ArcGIS Pro

Analysis & Geoprocessing

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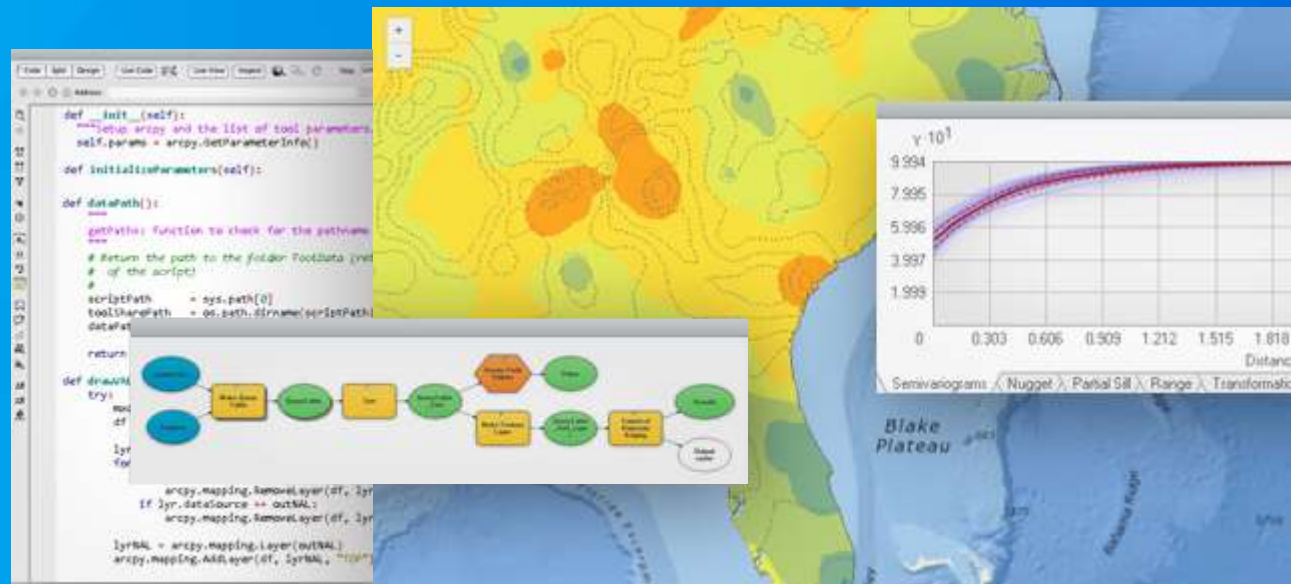
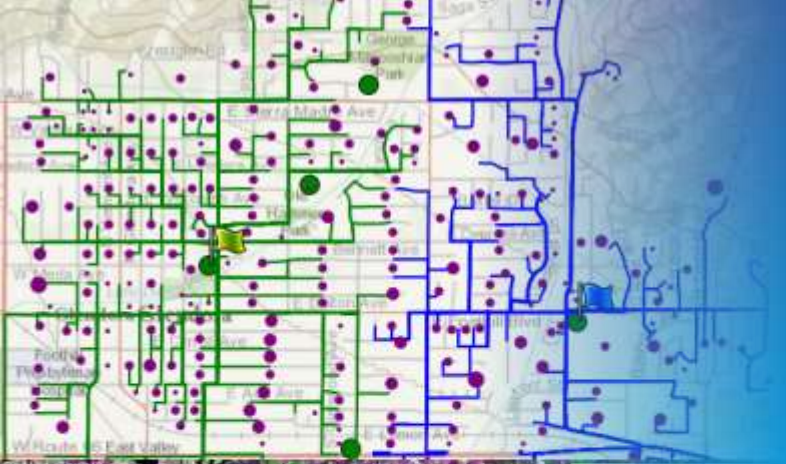
What is analysis?

Analysis transforms raw data into information or knowledge

Spatial analysis **does this for geographic or spatial data**





Who? What? Where? When? Why?

Spatial analysis answers *where* questions

Where is the best location for a new community center?

Where is an area with statistically high crime rates?

Where has the landscape changed in the last 10 years?

Pro 1.0 – January
Pro 1.1 – Now!

