Esri International User Conference | **San Diego, CA**

Technical Workshops | **7-14-2011**

3D Analyst – Surface Analysis

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3D Team

Surface Analysis

- **Derivatives**
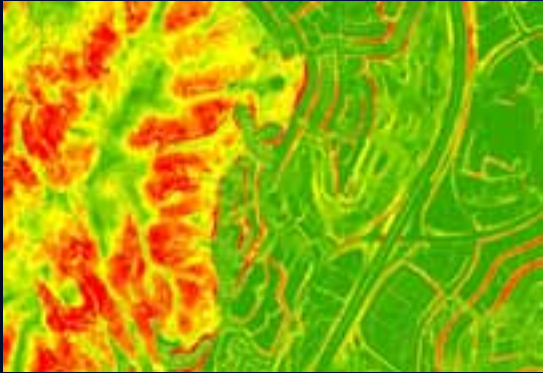 - **Slope**
  - **Aspect**
  - **Hillshade**

- **Visibility**
  - **Viewshed**
  - **Line of Sight**

- **Feature Interpolation**
  - Interpolate Shape
  - Interpolate Poly To Patch
  - Surface Length
  - Surface Spot
  - Contour

- **Volume**
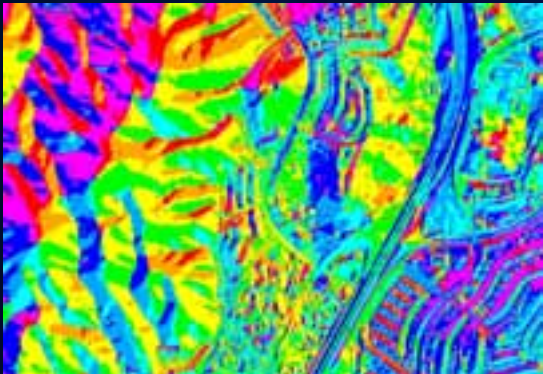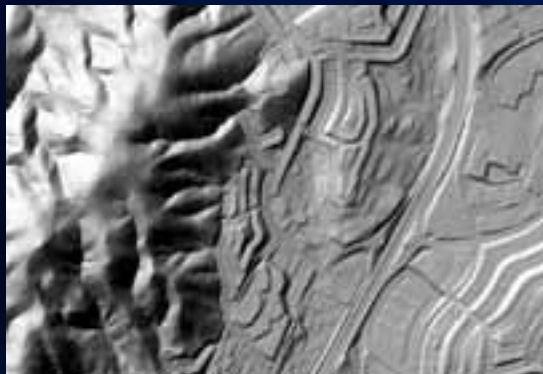 - **Surface Volume**
  - **Cut Fill**
  - Surface **Difference**
  - **Polygon Volume**
  - **Extrude Between**

