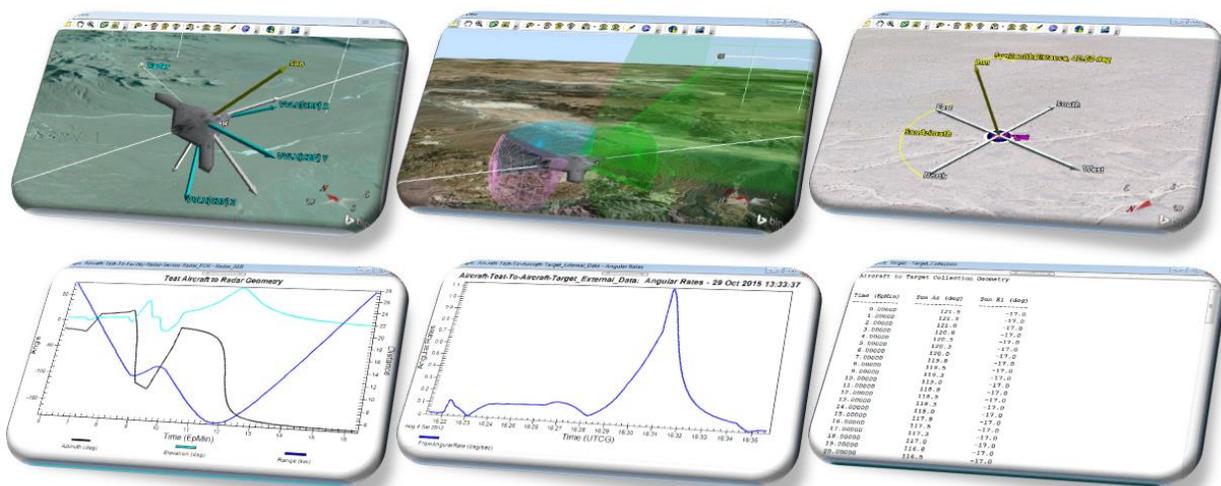


Introduction to STK – Aircraft Systems

Introduction:

This scenario depicts a representative aircraft mission using the free version of STK. The "Test" aircraft  takes off from Edwards AFB , and performs a variety of system tests to evaluate:

1. Radar Geometry █
2. Antenna Switching █
3. GMTI Collection █
4. Image Collection █
5. Airspace Violation █



Exploring this demo

- Use the Animation toolbar to put the scenario into motion: 
- Use Stored Views to visualize each test 
- Use Quick Reports to evaluate each test 
- Use 3D object editing to modify the route:  Aircraft/Test

Test 1: Radar Geometry

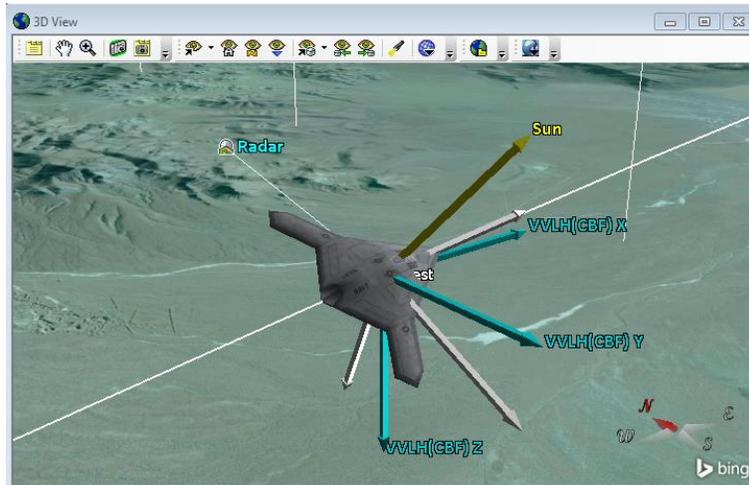
This test is designed to evaluate the performance of a ground based radar tracking an incoming aircraft.