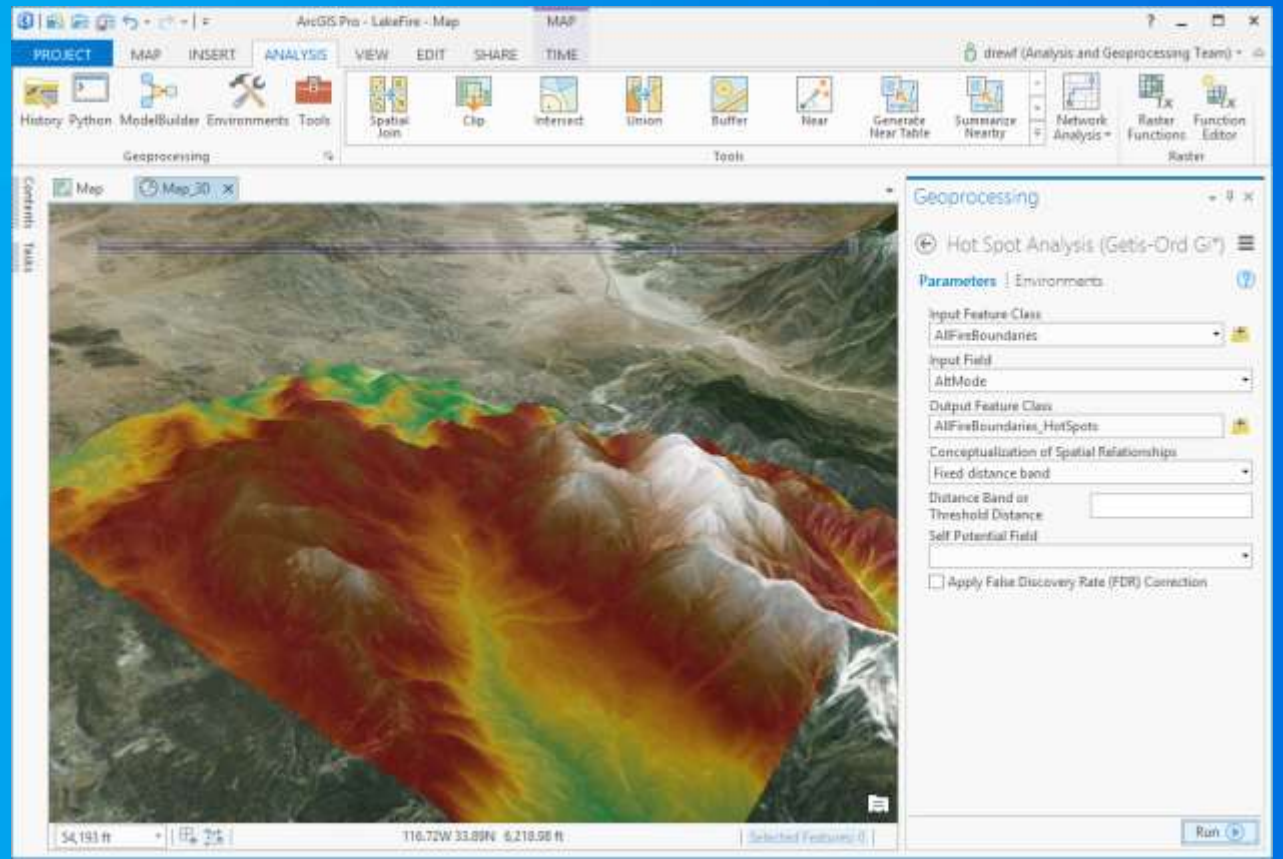
Analysis in ArcGIS Pro

ArcGIS Pro provides incredible analysis capabilities in 2D, 3D, and 4D

Scalable 64-bit execution, non-blocking threading, and visualization

Geoprocessing is the technology that ties it all together

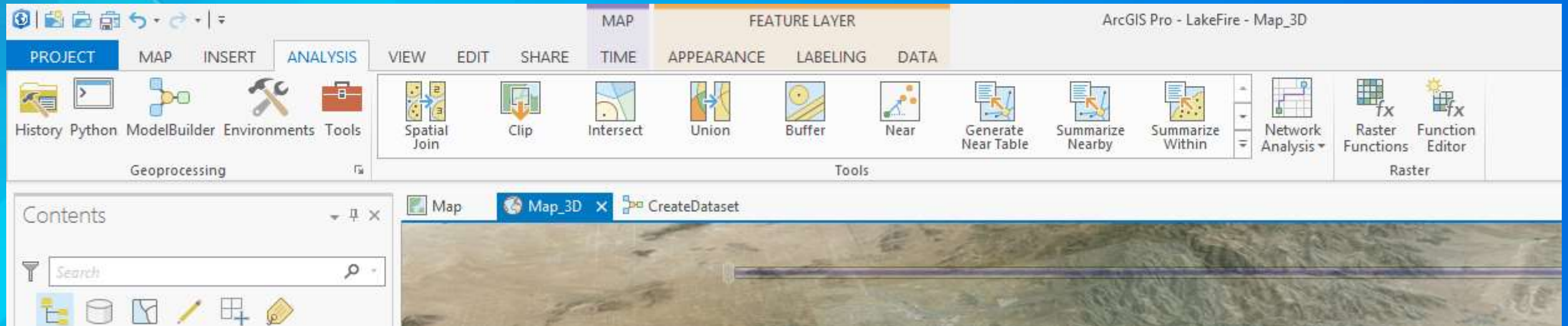
- Spatial Statistics
- Analysis extensions
  - Spatial Analyst
  - Network Analyst
  - 3D Analyst
  - Geostatistical Analyst
- Ready-to-use services



Analysis in ArcGIS Pro

The *ANALYSIS* ribbon tab provides access to

- Gallery of powerful analytic tools
- Suite of all ~700 geoprocessing tools
- Geoprocessing History
- Python command line
- ModelBuilder
- Network analysis
- Imagery processing / raster functions



What is geoprocessing?

Geoprocessing is a rich suite of tools for processing geographic data

Spatial analysis + GIS data management

A typical geoprocessing tool processes input data and produces an output

E.g. Buffer a map layer to create areas around the layer's features

Geoprocessing is also a framework you can use to model and automate processes using ModelBuilder or Python

Geoprocessing

Demo

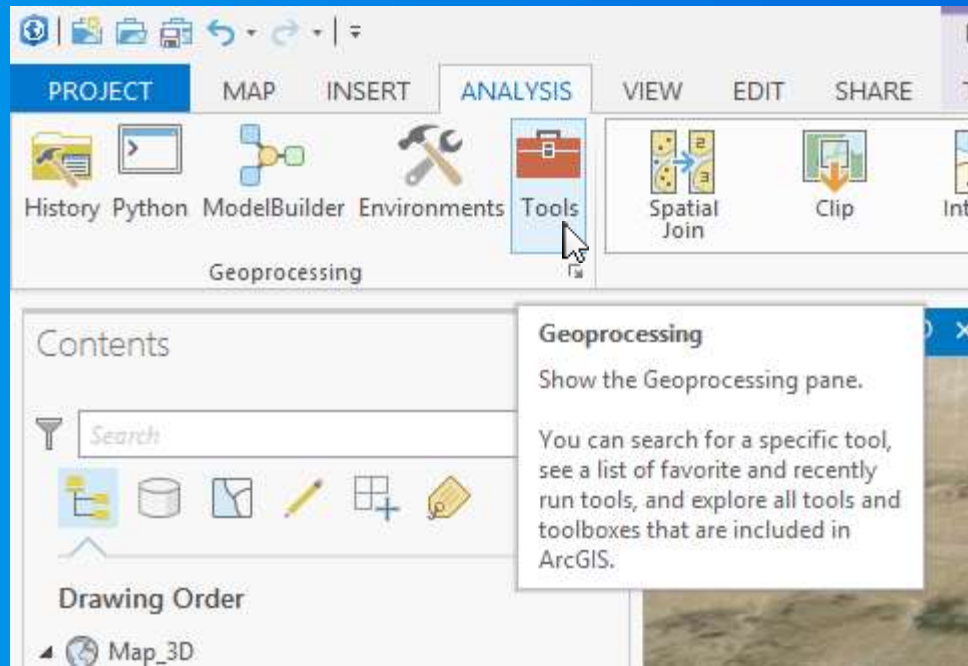
Geoprocessing in ArcGIS Pro

Familiar user experience, and easy migration for ArcMap users

Supports most tools, models, and Python scripts that work in ArcMap

ArcObjects-based custom tools are not supported

Analyze for Pro tool checks models and scripts for unsupported tools, data, and Python code