Slope: steepness
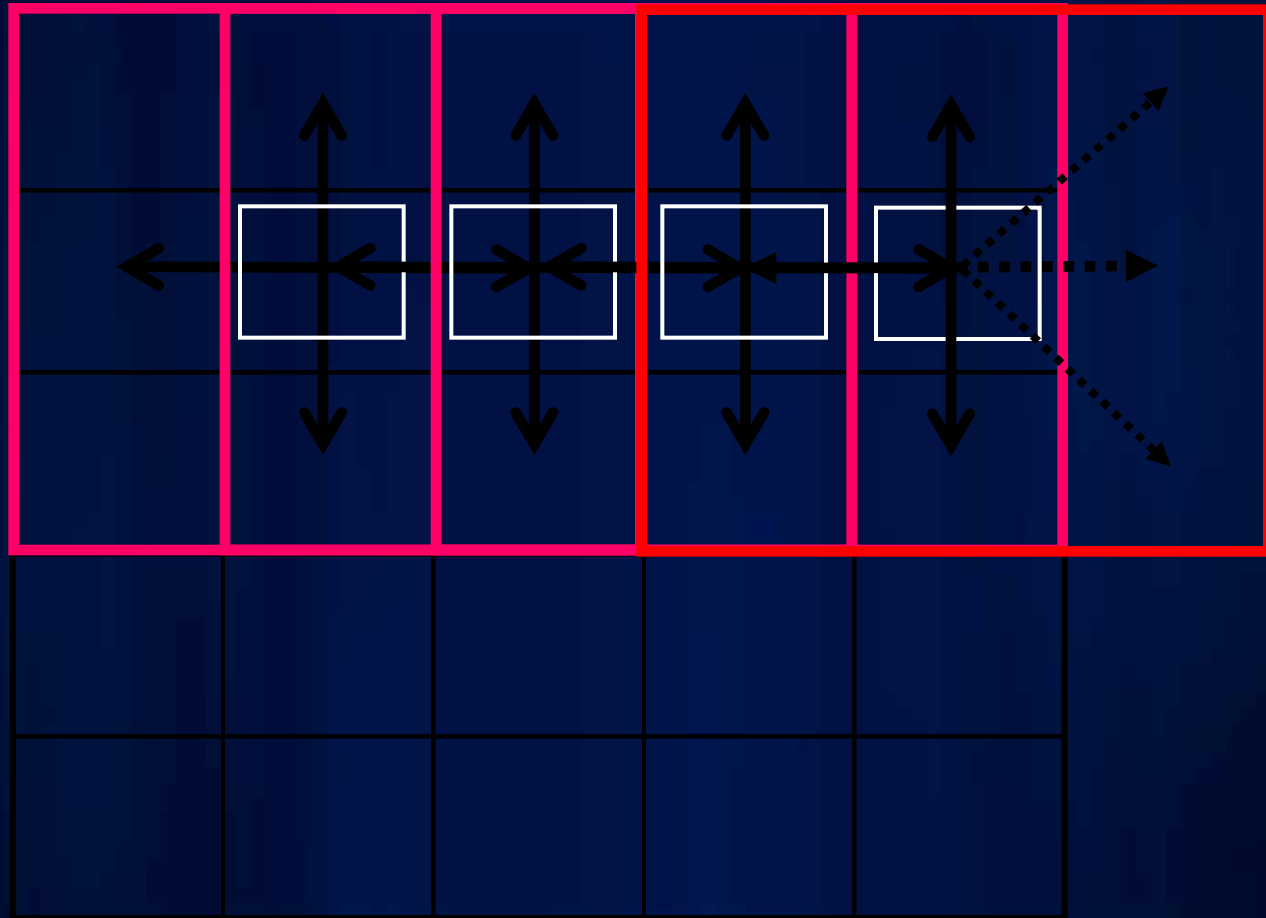

Aspect: direction of steepest slope

Hillshade: steepness and direction relative to light source

Derivative Calculation

- **Raster based**
    - Local functions, 3x3 roving windows
    - Plane fitted to this 'neighborhood'

