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DEVELOPING A DATA FUSION CONCEPT FOR RADAR AND OPTICAL GROUND BASED SST STATION.

Abstract

As part of the Portuguese Space Surveillance and Tracking (SST) program, a tracking radar and a double Wide Field of View Telescope system ($4.3° \times 2.3°$) are being installed at the Pampilhosa da Serra Space Observatory (PASO) in the center of continental Portugal, complementing an already installed deployable optical sensor for MEO and GEO surveillance. The tracking radar will track space debris in Low Earth Obit (LEO) up to 1000 km and at the same time the telescope will also have LEO Tracking and surveillance capabilities.

This article intends to discuss possible ways to take advantage of having these two sensors at the same location. With the installation of radar and optical sensors, Radar measurements give precise radial velocity and distance to the objects, while the telescope gives better sky coordinates measurements. With the installation of radar and optical sensors, PASO can extend observation time of space debris and correlate information from optical and radar provenances in real time. During twilight periods both sensors can be used simultaneously to rapidly compute new TLEs for LEO objects, eliminating the time delays involved in data exchange between sites in a large SST network. This concept will not replace the need for a SST network with sensors in multiple locations around the globe, but will provide a more complete set of measurements from a given object passage, and therefore increase the added value for initial orbit determination, or reentries campaigns of a given location. PASO will constitute a perfect site for the development and testing of new radar and optical data fusion algorithms and techniques for space debris monitoring. This concept will contribute to the development of new solutions to better characterize the objects improving the overall SST capabilities.