Tutorial Set 2: Data interpolation

Exercise Site20_2-1 Interpolating soil sampling data

Learning objective:Generating soil properties variability maps: Potassium (K), Organic
matter (OM), pH, phosphorus to Aluminum ratio (P/Al)Techniques:Geostatistical Analyst – Ordinary Kriging
Data Source:DataDataset2

Part 1: Layer management

- 1. Bring following required layers into ArcMap:
 - Field20_Boundary.shp
 - Field20_Corn_2006.shp
 - Field20_Corn_2009.shp
 - Field20_Soybean_2007.shp
 - Field20_Soybean_2010.shp
 - Field20_Wheat_2008.shp
 - Field20_Soil_2008.shp

2. In the Table of Contents (ToC):

- Right click on Layer to add New Group Layer, name it as "Soil Interpolation".
- Add another group layer and name it as "Yield Interpolation".
- Move/drag *Field20_Soil2008* to the "Soil Interpolation" group.
- Move/drag Field20_Corn_2006, Field20_Corn_2009, Field20_Soybean_2007, Field20_Soybean_2010 and Field20_Wheat_2008 to the group "Yield Interpolation".
 Untitled - ArcMap



- **3.** For the following section, we are going to work with **Field20 soil properties** data under **Soil Interpolation** group layers
 - Display the label: (right click on the Field20_Soil_2008 data layer in ToC): Layer Properties>Labels>Label Field, select pH and click OK_

Layer Properties				N			
General Source	Selection D)isplay	Symbology	ö Fields	Definition Query	Labels	J
Label features	in this layer						
Method:	Label all	the featu	ures the same	e way.		•	
All features will b Text String Label Field:	pH	ng the op	tions specifi	ed.		•	

• Select Layer Properties>Label Features, click OK



• A non-interpolated map showing pH at the soil sampling locations:



Part 2: Activating the Geostatistical Analyst

1. Go to **Customize** > **Extensions** to launch **Extension** dialog window and select (checkbox on) **Geostatistical Analyst**, then **Close**.

(By default, Geostatistical Analyst is not activated in ArcGIS. You only need to activate once.)





Part 3: Creating interpolated soil property map using Kriging method

- 1. In Geostatistical Wizard, choose Kriging/CoKriging method under Geostatistical methods.
- 2. Source Dataset: *Field20_Soil_2008*.
- 3. Data Field: **pH**
- 4. Click NEXT

Geostatistical Wizard: Kriging /	CoKriging	
Methods	Input Data	
🖃 Deterministic methods	🗆 Dataset	
Inverse Distance Weighting	Source Dataset	Field20_Soil_2008
Global Polynomial Interpolatior	Data Field	pH 👻
Local Polynomial Interpolation	🗆 Dataset 2	
Radial Basis Functions	Source Dataset	<none></none>
Geostatistical methods	🗆 Dataset 3	
	Source Dataset	<none></none>
Kernel Smoothing	🗆 Dataset 4	
Diffusion Kernel	Source Dataset	<none></none>

5. Change Kriging Type to Ordinary Kriging, and click Next.

Geostatistical wizard - Kriging step	2 of 5		
Kriging Type	E	Dataset #1	
Ordinary		Transformation type	None
Simple Universal Indicator Probability Disjunctive		Order of trend removal	None

6. Model #1 -> Type = **Spherical**, and click **Next**.



Geostatistical wizard - Kriging step 4 of 5 - Searching Neighborhood			XX
● - • • • • • • • • • • • • • •	Dataset	#0 [Field20_Soil_2008 - pH]	
	Search Neighborho	od	
	Neighborhood type	Smooth	-
	Smoothing factor	0.2	
	Copy from Variogram	True	
	Angle	0	
	Major semiaxis	258.2599	
	Minor semiaxis	258.2599	
	Anisotropy factor	1	
	Predicted Value		
	X	684742.4	
	Y	5063503	
	Value	6.377018	
	Weights (16 neight	oors)	