- **TIN based**
    - Each triangle defines a plane unambiguously

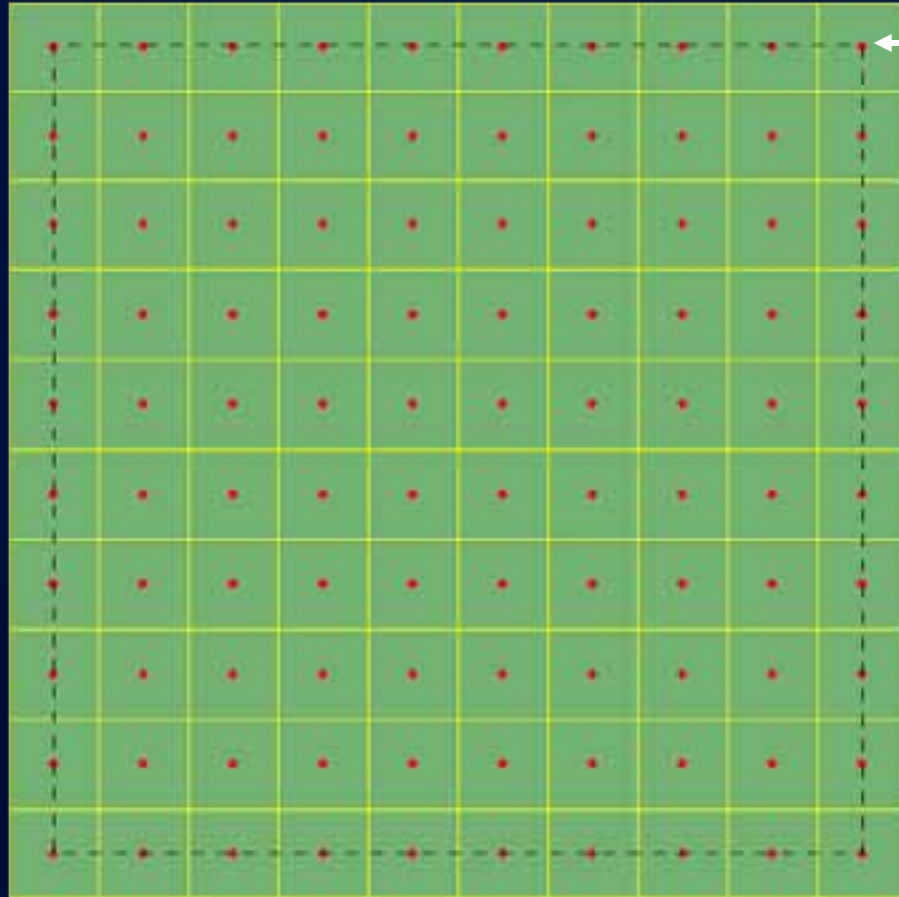# 3x3 Roving Windows

Note: Hillshade will not estimate values for boundary cells

Interpolation

- **Feature interpolation**
  - **Raster**
    - **Bilinear**
    - **Sample distance**
  - **TIN**
    - **Linear**
    - **Natural Neighbors**
    - **'Natural' densification**

