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Overview and Use of AFSIM's Space Simulation Capabilities for Multi-Domain Operations Analysis

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DR. MICHAEL MOSS

INFOSCITEX



Advanced Framework for Simulation, Integration, & Modeling (AFSIM) Space Capabilities



- **AFSIM's** Multi-Domain Modeling Delivers Significant and Evolving Capabilities to Simulate Key Space Mission Areas
 - ISR, SSA, RPO, PNT, SATCOM, OPIR, Launch-to-Orbit
- **Multi-Resolution Modeling**
 - From Detailed Physics-Based to Simple Effects Representations of Platforms, Sensors, Communications Systems, and Weapons
- **Wizard** Supports Constructive Analysis and Architecture Trade Studies
- **Warlock** Enables Real-Time Wargaming with Assets Spanning from Subsurface to Space
- **Results Visualization** Allows Users to View and Post-Process Constructive or Real-Time Scenario Replays



AFSIM's Modeling, Simulation, and Visualization Capabilities Provide a Powerful and Flexible Environment to Conduct Space-Based and Multi-Domain Analysis and Experimentation

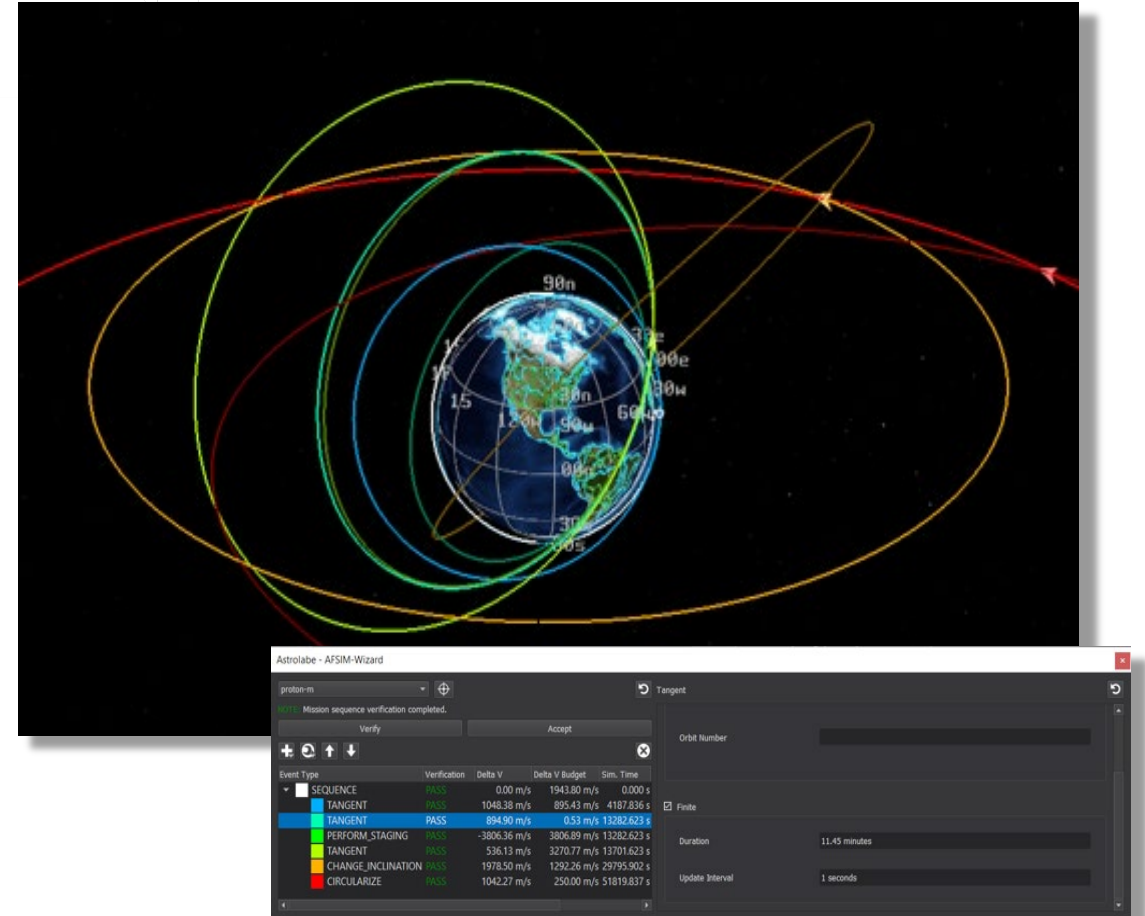


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Astrolabe



- Use Astrolabe to Create, Verify, and Visualize Orbital Mission Events and Sequences
- Plan Maneuvers Constructively in Wizard
- Execute Tactical Maneuvers in Real-Time with Warlock
- Utilize a Variety of Supported Orbital Maneuver Events
 - Rendezvous, Intercept, Target, Match Velocity
 - Normal, Tangent, Radial, Plane Change
 - Launch Insertion, Hohmann Transfer, Circularize
- Optimize Maneuvers Based on Time or Delta-V and Customize Event Constraints
- Specify Impulsive or Finite Maneuvering Model



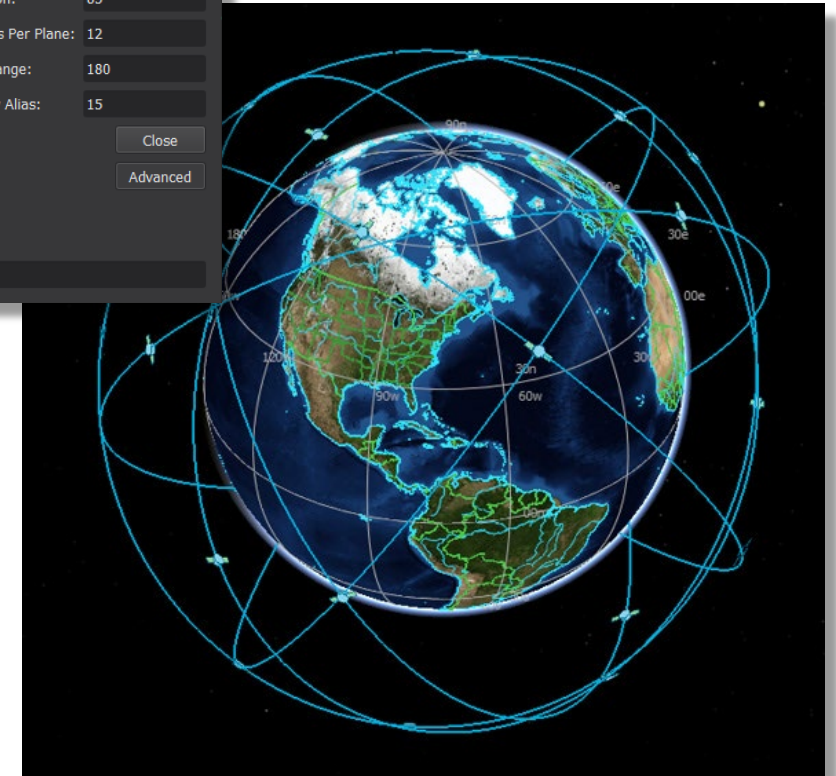
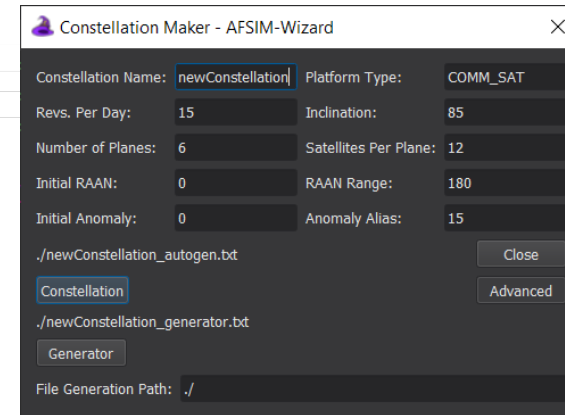