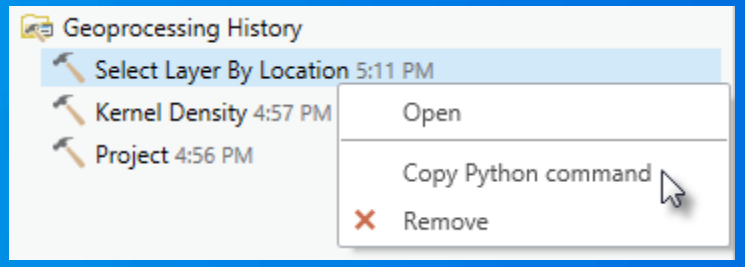


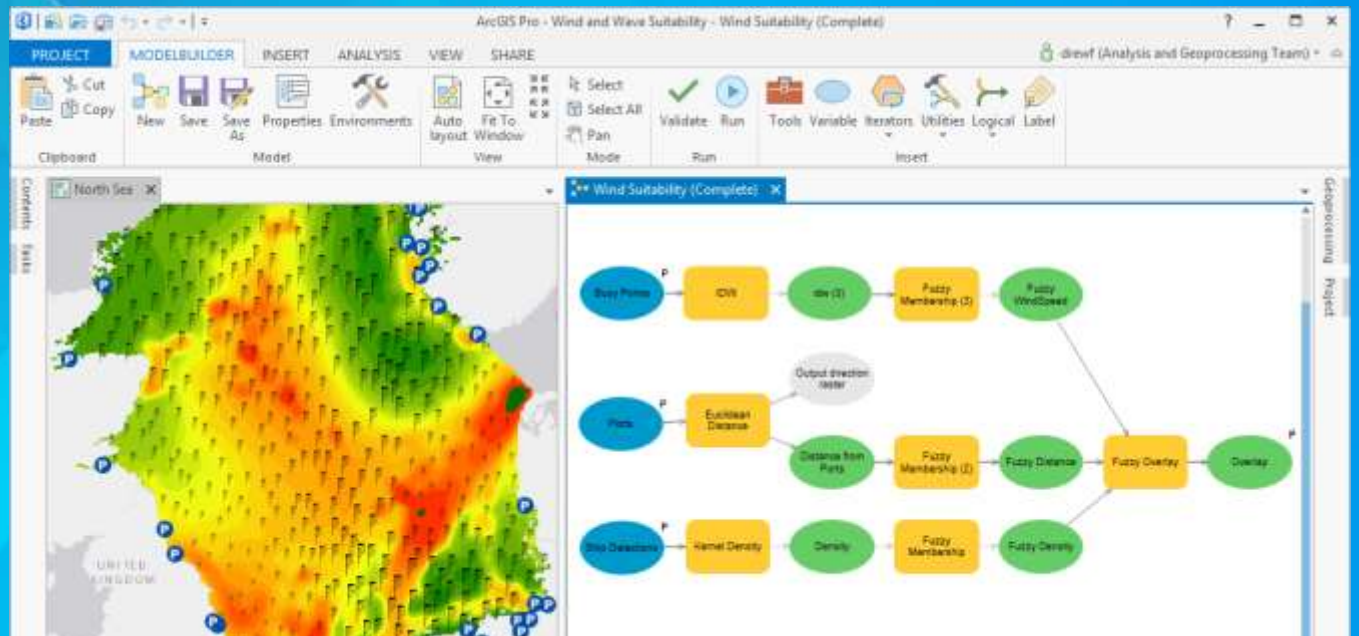
Create a geoprocessing workflow

Automate geoprocessing using Python code

To get started, run the tool in Pro, then *Copy Python command* and paste into script

```
arcpy.Buffer_analysis(input, output, "10 Miles")
```





Build a model of your workflow using ModelBuilder

Connect tools and data to make a diagram that represents your workflow

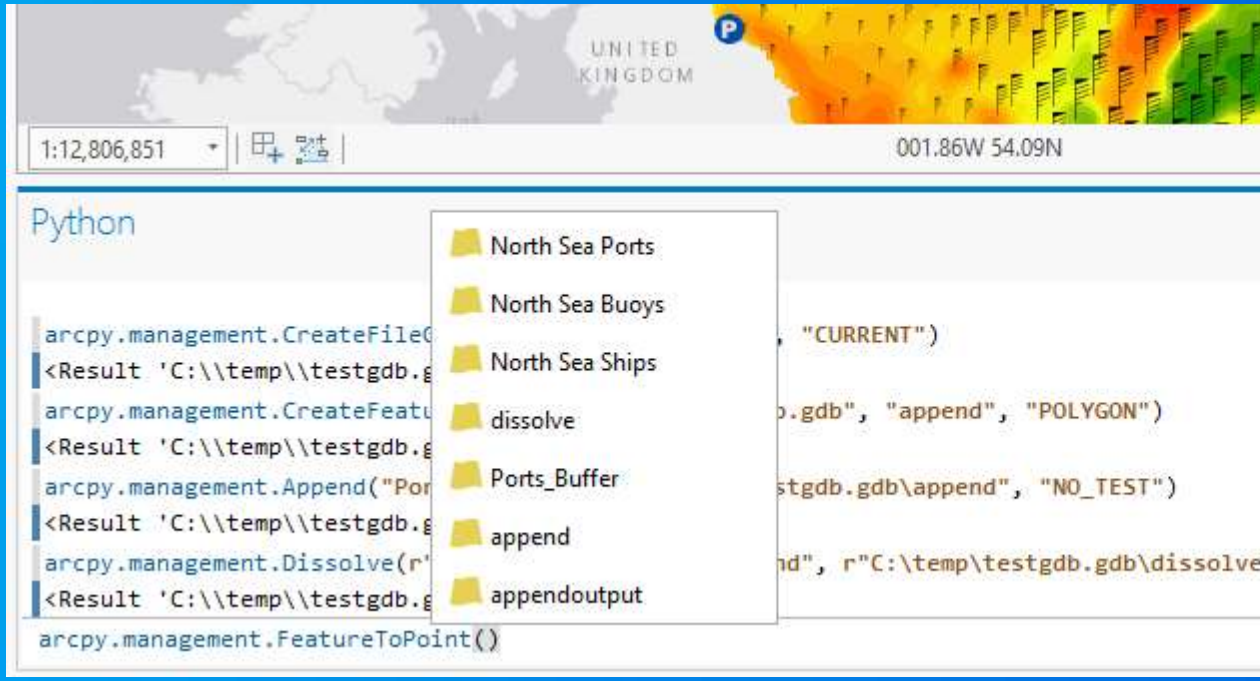
Python in ArcGIS Pro

Uses Python version 3.4

Full Python is not included in the default Pro installation, just enough to run system script tools and the Python window