- **Contouring**
  - **Similar for both raster and TIN**
    - **Linear threading through triangles**
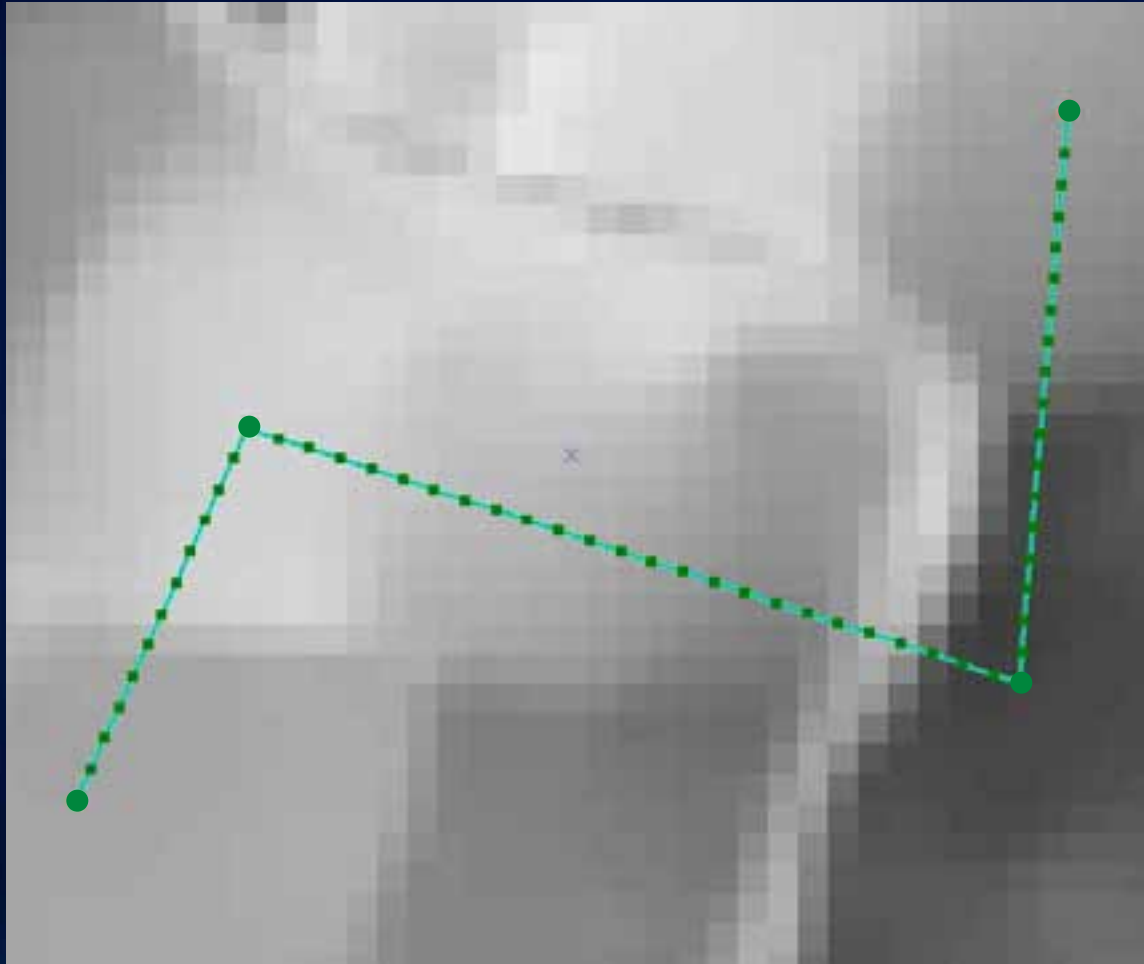
Cell vs. Surface Data Area
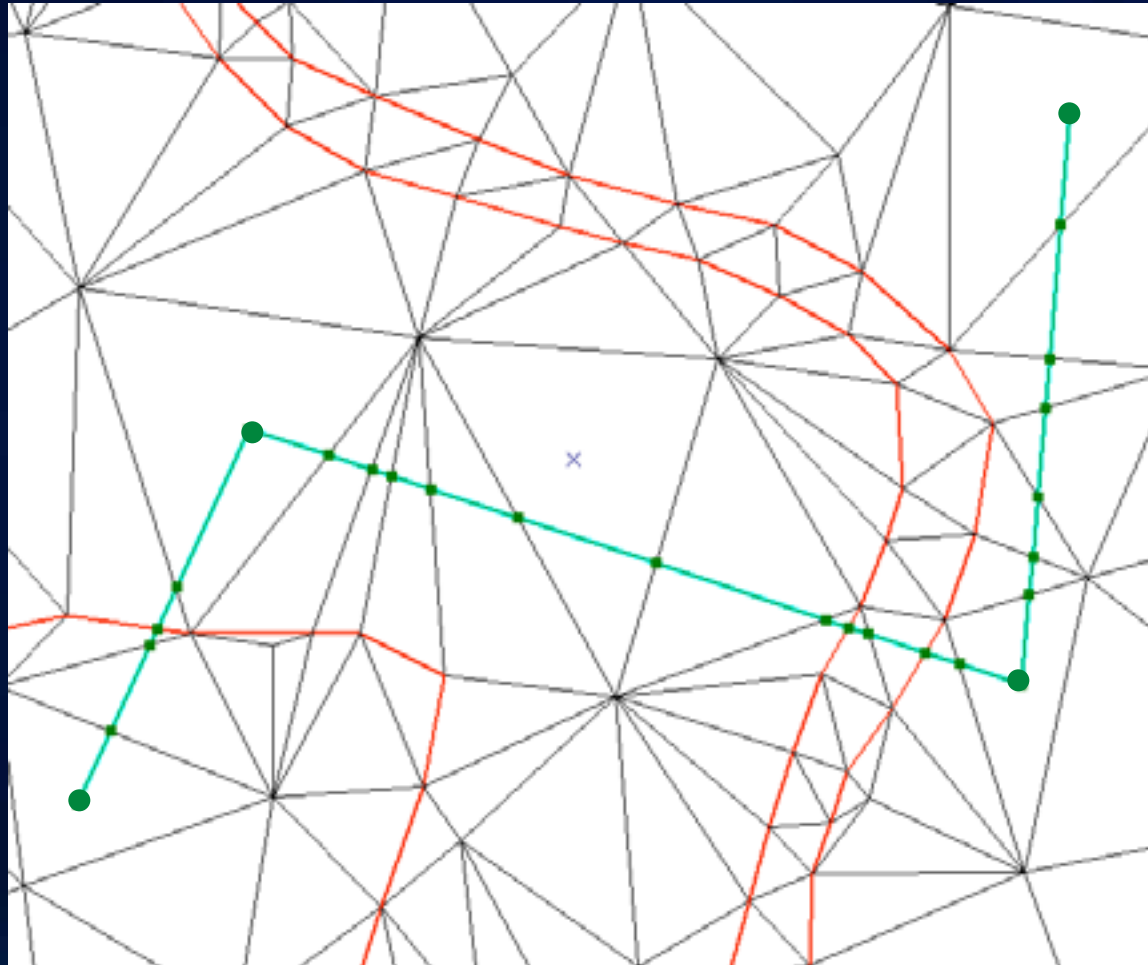

