

INVITED TALK

The Space S&T Challenges from LEO to Cislunar

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ABSTRACT

The US Space Enterprise is continuing to pivot towards Space Warfighting, with an emphasis on resilient, disaggregated, proliferated platforms, agile business practices, and emphasis on partnerships. Challenges with operating in a contested domain combined with the need to move to more integrated multi-domain operations for peer conflicts present significant challenges for space systems. This is especially true as NASA, commercial entities, and allied partners extend space operations beyond GEO and into the cislunar sphere. AFRL has taken a leading role in advancing key elements in the overall space architecture through science and technology, rapid prototyping, new strategies for engaging nontraditional partners—e.g. Space Accelerators, novel business mechanisms, and broad international cooperation.

Space Domain Awareness (SDA) from LEO to cislunar is the foundation for deterrence and lays the groundwork for operations in a contested and congested domain. As a community, there are a number of challenges that must be addressed. First, we must agree on open architecture standards for messaging and data, and these must be extensible to new sensors, new sensor types/modalities, and advanced orbit determination approaches to include elements of object identification and not just metric tracking. Second, we must create the culture and technology to allow data to flow. Data cannot just flow into repositories; it must also be allowed to flow out providing data sets to the community at large to develop new tools to make use of it. Third, we must develop the tools to make sense of this torrent of data. We need to understand how to fuse different modalities of data to provide better metric tracking and object identification. We must have robust analytical tools to understand the performance of the entire system and where new technologies can improve performance. Finally, key to such a broad distributed network, we must develop tools to validate data to appropriately identify and either correct or dismiss outliers.

The future of SDA holds many exciting promises and challenges. AFRL looks forward to working through a wealth of partnerships to solve them.