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Constellation Maker



- Rapidly Prototype and Study Constellations Targeting Specific Mission Areas
- Generate Notional Constellations using Wizard
- Traditional Walker Delta and Walker Star Types
- Custom Constellation Types
- Automatically Create AFSIM Scenario Input Files
- Constellation Members Inherit All Subsystems from their Defining Platform Type
- Customize Specific Constellation Members via the Advanced Generator Option



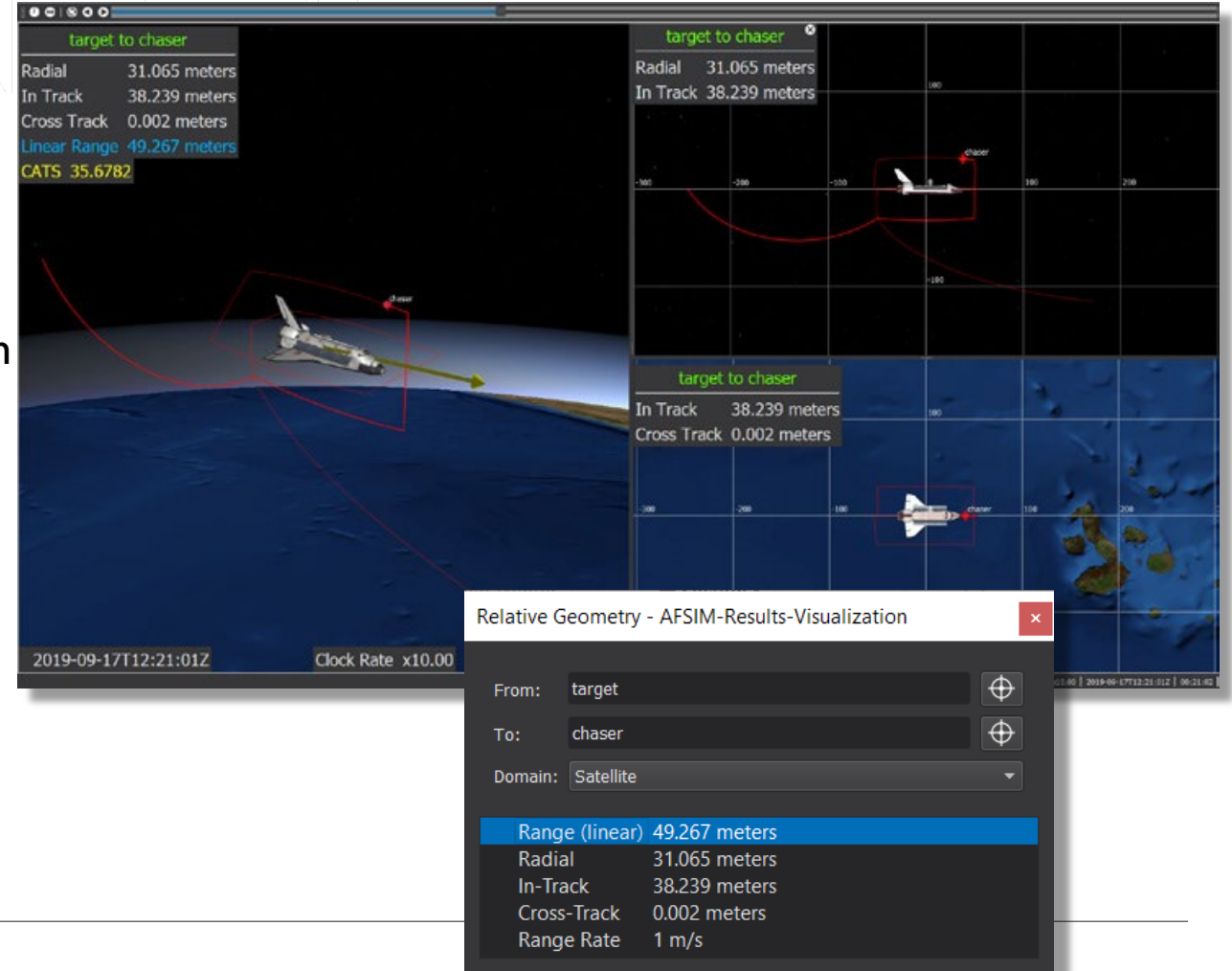


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Rendezvous & Proximity Operations (RPO)