Optional Python for ArcGIS Pro install enables running scripts outside Pro

Includes new libraries: Pandas, SciPy, and NetCDF4

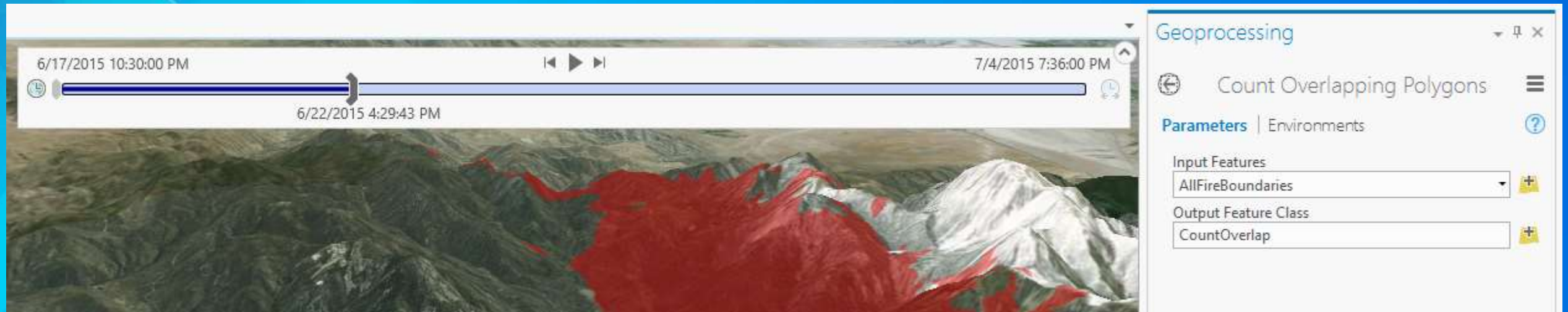


★ What's new in Pro 1.1

Geoprocessing tools support time and range extents on map layers

ModelBuilder undo-redo; create workflows from History

Project packages include geoprocessing history



ModelBuilder

Demo

Spatial Analyst

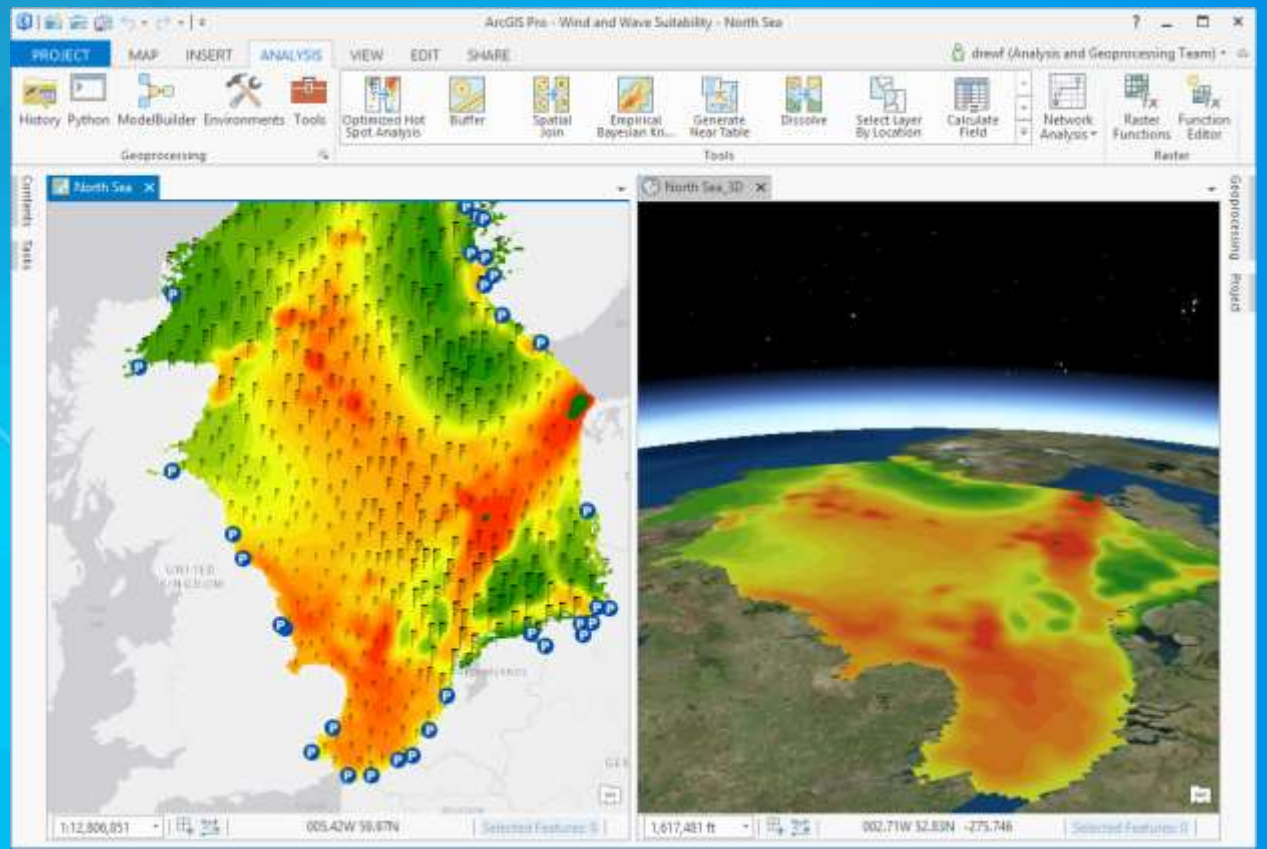
Extension

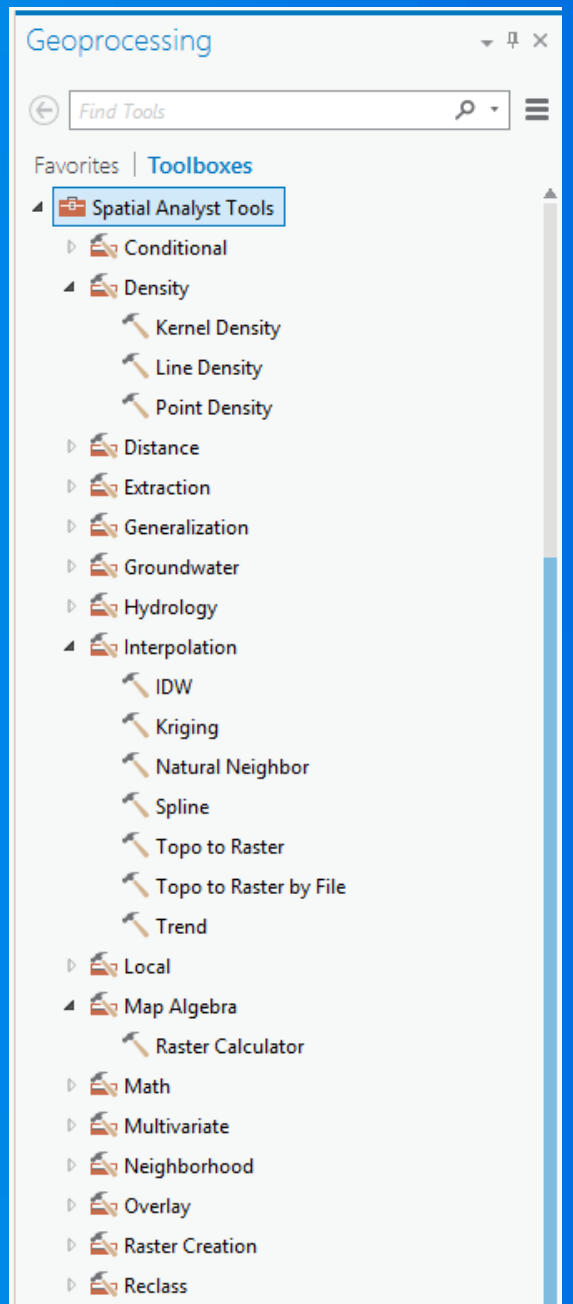
Spatial Analyst

Extension available across the ArcGIS platform

Provide spatial modeling and analysis tools for cell-based data

Similar user experience in ArcGIS Pro as in ArcMap





Spatial Analyst key features

- Suitability modeling
- Density analysis
- Distance and cost of travel analysis
- Hydrologic analysis
- Powerful Map Algebra language & Raster Calculator

