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3D - Types of Surface Models

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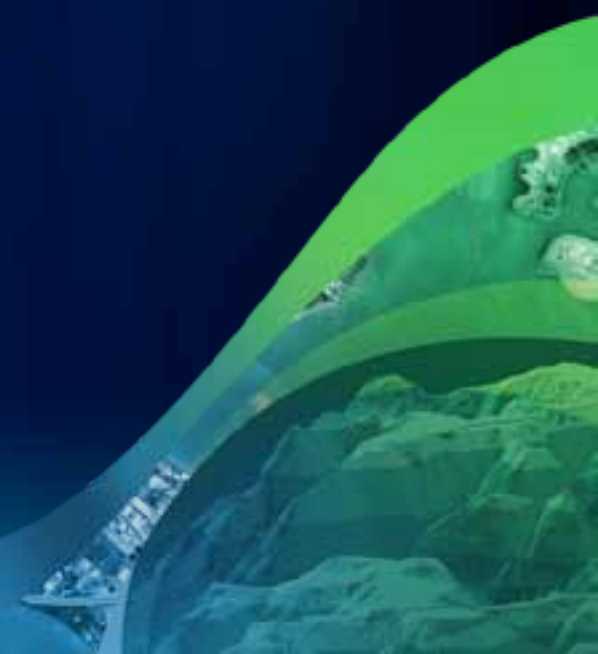


Agenda

- Overview
- Discrete Vs. Continuous data
- Functional Surface
- Guidance for surface type selection

Surface types in ArcGIS

- Three surface types

Raster TIN Terrain

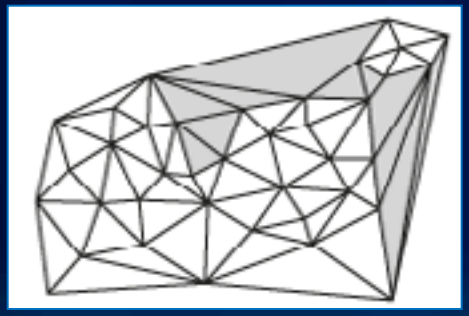
Surface types in ArcGIS

- **Raster**
  - **Rectangular matrix of cells**
  - **Can store discrete and continuous data**
  - **A powerful format for advanced spatial and statistical analysis**
  - **Can potentially get very large**
  - **Spatial inaccuracies, loss of precision**

Surface types in ArcGIS

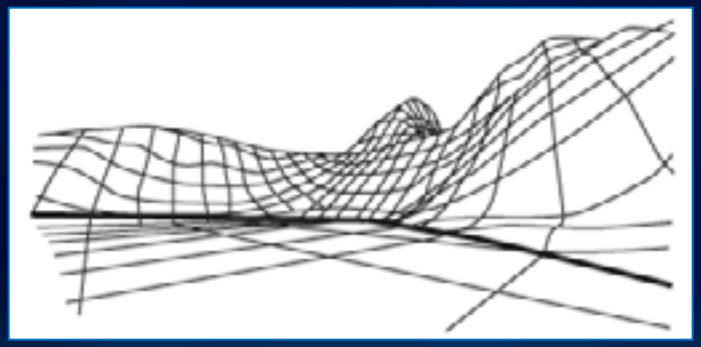
- **TIN**
  - **Triangulated Irregular network**
  - **Nodes, edges, triangles**

Hull



Surface types in ArcGIS

- **Breaklines**
  - **Soft breaklines**
    - **Linear features; feature edges are maintained**
    - **Do not interrupt surface slope**
    - **Survey line, study area boundary etc.**
  - **Hard breaklines**
    - **Define interruptions in surface smoothness**
    - **Streams, ridges, shorelines, building footprints etc.**



Surface types in ArcGIS

- Terrain
  - A multi-resolution, TIN-based surface
  - Lidar, Sonar or photogrammetric sources
  - Reside in the geodatabase
  - Z-Tolerance and Window size pyramiding techniques
  - Supports all types of breaklines
- ArcGIS offers tools to convert between different types

Discrete Vs. Continuous data

- **Discrete**
  - Known and definable boundaries
  - Finite number of possible values
  - A lake boundary, land-ownership boundaries etc.
- **Continuous**
  - Spatially non-discrete
  - Can assume infinite number of values within a range
  - Elevation, Temperature etc.

Functional Surface

- All three surface types are functional surfaces
- Any given location on the surface can have only one z-value
- Two and a half dimensions (2.5D)
- True 3D surfaces are known as solid model surfaces

How do I choose?

- Raster
  - Advanced spatial analysis
  - Find patterns
  - Leverage map algebra
- Triangulated approach
  - Preserve the precision of the input data
  - Incorporate breaklines
  - Tin
    - High-precision modeling of smaller areas
    - Working with <10 million points
  - Terrain
    - Working with >10 million points, up to a few billion
    - Long term data management solution

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