- Explore AFSIM's Expanded Space-Domain Visualizations for RPO to Mission Plan and Understand the Playing Field
- Visualize Relative Orbit Systems using Tracks (Perception) or Truth
- Compute Relative Metrics on the Fly Between a Target HVA and Chaser Satellites
- Tile Radial, In-Track, and Cross-Track (RIC) Planes of Interest Relative to Selected HVAs
- Display Dynamic Data of Concern on Any Satellite Tether View Window



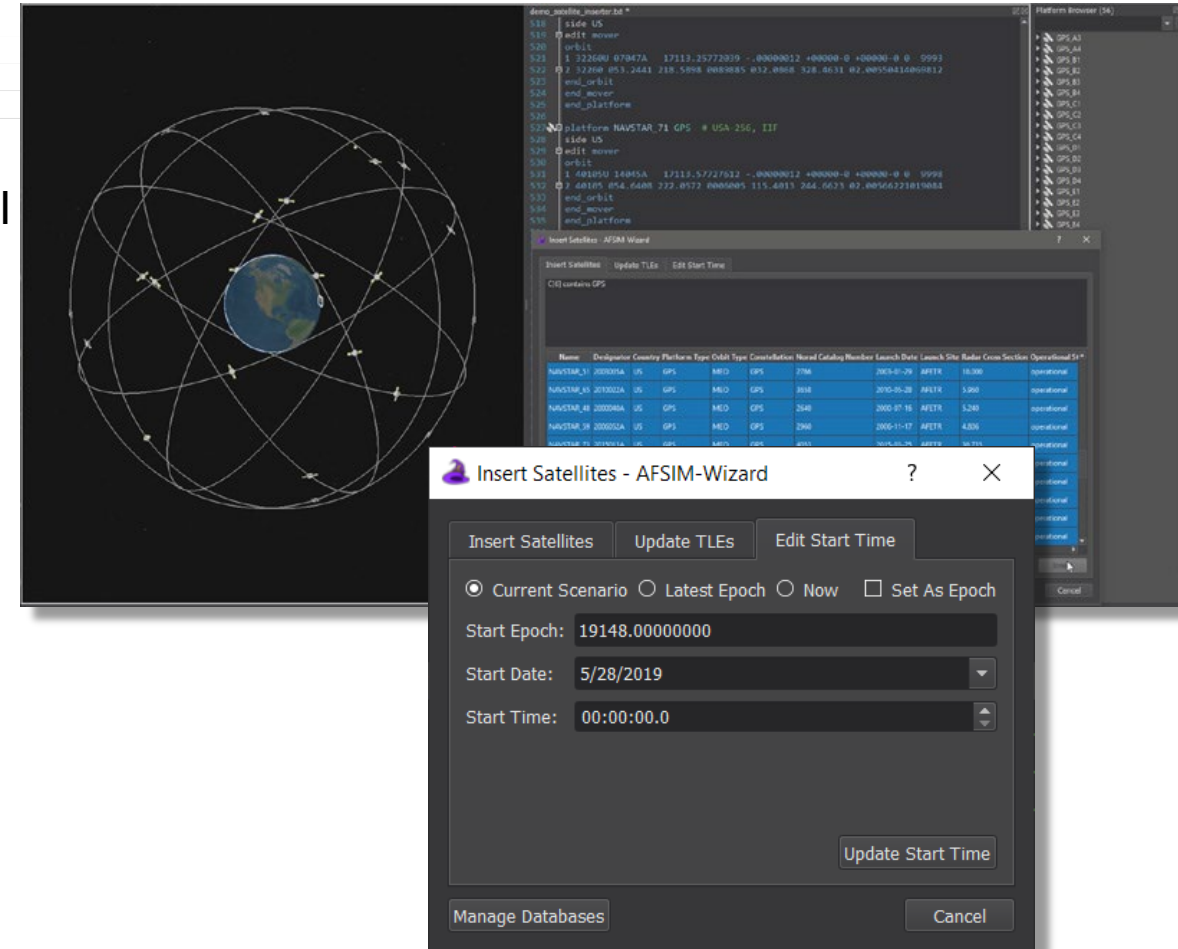


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Satellite Inserter Tool



- Easily Add or Update Satellites and Constellations from Catalogs via Wizard
- Supports Two-Line Elements (TLEs) and Classical Orbital Elements
- Create Your Own Satellite Catalog from an Existing Scenario
- Insert and Update TLEs from an Imported Catalog
- Filter Across All Catalogs to Include Satellites Based on Different Categories
 - Orbital Regime, Country, Launch Date
- Easily Select Scenario Start Time Based on Reference Epochs of Included Satellites