There is an access calculation from the Test aircraft to the Radar Facility - Radar_FoR sensor with a 15 nm

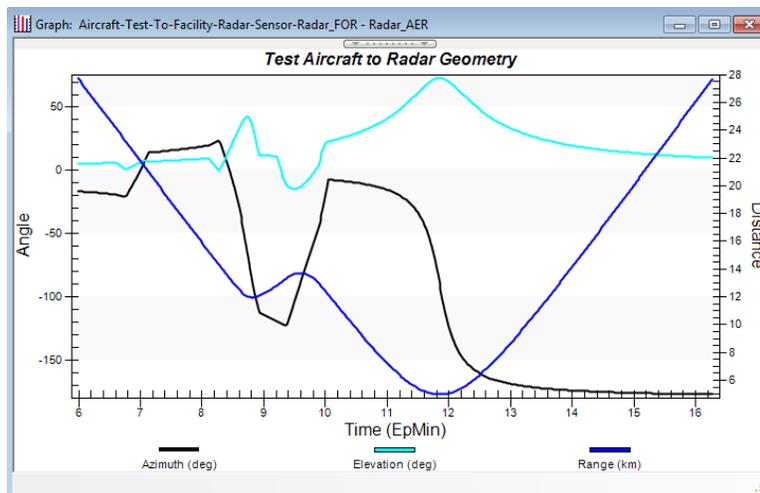
range constraint.

This access calculation can be used to determine the time interval when the 15 nm range constraint is met, and can also be used to extract data on the relationship between the Test aircraft and the Ground radar, such as Azimuth, Elevation, and Range.

Stored View: Test 1: Radar Geometry



Quick Report: Test 1: Radar Geometry



Note: [STK Radar](#) provides higher fidelity capabilities for radar analysis including Probability of Detection, Signal-to-Noise ratio, interference effects and more.

Test 2: Antenna Switching

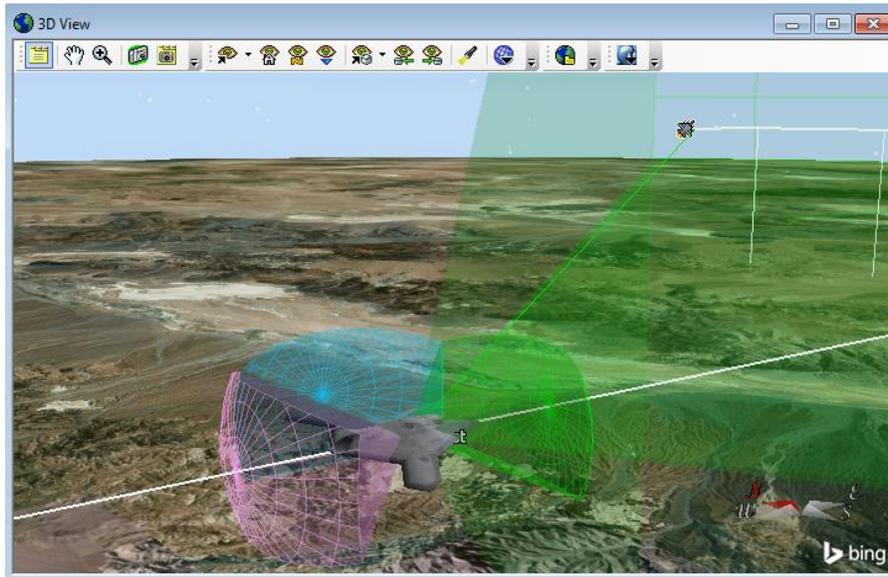
This test is designed to evaluate the ability of the antennas on board an aircraft to track a target aircraft.

The target aircraft was created using an external data file for its position (Cartesian X, Y, Z) and orientation

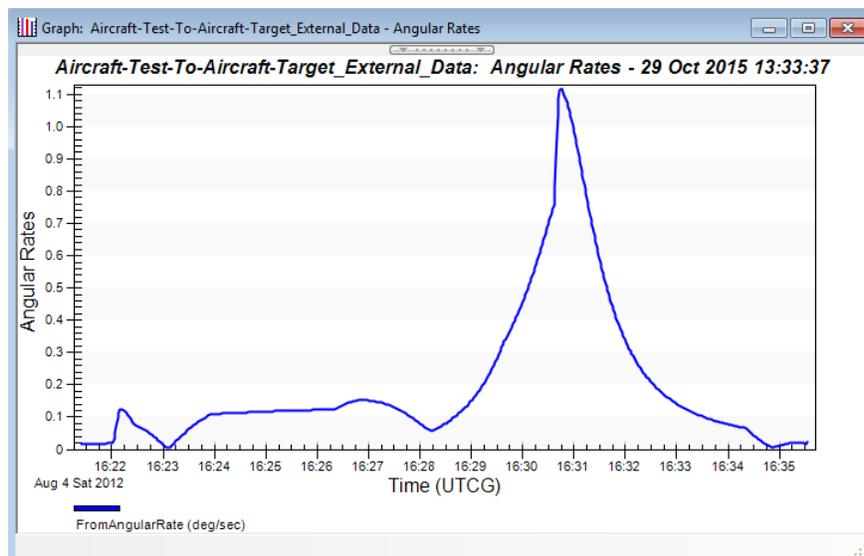
(yaw, pitch, roll).

