SINTRA

SPACE DEBRIS IDENTIFICATION AND TRACKING

INTELLIGENCE VALUE

The IARPA SINTRA program seeks to understand the interaction of orbital debris with the surrounding space environment, and whether the resulting phenomena can be used for the detection, tracking, and characterization of lethal non-trackable orbital space debris. The detection of lethal non-trackable orbital debris would enable safer operation of our valuable government and commercial space assets.

Space debris poses a risk to all space missions, including those of the Intelligence Community (IC). With an average low Earth orbit (LEO) impact velocity of 22,500 MPH, even the smallest of debris can cause significant damage. Currently, there are over 100 million objects greater than 1 mm orbiting the Earth, however, less than 1 percent of debris that can cause mission-ending damage are currently tracked. Due to the dynamic nature of the near-Earth space environment, predicting the trajectory of the debris is extremely difficult, necessitating persistent monitoring. While debris larger than 10 cm can be detected and tracked, smaller debris cannot be tracked using current capabilities.

As a result, there is an increased interest in tracking debris less than 10 cm. The detection, tracking, and characterization of lethal non-trackable space debris would support the safe operation of valuable space assets worldwide.

SINTRA is planned as a 48-month multi phase program, which will advance the state of the art for sensors capable of detecting orbital debris signatures and develop automated methods for signature analysis and debris tracking. These advances will help characterize orbital debris size, density, and mass, while reducing the uncertainties associated with their orbital predictions. If successful, SINTRA would enable the first tracking capability for the small debris population, reducing risk to worldwide space operations.

PRIME PERFORMERS

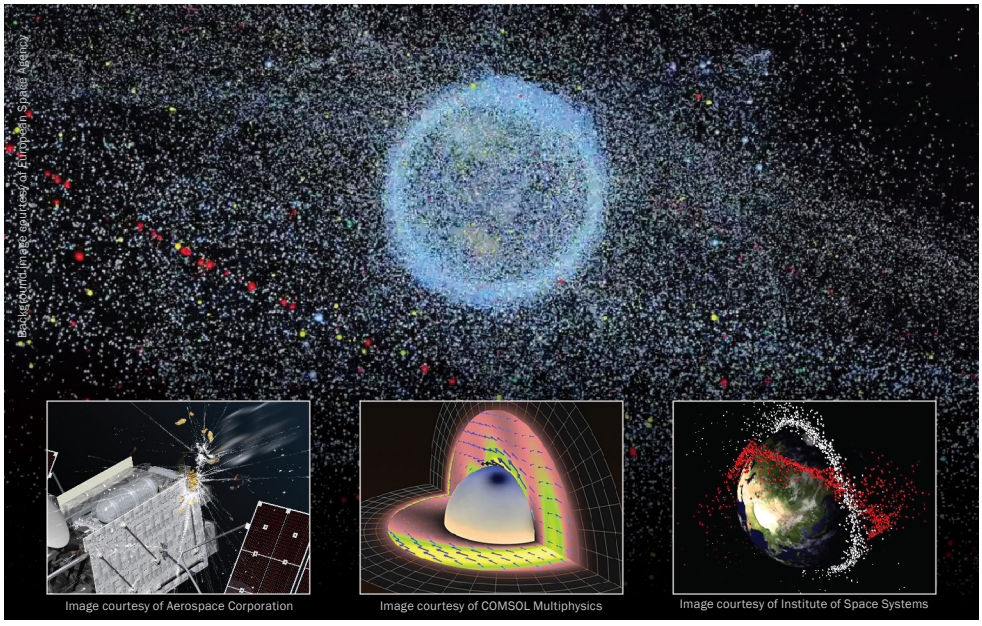
- Advanced Space
- BlueHalo
- SRI International
- West Virginia University Research Corporation

TESTING AND EVALUATION PARTNERS

- Massachusetts Institute of Technology — Lincoln Laboratory
- Naval Research Laboratory
- Los Alamos National Laboratory
- Johns Hopkins University — Applied Physics Laboratory

KEYWORDS

- Orbital debris
- Debris
- Plasma
- Radar
- Telescope
- Satellite



Background shows the distribution of 100 million debris objects greater than 1mm in size. Insets from left to right illustrate: (1) satellite damage caused by debris impact, (2) signatures created by the interaction of debris with the surrounding space environment, and (3) the spread of debris over time.

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