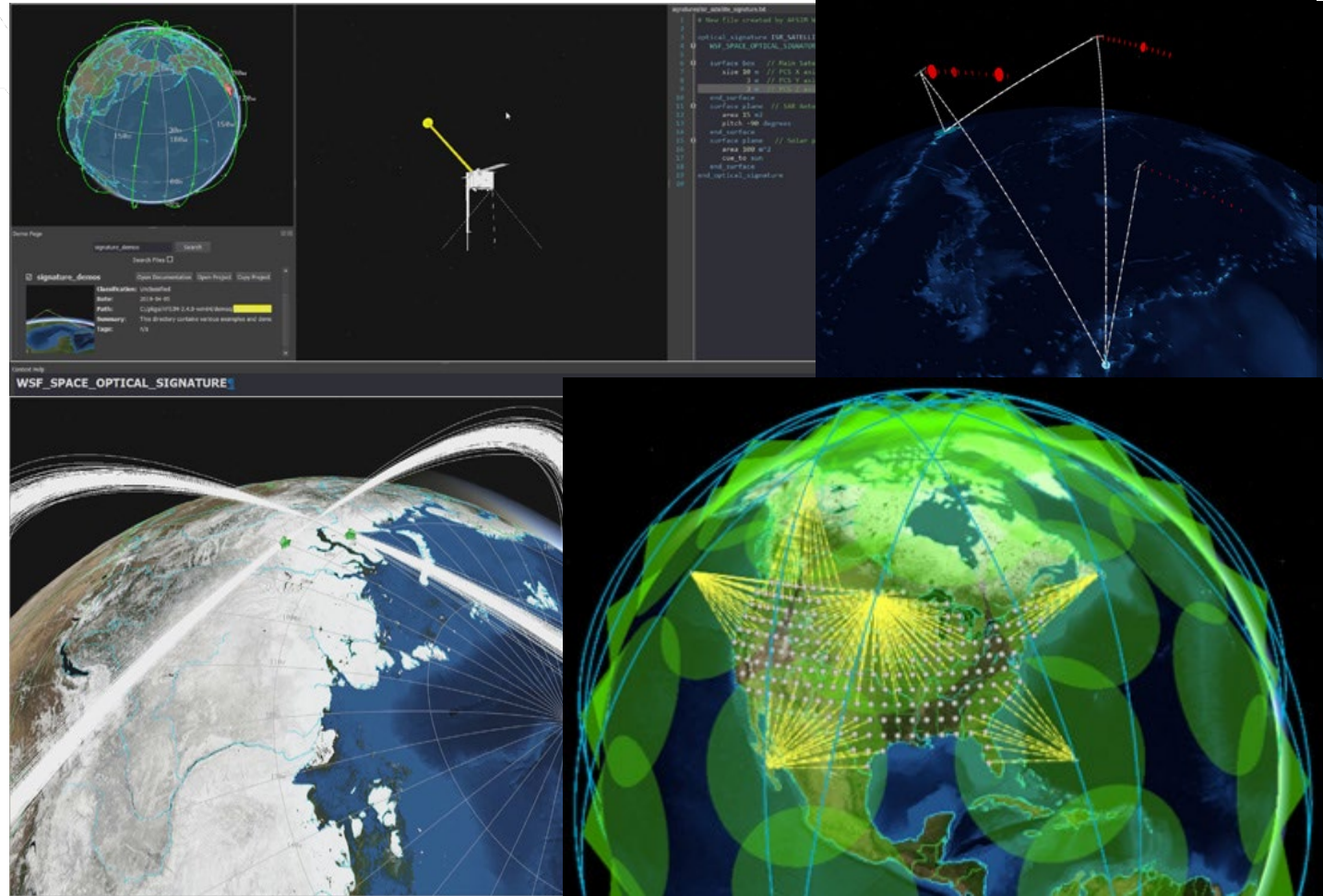


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Space Environment, Sensors, & Signatures



- Simulate the Space Environment
 - Satellite Signatures – RF, IR, and Optical
 - Orbital Conjunction Prediction and Avoidance
 - Collision and Debris Modeling
- Conduct Space Situational Awareness (SSA) Analysis
 - Model Space Surveillance Network Sensors
 - Use Multi-Type Data Fusion to Track and Update Perceived States of Space Objects
- Study the Access and Performance of Notional or Existing ISR and SATCOM Constellations