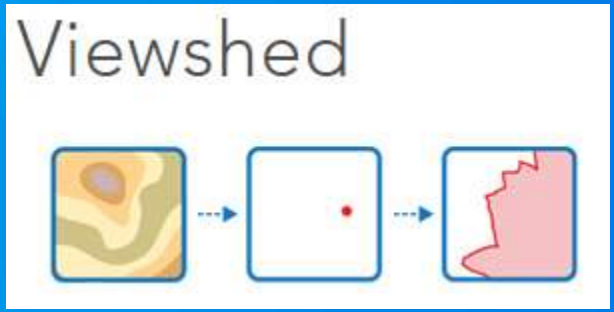
Ready-to-use services

Provide specific Spatial Analyst capabilities without the extension, using curated worldwide DEM data

- **Profile, viewshed, summarize elevation, trace streams, and watersheds**

Make an ArcGIS server connection to

- ***http://elevation.arcgis.com/arcgis/services***
- ***http://hydro.arcgis.com/arcgis/services***



Uses ArcGIS.com credits and you must be connected to an ArcGIS online organization with analysis privileges

★ What’s new in Pro 1.1

New segmentation and classification tools:

- Compute Confusion Matrix, Create Accuracy Assessment Points, and Update Accuracy Assessment Points

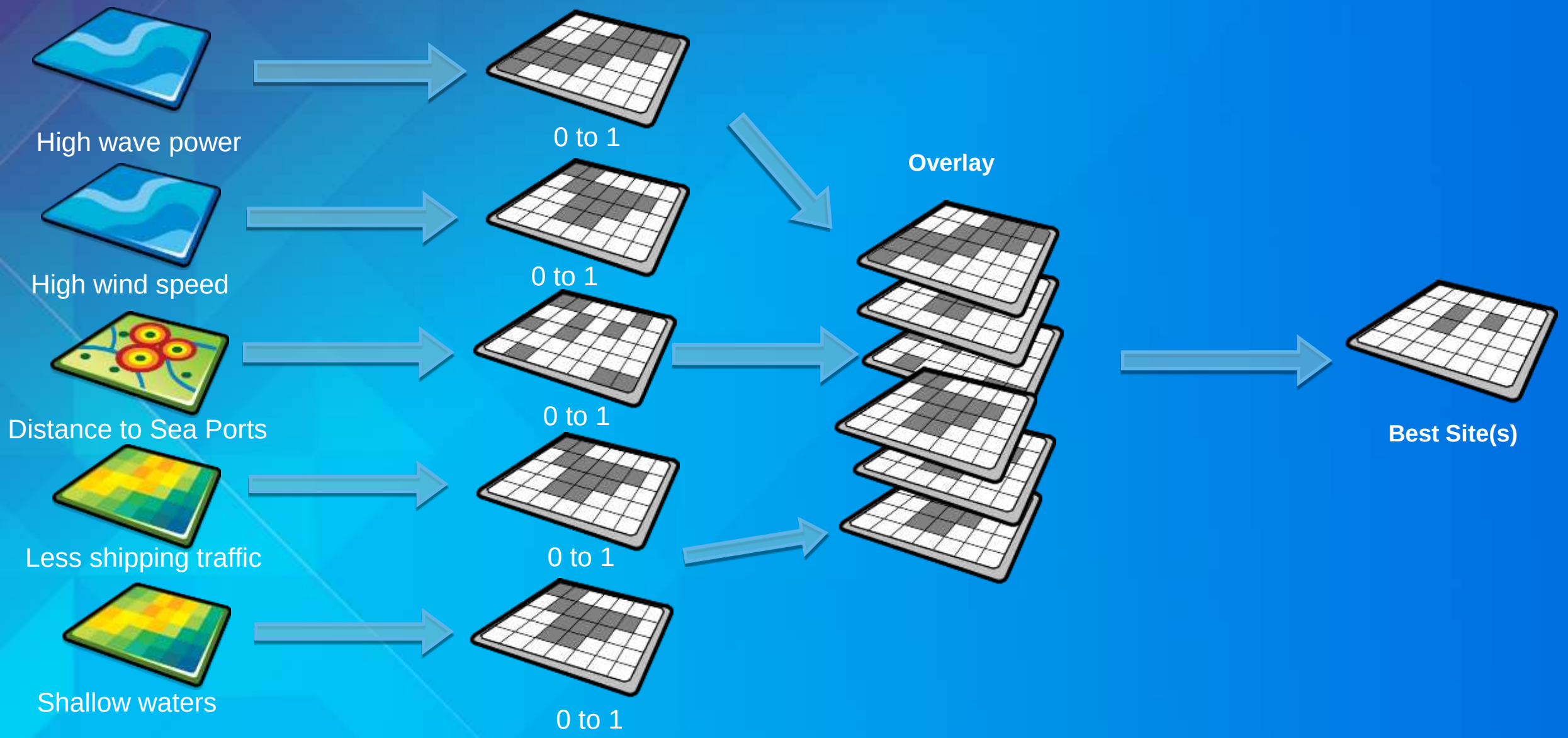
More tools use parallel processing (same in 1.0 and ArcMap)

