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

AFRL

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

- **AFSIM**'s multi-domain modeling delivers significant and evolving capabilities to simulate key space mission areas
  - ISR, SDA, 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
- **Mystic** allows users to view and post-process constructive or real-time scenario replays
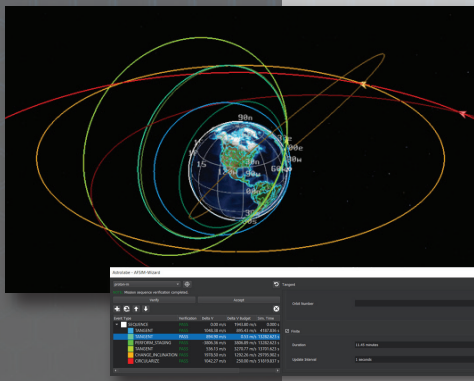
Astrolabe

- 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

Constellation Maker

- Rapidly prototype and study constellations targeting specific mission areas
- Generate notional constellations via GUI or scripted option
  - Traditional walker delta and walker star types
  - Custom constellation types
- Automatically create AFSIM scenario input files to facilitate design of experiments
- Constellation members inherit all subsystems from their defining platform type
- Customize specific constellation members via the advanced generator option
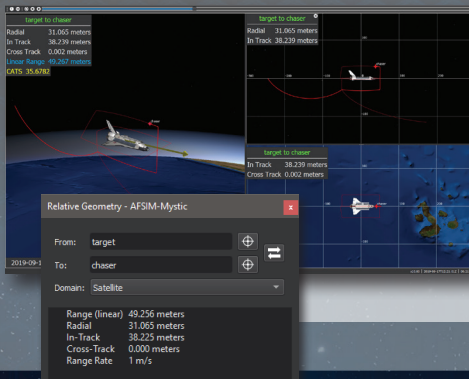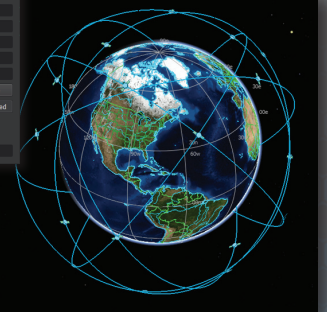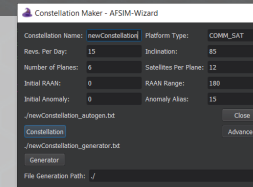
Rendezvous & Proximity Operations (RPO)

- 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

AFSIM Coverage

- Study sensor coverage of notional or existing ISR constellations
- Define coverage grids of various kinds (terrestrial, GEO belt)
- Select coverage assets from existing platforms or platform templates
- Collect a wide variety of measures of effectiveness
  - Including: coverage time, revisit time, asset coverage, access duration
- Generate reports in multiple formats
- Visualize results with integrated overlay in Wizard, Warlock, and Mystic
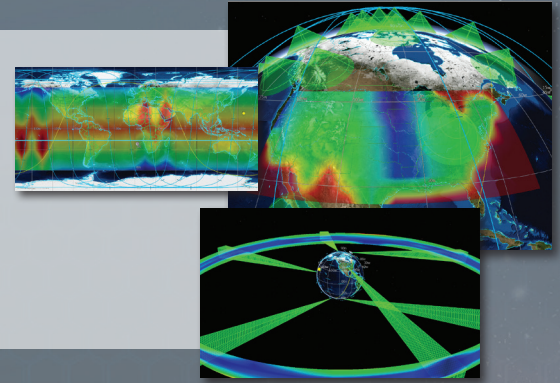
Space Environment, Sensors, & Signatures

- Simulate the space environment
  - Satellite signatures – RF, IR, and optical
  - Orbital conjunction prediction and avoidance
  - Collision and debris modeling
- Conduct space domain awareness (SDA) analysis with expanded cislunar modeling
  - Model space surveillance network sensors
  - Use multi-type data fusion to track and update perceived states of space objects
  - Employ AFSIM's flexible, extensible, and accurate integrating propagator
  - Create scenarios around central bodies other than earth
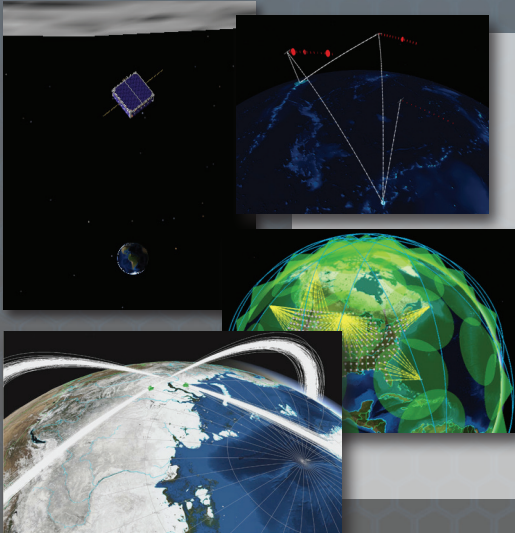
Multi-Domain Operations

- 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!
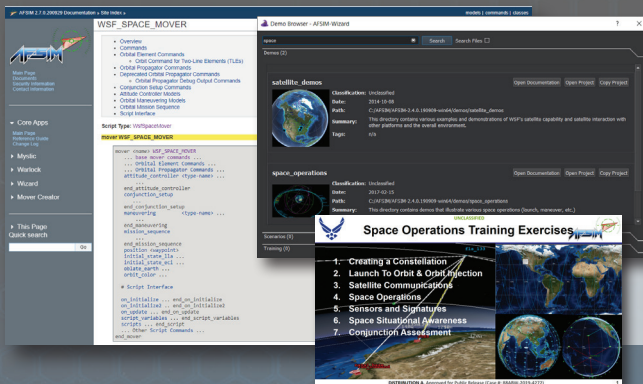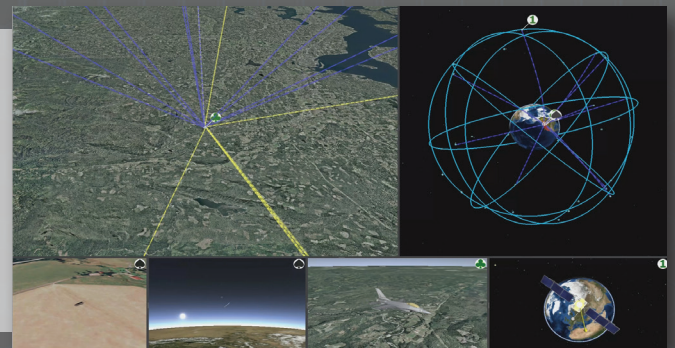
Utilize AFSIM's Extensive User Resources

- Physics and API documentation
- Satellite and space operations demos
- DIY training with user's guide
- Hands-on, SME-guided AFSIM training
  - Space and basic user training
  - Developer training

Government Management

- AFSIM is available to DoD and DoD industry at no cost, includes source code, documentation, and access to training material
- 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 JULY22