



# Empirical Bayesian Kriging and EBK Regression Prediction in ArcGIS

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An abstract 3D architectural graphic on the right side of the slide. It features various geometric shapes like rectangles and lines in shades of blue, orange, and green, creating a sense of depth and perspective. Some shapes have patterns or textures, such as a grid or a stippled effect. The overall style is modern and technical.

GIS  
INSPIRING  
WHAT'S  
NEXT

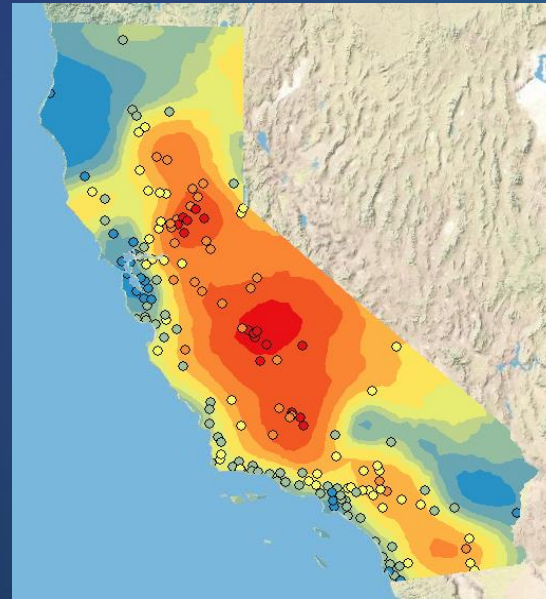
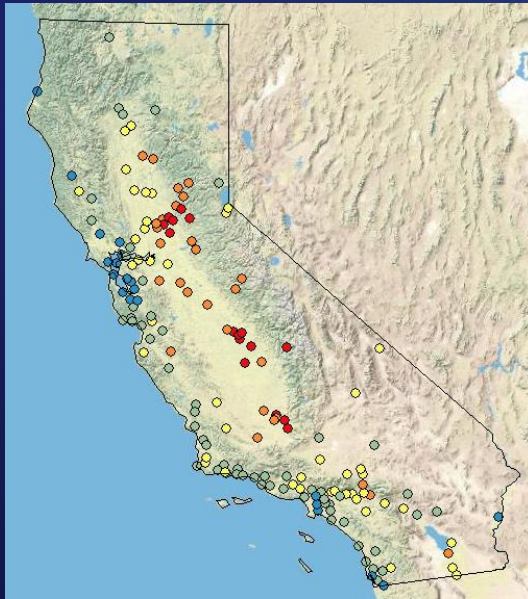
# Geostatistical Analyst Resources