- Reclassify, Weighted Overlay, Zonal Statistics

Spatial Analyst

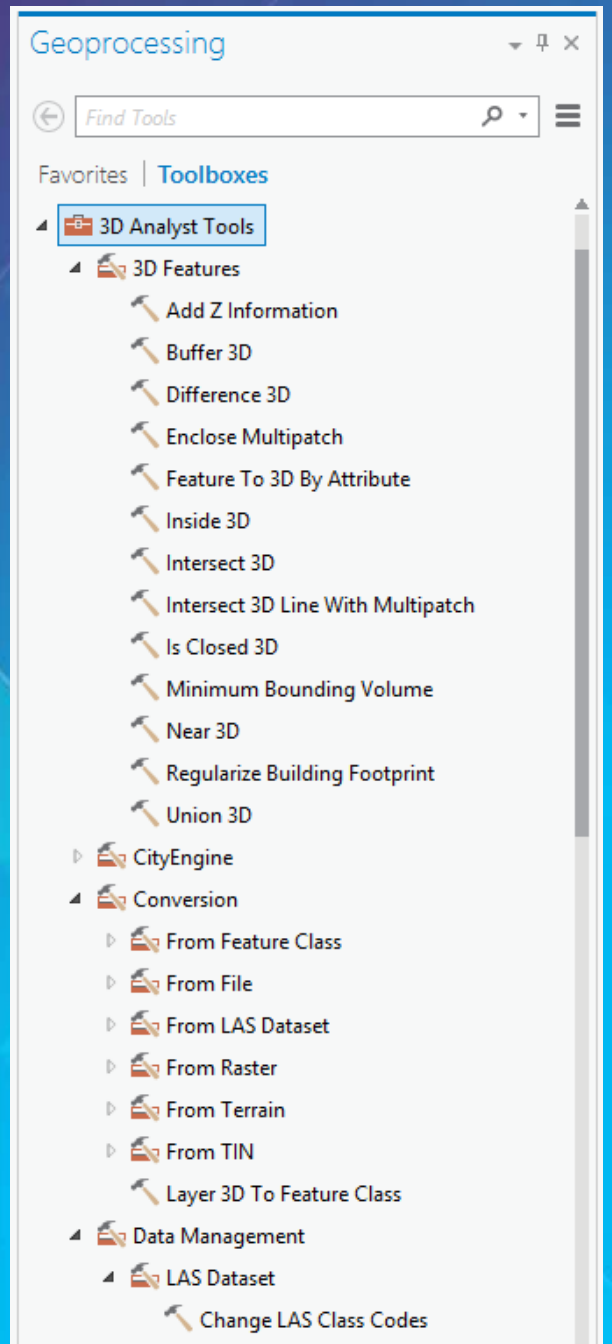
Suitability analysis demo

Where is the best place to build a wind farm in the North Sea area?



3d Analysis

Extension



3D Analyst extension

100+ geoprocessing tools for elevation surface creation and analysis, using vectors, rasters and TIN-based models

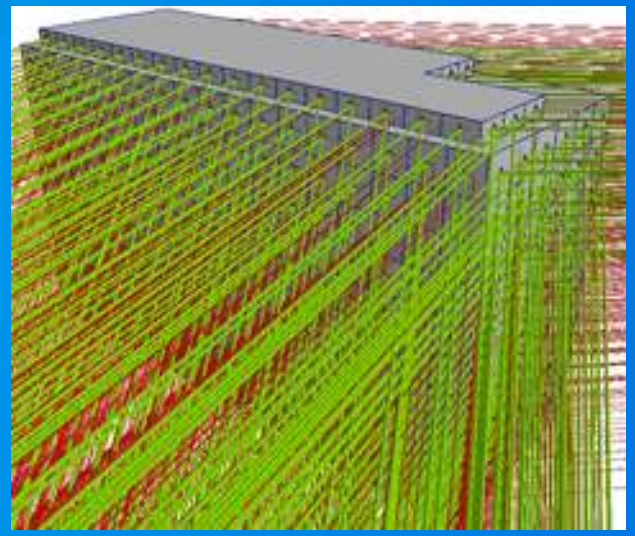
Support for analysis and visualization of Lidar and point-cloud data through the LAS dataset format

Measuring distances/proximity and evaluating spatial relationships in 3D

Volumetric and visibility analysis

NOTE: 3D mapping and visualization does not require 3D Analyst extension

★ What's new in Pro 1.1



New tools

- Minimum Bounding Volume
- Regularize Building Footprint
- Layer 3D to Feature Class
- Extract LAS
- New options for Features From CityEngine Rules

New RGB rendering for LAS dataset point clouds
"It's amazing" -Drew

3d Analysis DEMOS

LASd RGB point rendering* (3gb data)

Line of sight analysis

*Data source: NASA Grant NNX13AP69G, the University of Maryland, and the Sonoma Vegetation Mapping and LiDAR Program

