

Coverage analyzes when and how well regions on or above the central body's surface are "covered" by a collection of assets based on a user-defined performance criteria.

Coverage uses the following variables to determine the quality of system performance for a chosen analysis interval:

- **Coverage definition grid.** The set of points used for sampling within the area(s) of interest is called the coverage grid. Coverage computes FOM satisfaction based on the access accessibility to these points.
- **Coverage assets.** The selection of vehicles, sensors, or ground stations that define your coverage analysis system.
- **Figure of merit (FOM).** The quality or type of coverage that measures system performance.

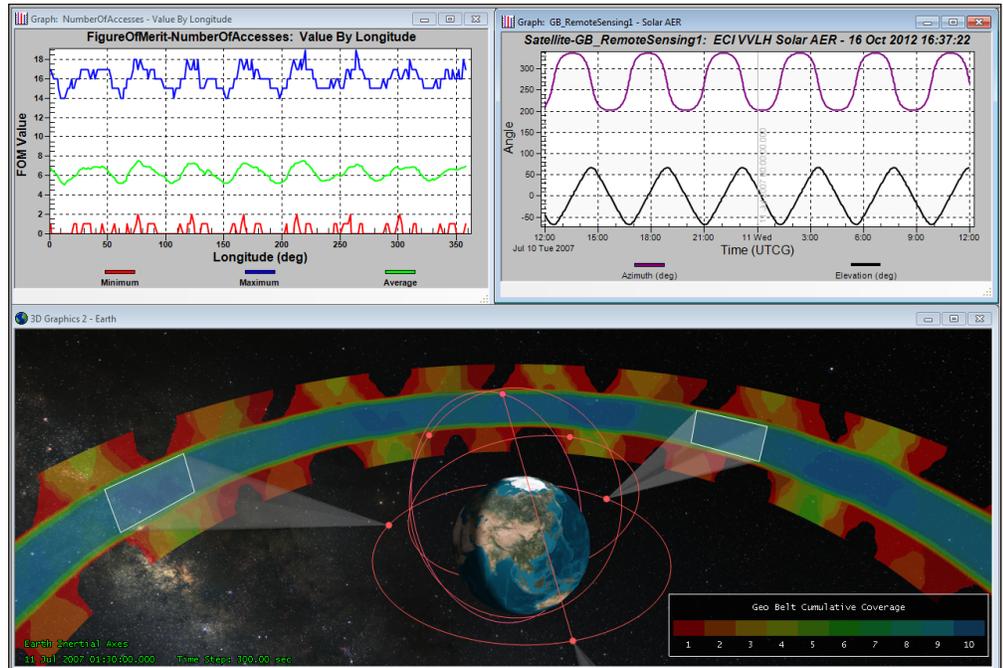
Coverage computes FOM satisfaction based on the access from the coverage assets to each of the coverage definition grid points. In addition to reports and graphs, the system performance for any FOM is visually displayed as color-coded performance areas that can be displayed as cumulative results over the analysis period or dynamic instantaneous results at each time step.

## Coverage definition

A coverage definition, which is also called an area of interest, can be defined as:

- A contiguous area such as a country, the globe, or a user-defined boundary
- A collection of areas – such as two states and a lake

**Pre-defined grid definitions.** Global, latitude bounds, lat/lon bounds, user-selected region, user-defined boundary, latitude line, and longitude line



**Point granularity (sampling).** Grid definitions are point sampled based on a specified granularity or imported from a file that customizes the location of the point sample

**Point altitude options.** The coverage grid can be located on the surface of the ellipsoid or defined as follows: Altitude above MSL, altitude above terrain, altitude above WGS84, depth below MSL, altitude above ellipsoid, depth below ellipsoid, and radius.

**Grid constraints.** Reference constraint class, use object instance, use actual objects on the grid points, and line of sight obstruction surface.

## Customize assets

Any vehicle, sensor, facility, chain or constellation may be an asset with constraints used in access determination. STK objects may be used as assets in any combination.

## Figures of Merit (FOM)

A set of pre-defined metrics to measure your coverage performance.

**Simple coverage.** Measures a point is covered.

**N asset coverage.** Measures the number of assets available simultaneously during coverage.

**Coverage time.** Measures the amount of time during which grid points are covered, either in total time, time per day, or as a percentage.

**Revisit time.** Measures the duration of intervals during which coverage is not provided.

**Access duration.** Measures the duration of individual coverage intervals.

**Number of accesses.** Measures the number of independent accesses of points.

**Number of gaps.** Measures the number of gaps in coverage of points.

**Access separation.** Measures if a point has coverage from multiple assets within a user-defined time tolerance.

**Time average gap.** Measures the average length of the coverage gap found if sampled randomly.

**Response time.** Measures the time between a request for coverage at the point and the time at which the coverage is achieved. Options are mean, min/max, or nth-percentile values.

**Access constraint.** Measures the value of a user-selected visibility constraint such as elevation angle or slant range, or probability of detection using TIREM.

**Dilution of precision.** Measures the relative level of uncertainty of a navigation solution due to the relative geometry of the transmitter locations (i.e., Geometric, Position, Horizontal, Vertical, and Time).

