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SPACE DEBRIS SYMPOSIUM (A6)
Political, Economic and Institutional Aspects of Space Debris Mitigation and Removal (Joint with Space Security Committee) (6)

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DATA INTEGRITY IN ORBITAL DATA FUSION

Abstract

Global Space Situational Awareness (SSA) relies on complete and accurate space catalogs that include characteristic attributes of space objects (SOs) and their associated uncertainties obtained from a disparate and distributed suite of sensors. As diverse data sources are introduced into the SO characterization process, it becomes more crucial for the data fusion process to include robust and reliable data integrity monitoring in order to minimize corruption and aliasing. All sensor networks have limitations and costs inhibit full treatment of the problem. Development of a data integrity monitoring is an important component that must be incorporated to discriminate and accommodate varying data qualities in the state estimation processing. Assembling various sensors, data types, data frequencies, and accuracies poses significant challenges to ensure the data integrity is sufficient to produce a product worthy of use in operational applications. Trending is also an important element that can be used to establish a baseline for data performance to allow detection of data anomalies and changes in performance. In this work we examine several processing techniques which rely implicitly on data consistency and its effect on the estimated parameters and their associated predictions and prediction uncertainties. Several scenarios are examined which explore the sensitivity of the data consistency to data quality and unmodeled forces. Results demonstrate the viability of incorporating near real-time data integrity and trending processes for autonomous integrity monitoring.