Network Analysis

Extension

Network Analysis

Routing / Directions

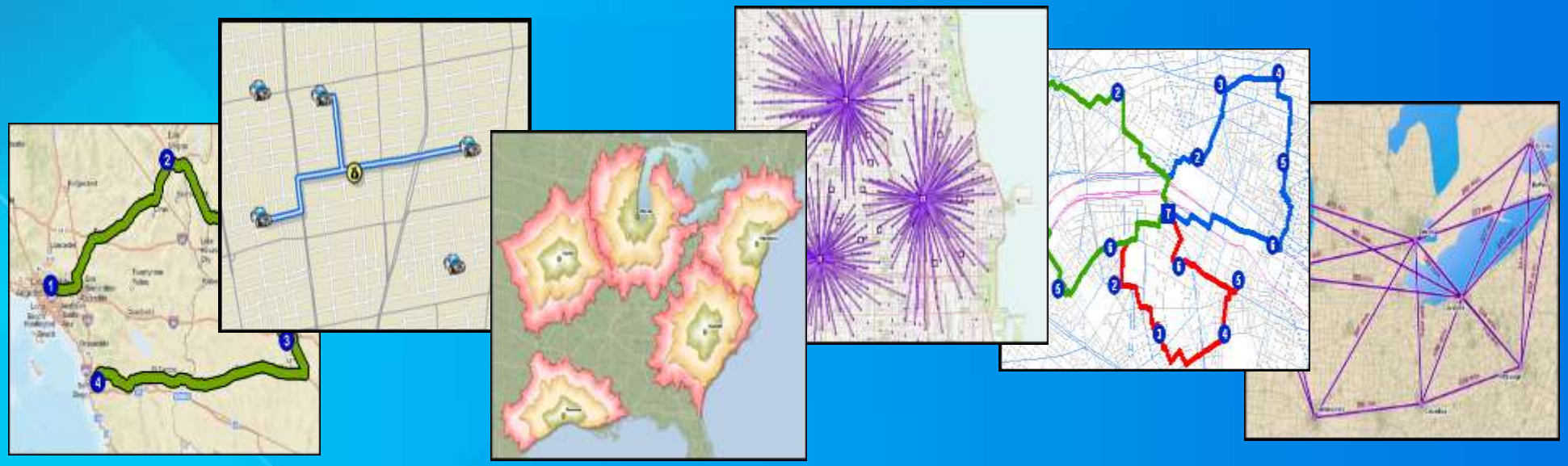
Closest facility

Drive-time / service areas

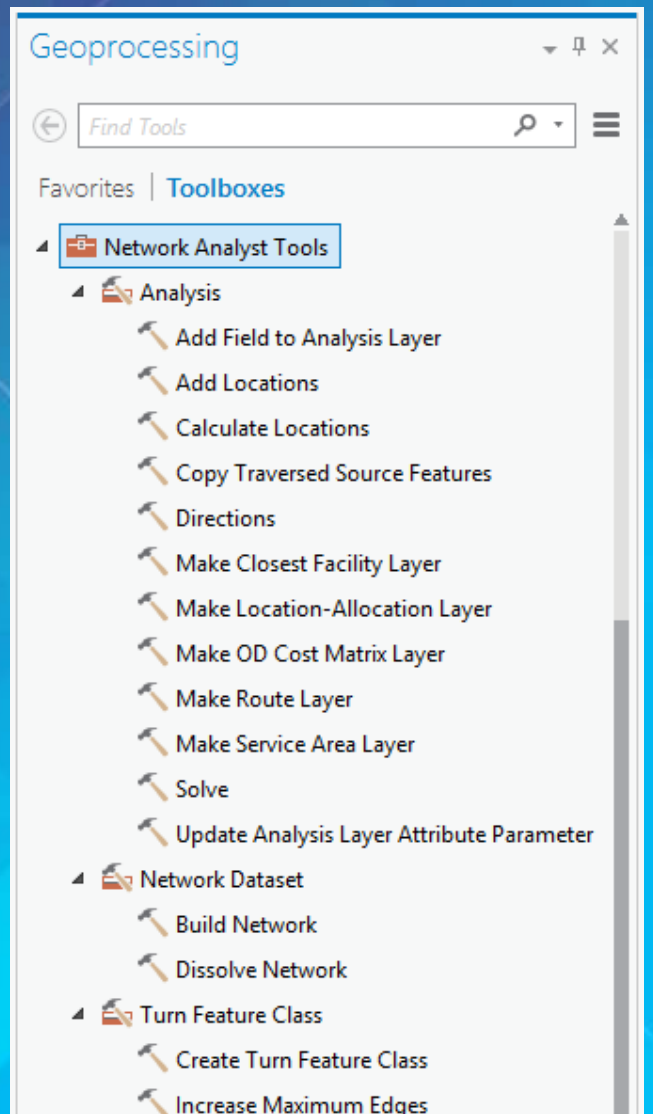
Location – Allocation

Vehicle routing problem

Origin – Destination matrix



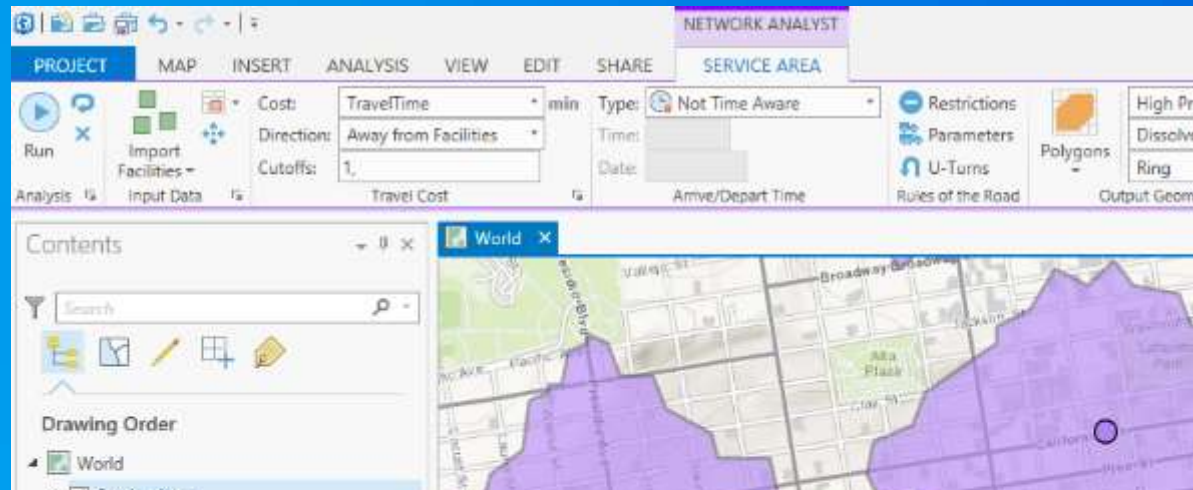
Network Analysis



20+ geoproccessing tools for simple to complex network analyses

2D and 3D network analysis

Contextual ribbon tab workflow



Ready-to-use services

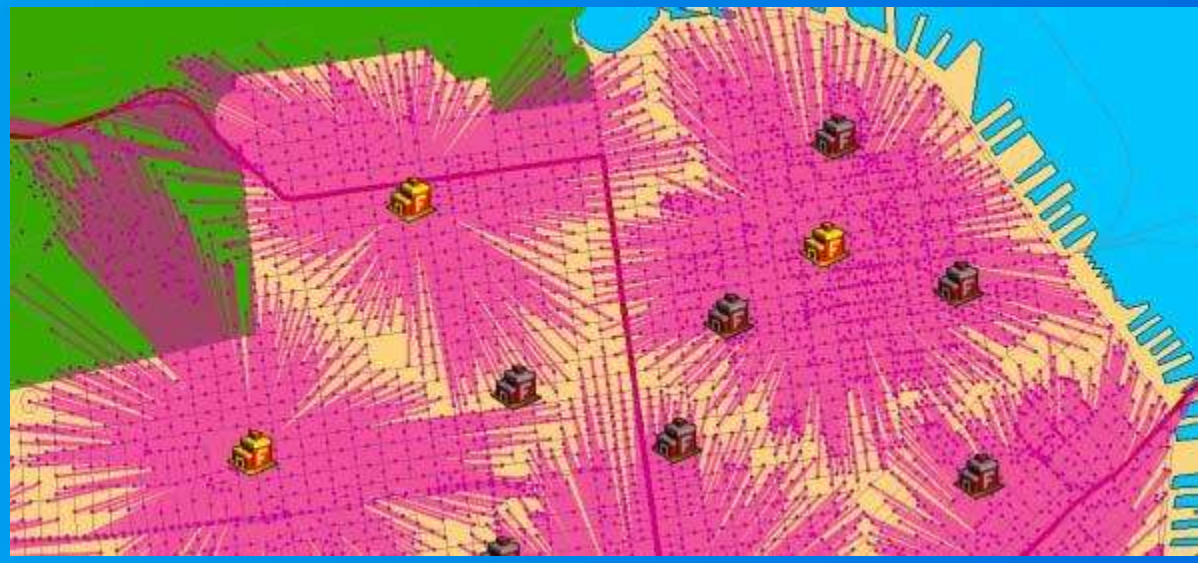
Provide Network Analyst capabilities without the extension, using curated worldwide street network datasets

Find closest facilities, routing, service areas, location allocation, and VRP

Make an ArcGIS server connection to

http://logistics.arcgis.com/arcgis/services

Uses ArcGIS.com credits and you must be connected to an ArcGIS online organization with analysis privileges



Statistical analysis

Geostatistical Analyst extension

Spatial Statistics

Geostatistical Analyst extension

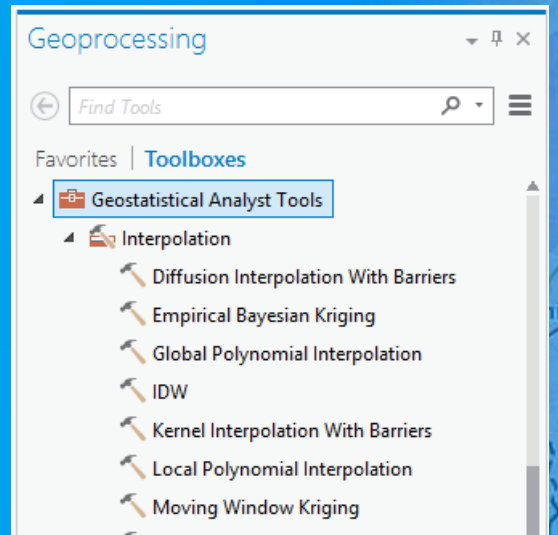
Modeling tools for creating statistically valid prediction surfaces along with prediction uncertainties

