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Space Debris Detection, Tracking and Characterization - SST (1)

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RESULTS OF SMARTNET'S FIRST OBSERVATION CAMPAIGN COVERING THE
GEOSTATIONARY RING OVER THE PACIFIC OCEAN

Abstract

SMARTnet is conceptualised to be a worldwide network of passive-optical telescope stations. They are operated by the German Space Operations Center (GSOC) of the German Aerospace Center (DLR), together with partners who operate their own telescope station and provide tracklets. DLR's second telescope station is located at Mt Kent near Toowoomba in Australia. For this study, we are using its 25cm-telescope (SMART-02-B-KENT) for survey observations, with a field of view of about 2.9 degree.

In the stage of observation planning, we apply an algorithm called Optimal Multi-Object Survey and Tracking Planner (OMST), which schedules the available observation time optimally in terms of observing as many objects as possible within a given orbital region, in our case the geostationary ring over the Eastern part of the Indian Ocean and a large part of the Pacific Ocean. The objects sought to be observed may be based on publicly available catalogues or an internal object database. To detect new objects, a population hypothesis is formed and the highest probability regions are observed. In this paper, we will describe the algorithm and its application to SMART-02-B-KENT. The OMST algorithm results are compared to a more classical approach where declination stripes at fixed right ascension coordinates are used.

The object detection and astrometry are performed at the station, the resulting tracklets are transferred to SMARTnet's Backbone Catalogue of Relational Debris Information (BACARDI) algorithm suite, which includes tracklet association and orbit determination. The aim of our analysis is to display the current object population in the geostationary ring above the Pacific region. This includes the objects known in publicly available catalogues in combination with the collection of newly found objects, which are not present in such catalogues.