Raster image boundary

Surface domain

Interpolation zone is ½ cell in from image boundary
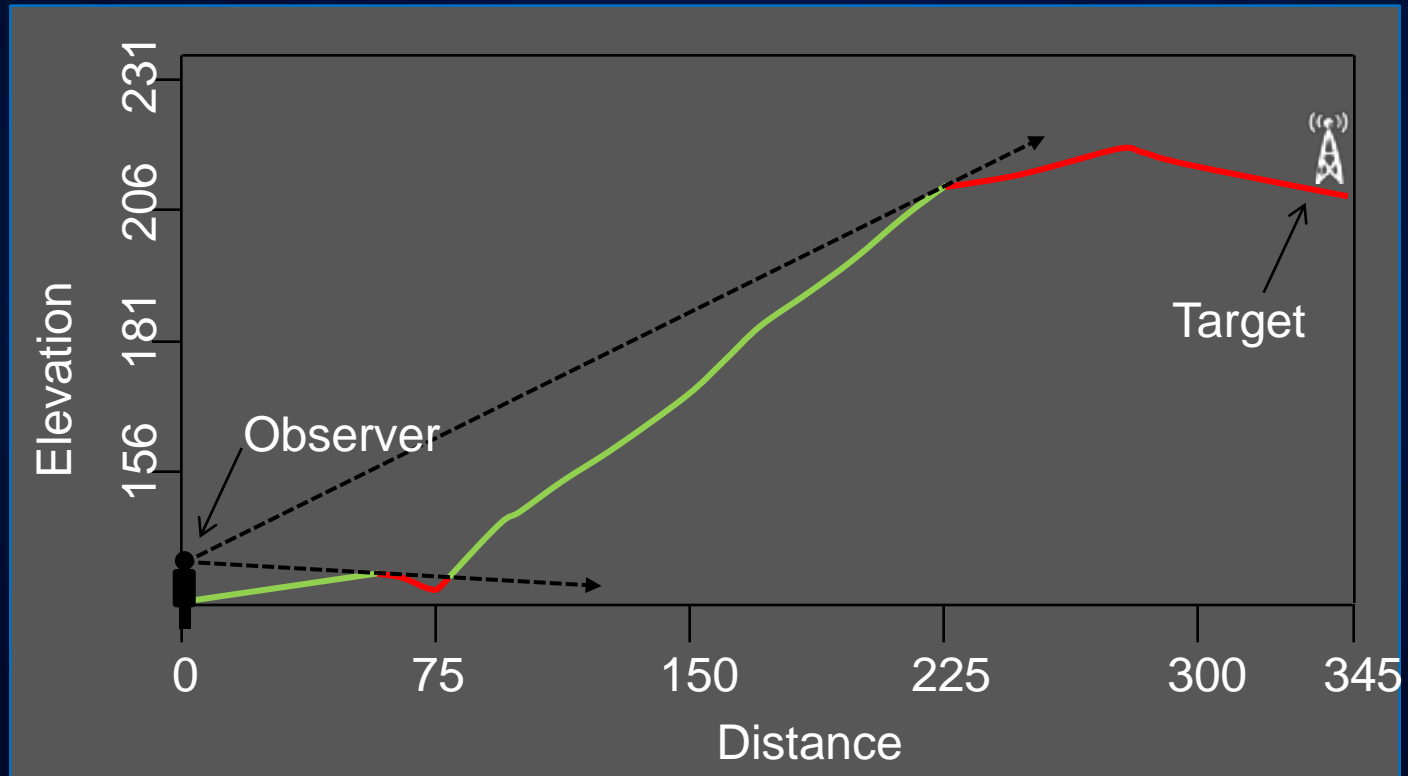
Raster Profile Sampling
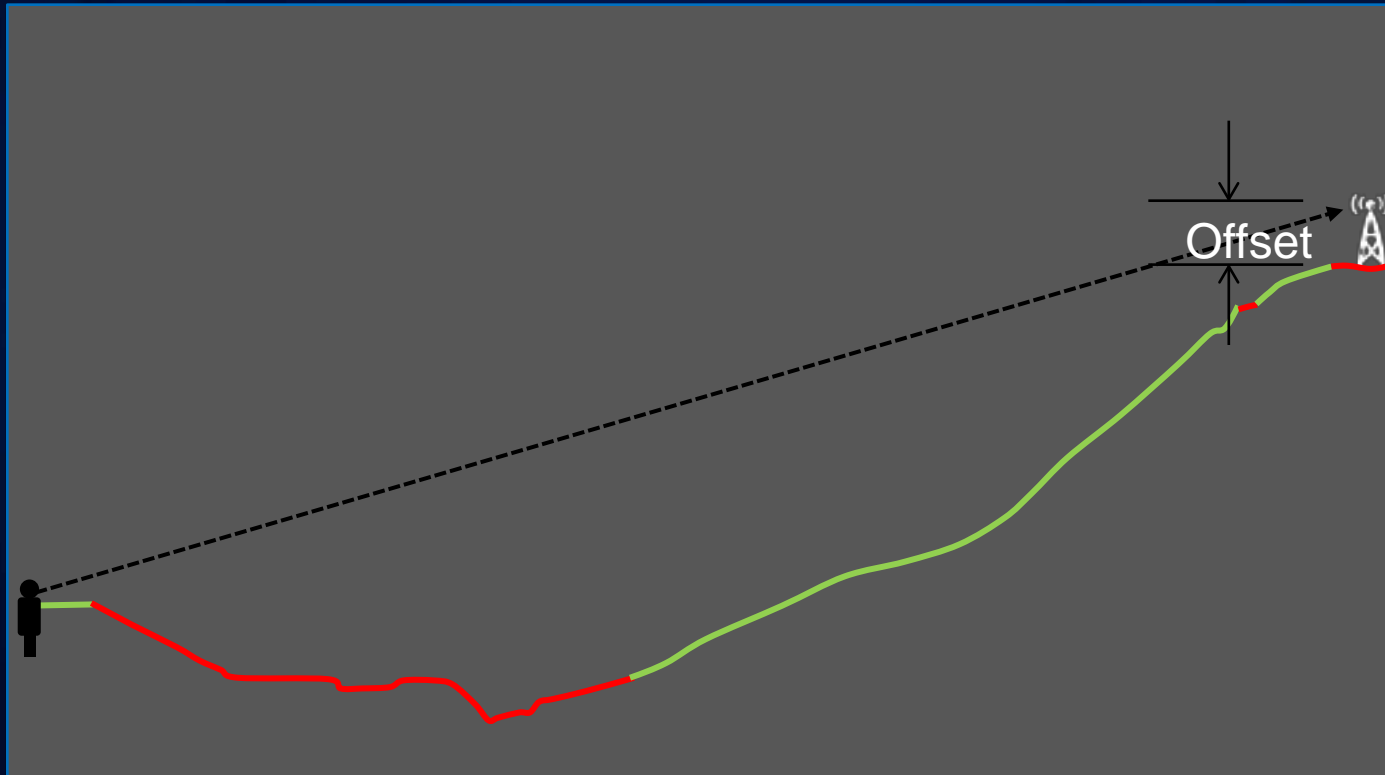
TIN Profile Sampling