<http://esriurl.com/GeostatGetStarted>

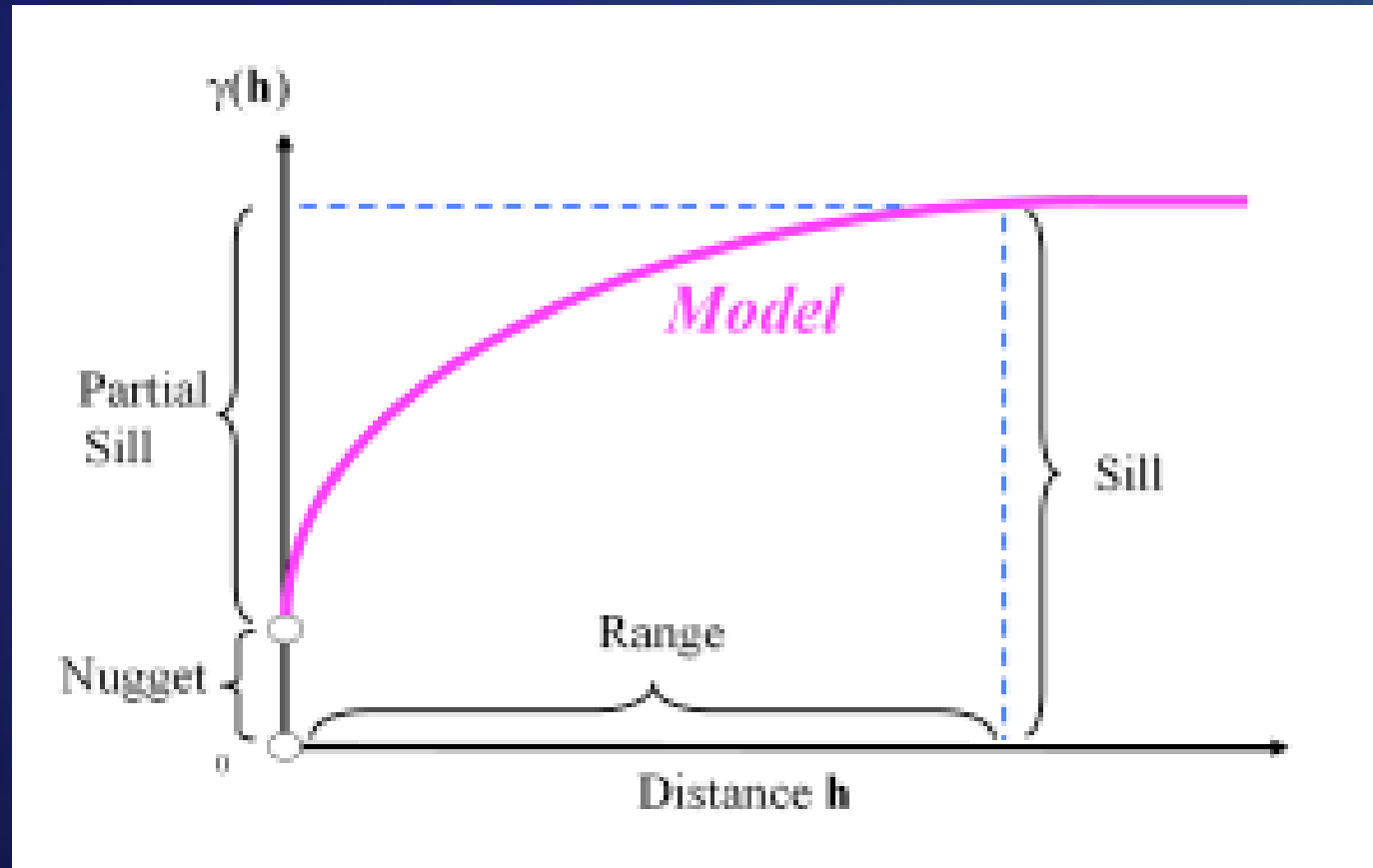
- GeoNet – [community.esri.com](http://community.esri.com)
  - Blogs
  - Free textbook and datasets
    - Spatial Statistical Analysis For GIS Users
  - Lots of discussions and Q&A
- Learn GIS – [learn.arcgis.com](http://learn.arcgis.com)
  - Model Water Quality Using Interpolation
  - Analyze Urban Heat Using Kriging

# What is interpolation?

- Predict values at unknown locations using values at measured locations
- Many interpolation methods: kriging, IDW, LPI, etc



# Semivariogram Modeling



# Empirical Bayesian Kriging

- **Advantages**

- Requires minimal interactive modeling, spatial relationships are modeled automatically
- Usually more accurate, especially for small or nonstationary datasets
- Uses local models to capture small scale effects
  - Doesn't assume one model fits the entire data
- Standard errors of prediction are more accurate than other kriging methods

- **Disadvantages**

- Processing is slower than other kriging methods
- Limited customization

# How does EBK work?

1. **Divide the data into subsets of a given size**
  - Controlled by “Subset Size” parameter
  - Subsets can overlap, controlled by “Overlap Factor”
2. **For each subset, estimate the semivariogram**
3. **Simulate data at input point locations and estimate new semivariogram from the simulated data**
4. **Repeat step 3 many times. This results in a distribution of semivariograms**
  - Controlled by “Number of Simulations”
5. **Mix the local surfaces together to get the final surface.**