**Navigation accuracy.** Measures the uncertainty of a navigation solution based on one-way range measurements from a set of transmitters. Most often, the transmitters are those onboard GPS satellites.

**System response time.** Measures the elapsed time from a request for coverage until collection assets are commanded, the collection occurs and the downlink of collected data is complete.

**Age of data.** Measures the time since the end of the last coverage interval.

**Cumulative N asset.** Determines the number of unique assets providing coverage to grid points.

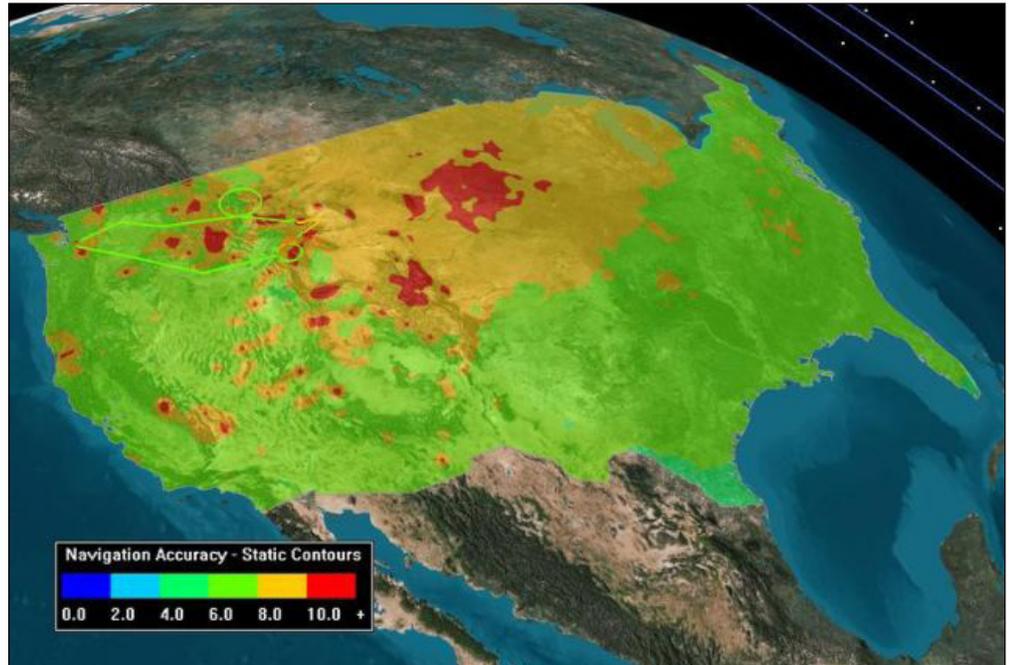
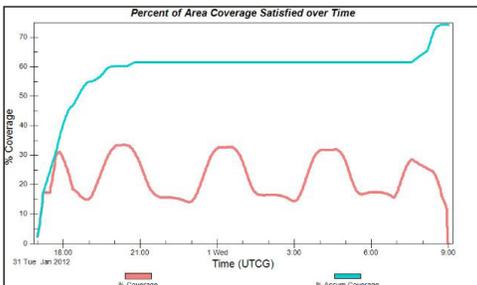
**Scalar calculation.** Creates a FOM using the Calculation tool.

## Coverage satisfaction

Satisfaction is a comparison operator which establishes “if” or “when” a FOM is “satisfied.” The Satisfaction criteria identify the relationship between the FOM value and the user-specified threshold value (i.e., at least, equal to, at most, greater than, less than). This lets you quickly answer questions of coverage.

## Attitude Coverage

Attitude Coverage combines features of Attitude and Coverage to enable you to analyze coverage in various directions over time, using several attitude-dependent figures of merit.



## Coverage tools

**Grid Inspector tool.** Enables you to focus closely on a region or point within a coverage grid, furthering your analysis efforts.

**Single object coverage.** Evaluates the dynamic coverage to a single object instead of a continuous area – for example coverage along a flight path, an orbit, or a truck route.

## Volumetric analysis

Volumetric analysis combines the Spatial Analysis tool with the capabilities of Coverage’s Volumetric object by evaluating user-defined volumes that are displayed as interpolated values across grids points in the 3D window. 3D grids can be defined in any coordinate system, relative to Earth or any STK object.

The Spatial Analysis tool requires Analysis Workbench.

## Coverage definition reports and graphs

Coverage reports and graphs provide the ability to dissect your overall performance. All data computed during the analysis is available to inspect at the asset-specific level or system level. Percent contributions, gaps, and time to cover values can all be analyzed.

## Figure of Merit reports and graphs

Provides analysis of minimum, maximum, and average values over the coverage grid as well as percent satisfied results over the analysis period.

## 2D and 3D coverage visualization

Coverage results can be displayed statically (an accumulation of figure of merit satisfaction over the analysis interval) or during animation (instantaneous satisfaction of the figure of merit for that particular time step).

Each grid point is color-coded based on the user-defined color selection or color ramp along with a defined number of contours or levels. To generate the smoothest looking contours, you can optionally choose to interpolate between grid points.

## Automation or third-party application access to Coverage

Coverage can be accessed via the STK Connect interface, the STK Object Model interface, and the STK scripting interface which supports Perl, VB Script or MATLAB.