7. Neighborhood type = **Smooth**, and click **Finish**. Press Ok for the method report.

8. A temporal interpolated Soil pH raster is added to the map. Right click on the layer *Kriging*, then go to **Properties>Extent** and specify shape to the rectangular extent of to **Field20_Boundary**. Then Apply>OK



Layer Properties			
General Source Di	splay Extent Symbology Method Summary		
Tip: You can specify represented by this la	the geographic extent of this layer's data source that will be yer	😡 Stir 20 - Jecklap - Arcludo	6/0
		Be fok few foximula jourt Selecton Geoporousing Cutomes Windows Be Be Be Be Be A Be A D Be A D Be Be A D Be Be A D BE A	BHD Gegstatistical Analys
Set the extent to:	the current extent of this layer	Table of Contents P ×	-
Visible Extent	the current extent of this layer a custom extent entered below the default extent of this layer the current display extent	Clargen Predetan Hop Predeta, Sd, 2000 (prt) relation, Sd, 2000 (prt)	
Left: 684558	the rectangular extent of Field20_Boundary the rectangular extent of Soil Interpolation the rectangular extent of Field20_Soil_2008 the rectangular extent of Field20_Soil_2008	1 Starbork + 4 STR558 1 St25221 + 6 STR578 1 St25221 + 6 STR506 1 St25221 + 6 STR506 1 St25221 + 3 St2521 1 St25221 + 3 St2521 1 St2521 + 3 St2521 1 St25	
	THE TRANSMENT CALLER THE FRANK THE TRANSFER TO THE ZUBBLE TZL	4 P Sol Intercolution N B B B C B C	

9. Go Layers>Properties>Data Frame Properties, select Clip to Shape from Clip Options, click tab Outline of Features, and then select *Field20_Boundary*. Click Apply and OK. E.g., Soil PH raster then has the same extent as *Field20_Boundary*.

- 1

- 10. Permanently save the interpolated soil pH map by right clicking on the *kriging* layer on the Table of Contents (ToC) > **Data** > **Export to Raster**.
- 11. Store this layer as "*pH*" in the folder Dataset2.

🗉 🥌 Layers		
E Kriging	Сору	
[Fie ×	Remove	
Fi 🔷	Zoom To Layer	
5.9	Visible Scale Range	
6.1	Compare	
6.2 🜮	Validation / Prediction	
6.4	Change output to Prediction Standard Error	2
6.5	Data 🔸	Repair Data Source(s)
6.8	Save As Layer File	Export to Raster
🗖 7.0 😜	Create Layer Package	Export to Vector

12. Stored pH layer is added to lower part of ToC. Right click on the **Kriging** (Predicted Map of pH) layer and then remove it from **Table of Content**.

Note - Repeat Part 3: Step 1 to 12 to generate maps for **OM** (Organic Matter), **PAI** (Ratio of Phosphorus to Aluminum), and **K** (Potassium) by using *Field20_Soil_2008* as source layer and entering the **Data Field** values as "om", "p_al_ratio", and "k_ppm", respectively.

13. Four new raster layers added in your ToC: *pH*, *K*, *OM*, and *PAI*. Drag and drop them to under the group "Soil Interpolation".



14. To get the color map, you need to change the symbology of the layer

- Right click one of the layer properties (e.g., pH)
- **Symbology>Stretched**, and then change the Color Ramp for pH
- Change the color ramp for all other maps (e.g., P/Al, OM, and K).

Layer Properties				×
General Source Key Me	etadata Extent Display Symbology	Time		
Show: Vector Field	Stretch values along a color ran	р	2	
Classified				<u> </u>
Discrete Color	Color Valu	e Label	Labeling	
	6.7481	High : 6.74		
				_
	6.1718	Low : 6.17		=
	Color Ramp:		•	

15. Results of the four soil property maps.



Or, choose Symbology>Classified, and then change the Color Ramp and no. of classes.

16. Save this project for further exercises.