# EBK Regression Prediction

- Allows you to use explanatory variable rasters to improve predictions
- Automatically extracts useful information from explanatory variables
- Uses Principle Components to handle multicollinearity

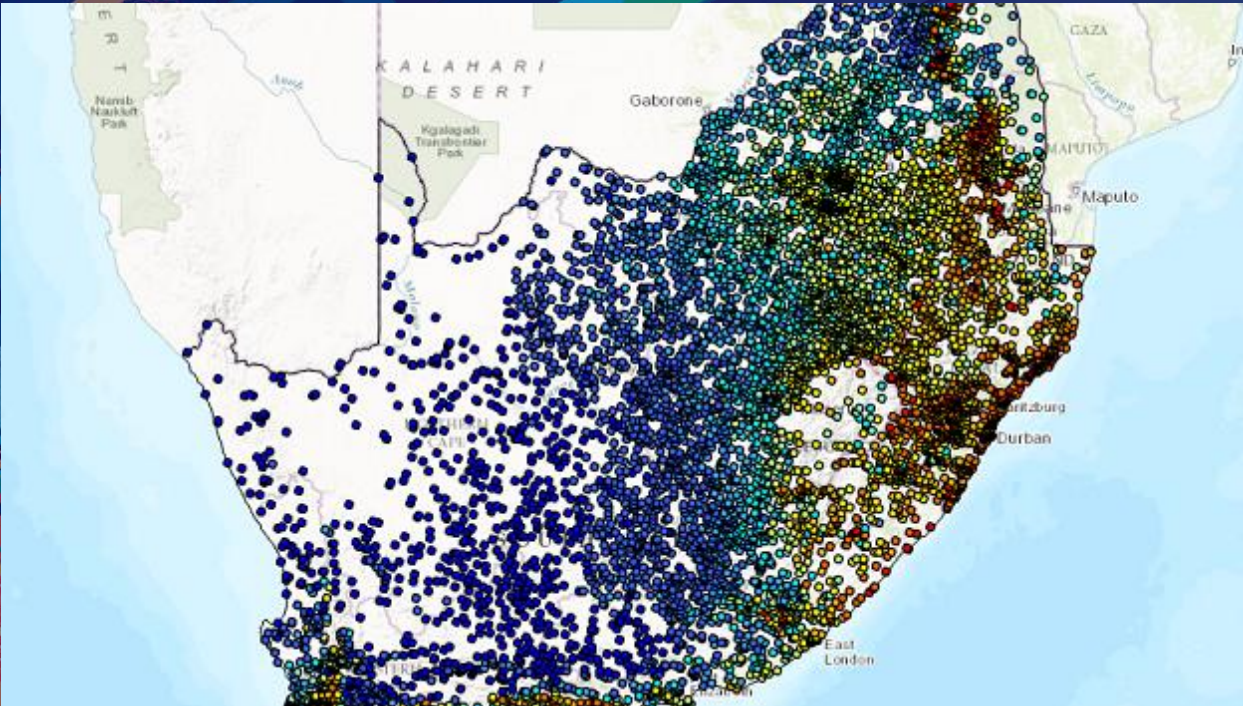
# Transformations

- **Two available transformations**
  - **Empirical – Fits a smooth distribution to the data, then transforms to normal distribution. Useful for data that is not bell-shaped**
  - **Log Empirical – Takes logarithm of data before performing Empirical transformation. Useful for data that cannot be negative (eg, rainfall)**



# Data in Geographic Coordinate Systems

- **Euclidean distance for geographic coordinates is very inaccurate, particularly far from the equator**
- **EBK uses chordal distances**
  - **Chordal distance is the 3D straight-line distance between points on a spheroid**
  - **Accurate approximation to geodesic distance up to 30 degrees**



Demo



esri

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