Visibility

- **Line Of Sight (LOS)**
  - Inputs are 2D or 3D lines
  - Only 1st and last vertices used as observer and target points
  - Raster and TIN implementations

- **Viewshed**
  - Frequency and Observers options
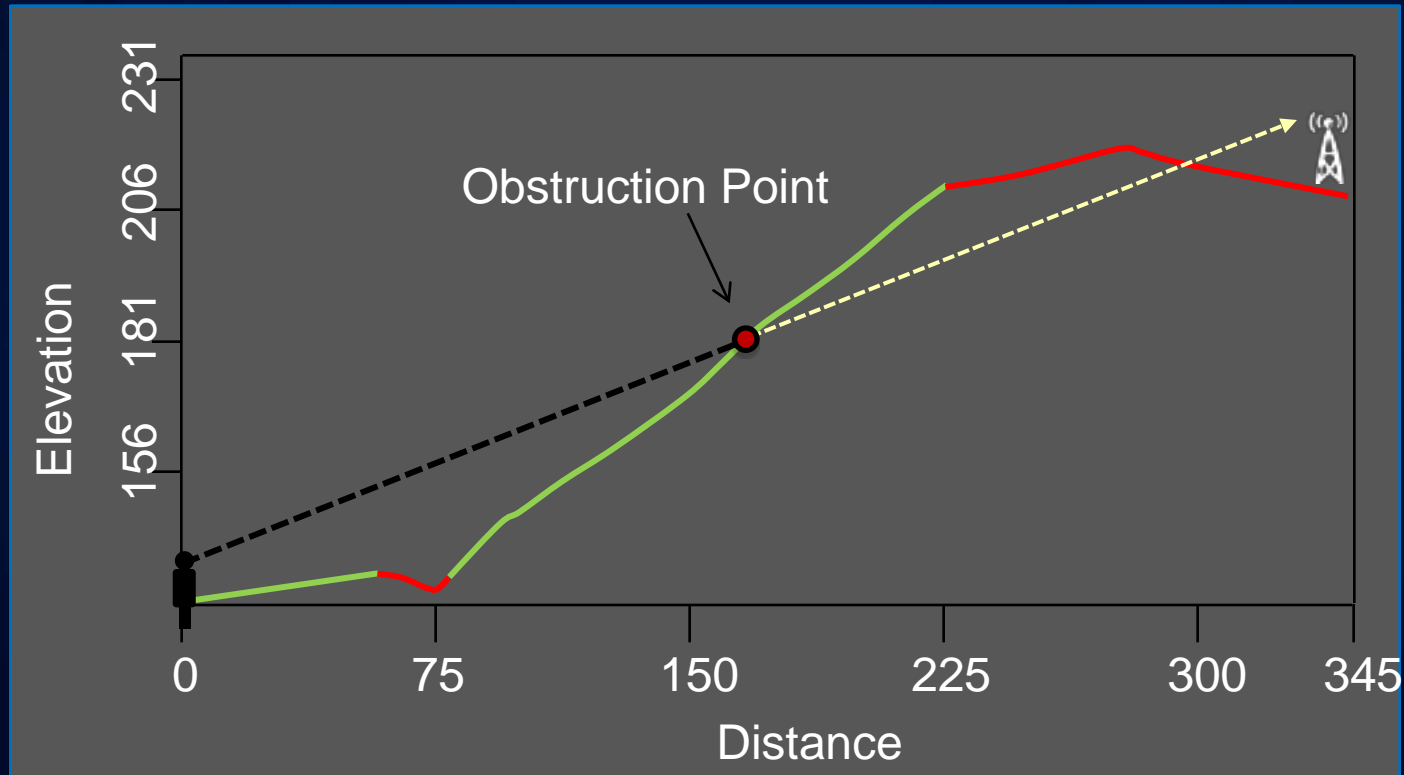 - Raster algorithm

Line of Sight

Line of Sight

When offset, the target can be visible even though the profile on the surface at that position is not.
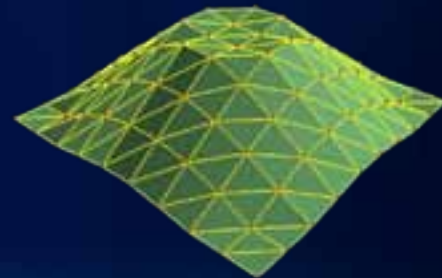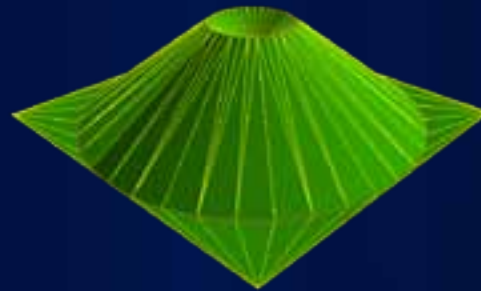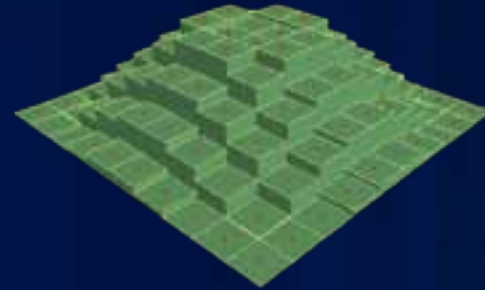
Line of Sight

When a target isn't visible, its obstruction point always occurs along a visible portion of the profile.

Volumetrics

- **CutFill**
  - Raster/cell based

- **SurfaceVolume**
  - Raster and TIN/Terrain

- **TIN/Terrain specific**
  - Polygon Volume
  - Surface Difference
  - Extrude Between

Demo

http://**www.esri.com/sessionevals**