This external data file was created using STK / Aviator, however other aircraft simulators or recorded flight telemetry can be used as well.

 **Stored View:** Test 2: Antenna Switching



 **Quick Report:** Test 2: Antenna Switching



Note: [STK/Aviator](#) provides higher fidelity capabilities for performing complex, highly accurate, time-based mission analysis.

Test 3: GMTI Collection

This test is designed to evaluate the ability of an air based GMTI radar to track a ground vehicle.

There is an access calculation from the Test aircraft - GMTI_FoR sensor with a 65 deg field of view to a ground vehicle.

The ground vehicle was created with an external data file (lat / lon / alt) generated from bing maps.

There is a second ground vehicle that has display times set to the access times with a MIL 2525b symbol marker and a lat / lon / alt data display.



Stored View: Test 3: GMTI Collection



Quick Report: Test 3: GMTI Collection

Note: [STK Radar](#) provides higher fidelity capabilities for radar analysis including probability of detection, signal-to-noise ratio, and interference effects.

Test 4: Image Collection

This test is designed to evaluate the collection of an EOIR sensor on a stationary ground target.

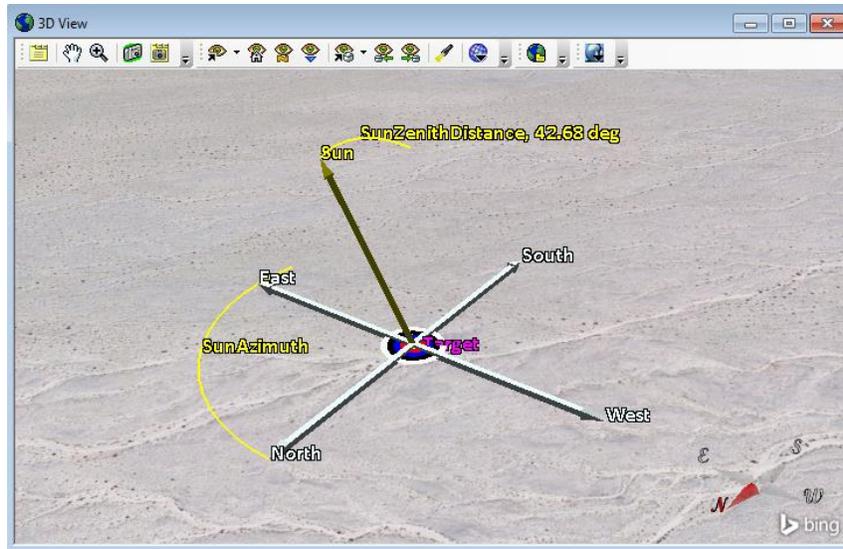
There is an access calculation from the Test aircraft - EOIR_FoR sensor with a rectangular 55 deg vertical half angle and 25 deg vertical half angle deg field of view to a ground target with a 20 deg elevation angle constraint.

The target has a variety of vectors displaying the collection geometry from the aircraft as well as the lighting position based on the location of the sun. Use 3d object editing to move the target around and see the aircraft vector change.

There is also a sensor on the target that can be displayed to visualize the elevation angle constraint for the target.



