

SPACE OPERATIONS SYMPOSIUM (B6)
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OCCASIONAL TWO STATIONS TRACKING TO IMPROVE ORBIT DETERMINATION ACCURACY
FOR GEOSTATIONARY SATELLITE: INDOVISION SCC IN CO-OPERATION WITH LAPAN

Abstract

Operational orbit determination (OD) for a geostationary satellite mostly rely on tracking data which consists of range and angles (elevation, azimuth) measurements from its auto-track TTC antenna. Many satellite operators rely on measurements from a single ground station which is economically feasible for small operators. Indovision SCC (Satellite Control Center) is a small GEO satellite operator; performs the tracking regularly for the Indostar-1 satellite which located at 107.7 E from its only ground station in Jakarta (6.163 S, 106.764 E). With longitude separation that is less than 1 degree, it raises geometric singularity in the observation. For single satellite at one orbital slot, the orbit determination accuracy from single station tracking still satisfies the ITU regulations for station keeping requirements. But, additional problems arise when Indostar-1 approach its End of Life. Due to its incapability to maintain near zero inclination, the daily libration increases and occupies more area in the longitude box. These problems increase the necessity for more accurate orbit determination.

Combining the tracking data from the primary ground station and additional remote tracking data is an effective method to increase the orbit determination accuracy. However, remote ranging station is costly and not economically feasible for small operators. Some other solutions to avoid dedicated remote ranging station are available including monopulse antenna, interferometry, and passive ranging. But, one conventional approach remain as an efficient solution to improve the orbit determination accuracy; occasional co-operation ranging. In co-operation with the Indonesian National Institute of Aeronautics and Space, LAPAN, two stations tracking for Indostar-1 are conducted with additional measurement from Biak ground station (1.175 S, 136.100 E). The result shows that the orbit determination accuracy is improving by periodically apply the estimated bias obtained from two station tracking.