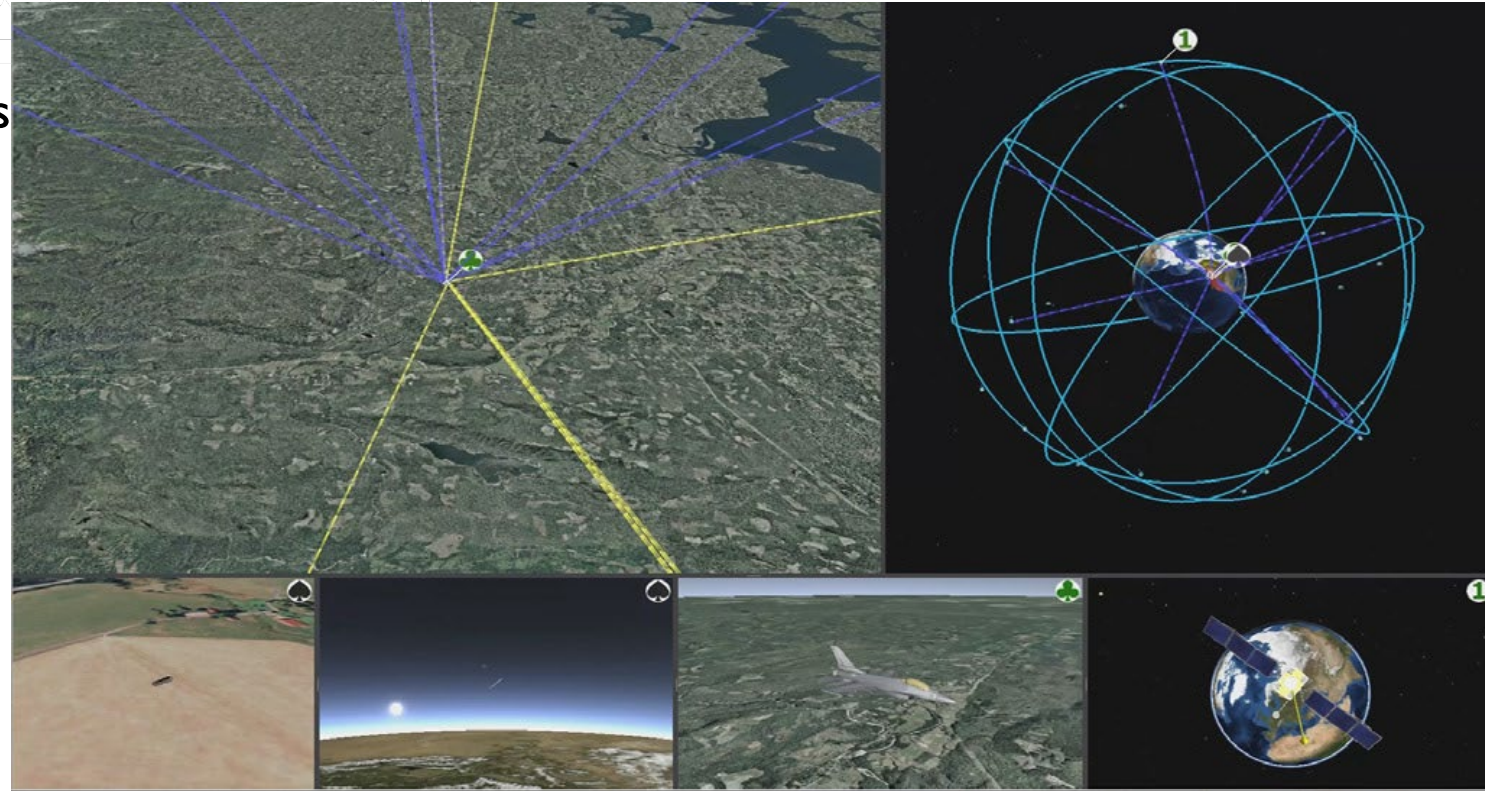


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Multi-Domain Operations



- AFSIM's Modeling, Simulation, Analysis, and Visualization Capabilities Span All Domains
- Seamlessly Integrate Space Assets with Surface, Ground, and Air Platforms
- Explore the Interplay of TCPED and F2T2EA Chains
- Take a Small Step into Space with AFSIM; Achieve a Giant Leap in Your Analysis!





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Utilize AFSIM's Extensive User Resources



- Physics and API Documentation
- Satellite and Space Operations Demos
- DIY Training with User's Guide
- Hands-on, SME-guided AFSIM Training Available from Infoscitex (IST)
- Space and Basic User Training
- Developer Training

The image displays two overlapping screenshots from the AFSIM user resources. The background screenshot is the 'AFSIM 2.4.0.190909 Documentation > Site Index' page, showing a sidebar with navigation links like 'Main Page', 'Documents', 'Security Information', and 'Contact Information'. The main content area is titled 'WSF_SPACE_MOVER' and lists various command categories such as 'Overview', 'Commands', 'Orbital Element Commands', and 'Orbital Propagator Commands'. A 'Script Type: WsfSpaceMover' section is also visible. The foreground screenshot is the 'Demo Browser - AFSIM-Wizard' window, which shows a search bar and a list of demo categories: 'satellite_demos' and 'space_operations'. Each category has a thumbnail image and a summary box containing 'Classification', 'Date', 'Path', 'Summary', and 'Tags'. The 'satellite_demos' category is selected, showing a summary for a demo dated 2014-10-08. Below the demo browser, there is a section titled 'Space Operations Training Exercises' with a list of seven exercises: 1. Creating a Constellation, 2. Launch To Orbit & Orbit Injection, 3. Satellite Communications, 4. Space Operations, 5. Sensors and Signatures, 6. Space Situational Awareness, and 7. Conjunction Assessment. This section includes a large image of a satellite constellation over a globe and a smaller image of a satellite in orbit.

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Government Management



- AFSIM is Available to DoD and DoD Industry at No Cost, Includes Source Code, Documentation, and Access to Training Events
- Information Transfer Agreement (ITA) Allows for Direct Distribution to Industry, Including Classified Version, Allowing use of AFSIM for IRAD Projects

***Send A Request For More Information Or A Copy Of AFSIM
To AFRL.RQ.AFSIM@us.af.mil***



Video



Questions?