (1)

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OPERATIONAL OBSERVATIONS OF LEO OBJECTS WITH OPTICAL SENSORS

**Abstract**

Optical sensors devoted to LEO observations, and consequently their contribution to space surveillance activities in this regime, have been unfrequently considered as operational, due to the very limited visibility windows and measurements accuracy, specially when compared to radars which are commonly used in that regime. The Earth shadow, the clear night condition and the fast-angular speed, has persuaded so far, to consider them as part of SST performing operational systems.

The cumulated experience with optical sensors at Deimos DeSS observatory, has permitted to develop a challenging LEO tracking optical sensor that together with ad-hoc observing strategies and processing techniques reach interesting results in terms of data accuracy (reaching tens of meters in LEO regime), data rate (with hundreds of tracks per night) and operational status. The paper describes the main differences when observing LEO and high altitude objects, the sensor capabilities required and the considerations for orbital computation in both case.

In this paper, the Antsy LEO sensor features, the observing and processing strategies, and the observing results are described and analyzed by comparing them with different reliable orbital reference sources. Different, publicly available, orbital datasets are compared against the observations and the orbital data obtained from the observations.