

SPACE DEBRIS SYMPOSIUM (A6)  
Measurements (1)

Author: Ms. Özgün YILMAZ

TUBITAK Uzay, Space Technologies Research Institute, Turkey, ozgun.yilmaz@tubitak.gov.tr

Dr. Egemen Imre

TUBITAK Uzay, Space Technologies Research Institute, Turkey, egemen.imre@uzay.tubitak.gov.tr

## SPACE-BASED SURVEILLANCE OF GEO USING ESA'S CONSTELLATION MISSION "GALILEO"

**Abstract**

Space-based systems are not a new concept for Space surveillance. In 1996, JPL had placed the Midcourse Space Experiment (MSX) into the Sun-synchronous orbit to expand the NASA's catalog of the resident space objects, particularly in the geosynchronous orbit (GEO) region. Space-based optical surveillance offers the advantage of surveillance of the whole GEO region even with a single satellite, in a cost-effective fashion and free from atmospheric effects. However, while satellite and debris population has been increasing steadily in the already cluttered and commercially critical GEO region, not many projects for space-based optical surveillance have been forthcoming. On one hand, a dedicated constellation for space-based surveillance of this region could provide timely data that could prove critical for conjunction analysis; yet, increasing launch costs suggest that funding constellations for such missions would be extremely difficult. We propose that a secondary payload on an existing constellation (in our study, GALILEO) could be the answer to this problem. We begin by characterizing the GEO debris and satellite population and define the requirements and the design of an optical sensor for surveillance from GALILEO orbit. We then analyze different observation strategies depending on the number and the orbital placement of the sensors. Finally, using ESA PROOF software, we present the estimated number of detection opportunities that could be expected from such a system.