Stored View: Test 4: Image Collection



 **Quick Report:** Test 4: Image Collection

Report: Target - Target_Collection

Aircraft to Target Collection Geometry

Time (EpMin)	Sun Az (deg)	Sun El (deg)
0.00000	121.5	-17.0
1.00000	121.3	-17.0
2.00000	121.0	-17.0
3.00000	120.8	-17.0
4.00000	120.5	-17.0
5.00000	120.3	-17.0
6.00000	120.0	-17.0
7.00000	119.8	-17.0
8.00000	119.5	-17.0
9.00000	119.3	-17.0
10.00000	119.0	-17.0
11.00000	118.8	-17.0
12.00000	118.5	-17.0
13.00000	118.3	-17.0
14.00000	118.0	-17.0
15.00000	117.8	-17.0
16.00000	117.5	-17.0
17.00000	117.3	-17.0
18.00000	117.0	-17.0
19.00000	116.8	-17.0
20.00000	116.5	-17.0

Note: [STK Pro & Analysis workbench](#) provides higher fidelity capabilities for access constraints including custom vector geometry, time, and calculation components, which allow users to calculate ground sample distance and custom metrics such as NIIRS.

Test 5: Airspace Violation

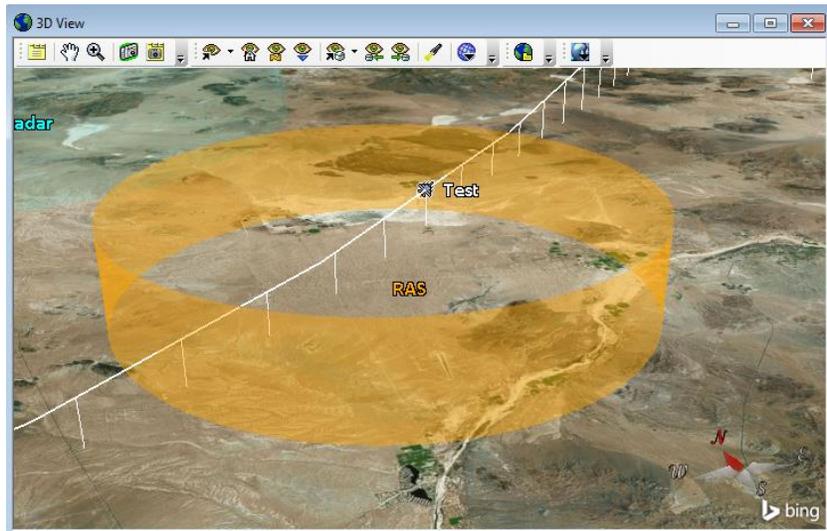
This test is designed to evaluate the time the aircraft flies through an airspace.

There is an access calculation from the RAS Area Target with a 90 deg elevation angle constraint to the Test aircraft.

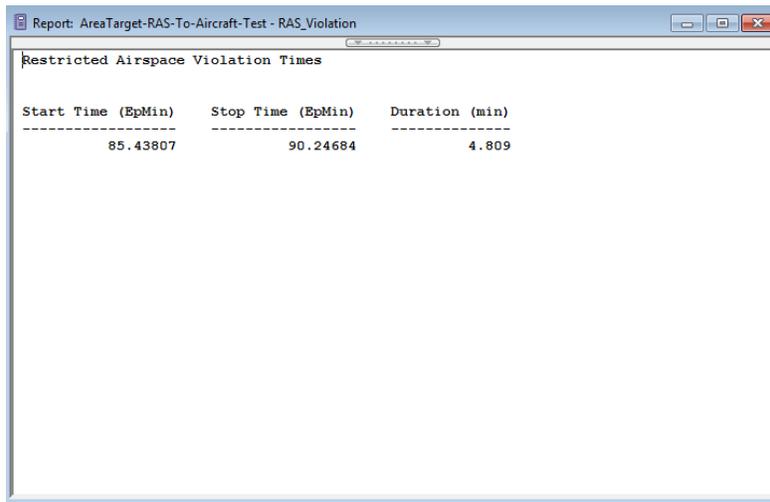
There is a second area target that is displayed only during access times and has less translucency to visualize when the aircraft is in the airspace.

Use 3d object editing to move the Test aircraft around to avoid the restricted airspace.

 **Stored View:** Test 5: Airspace Violation



 **Quick Report:** Test 5: Airspace Violation



Start Time (EpMin)	Stop Time (EpMin)	Duration (min)
85.43807	90.24684	4.809

Note: [STK Pro & Analysis workbench](#) provides higher fidelity capabilities for access constraints including custom vector geometry, time, and calculation components, which allow users to account for altitude conditions, terrain impacts, and custom miss distance calculations.