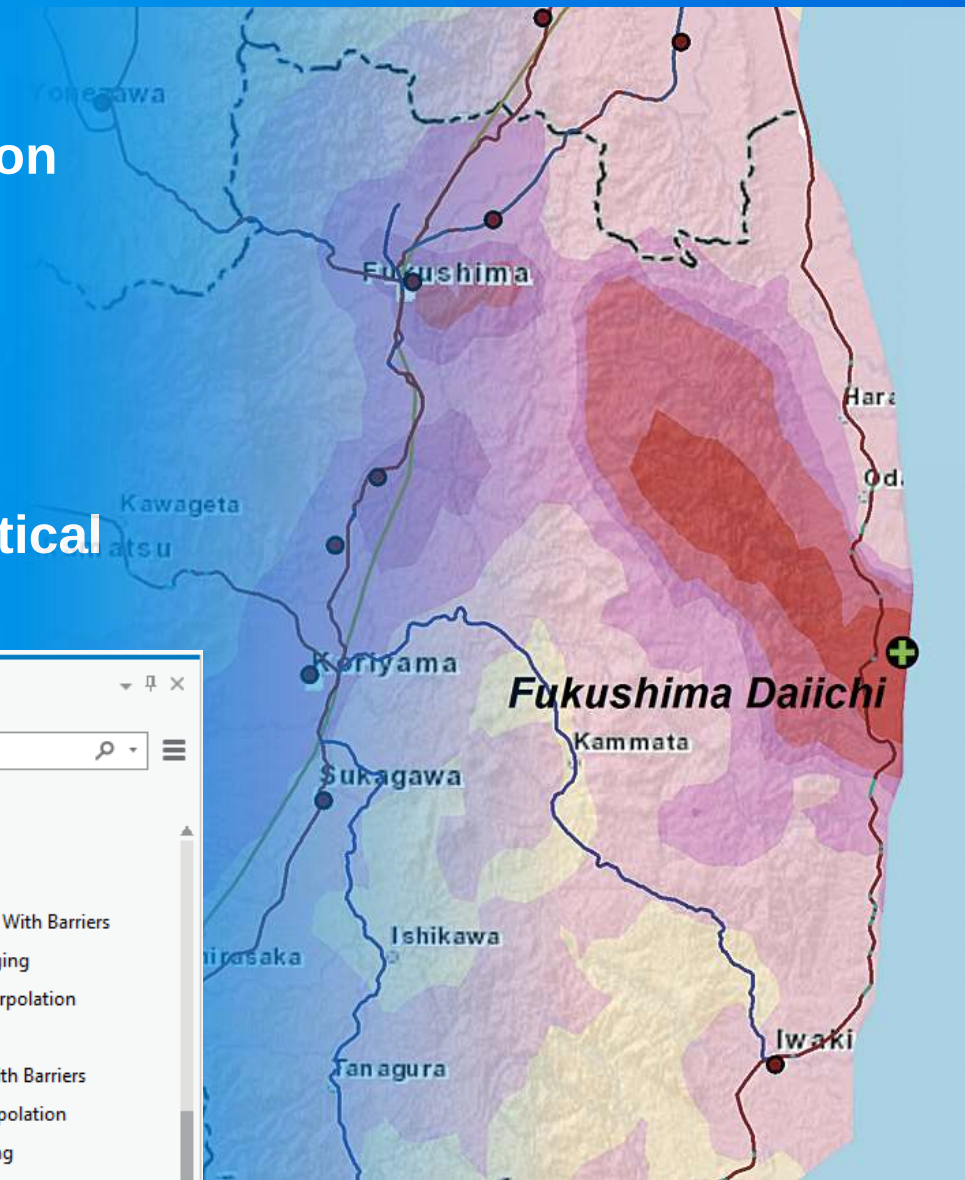
- Predict between known measurements – interpolation

Off-the-shelf tools for calculating extremely accurate interpolation surfaces without configuration of statistical models

- Empirical Bayesian Kriging

24 geoprocessing tools
No Geostatistical Wizard in Pro…yet





Spatial Statistics

Tools for analyzing spatial distributions, patterns, processes and relationships in 2D, 3D, and 4D (time)

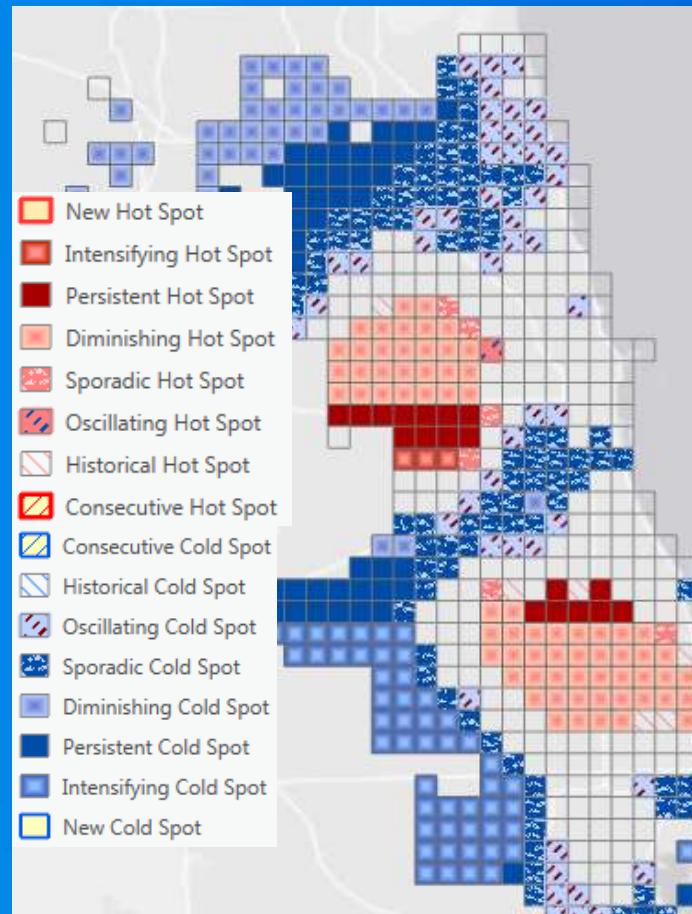
- Summarize key characteristics of a spatial distribution
- Identify significant clusters and outliers, hot and cold spots
- Model and explore spatial relationship through regression

Space-Time Pattern Mining

Aggregates data into cube data structure and identifies hot and cold spot trends

★ New tools in Pro 1.1

Visualize Space Time Cube in 2D & 3D



Statistical analysis

Space Time Pattern Mining demo

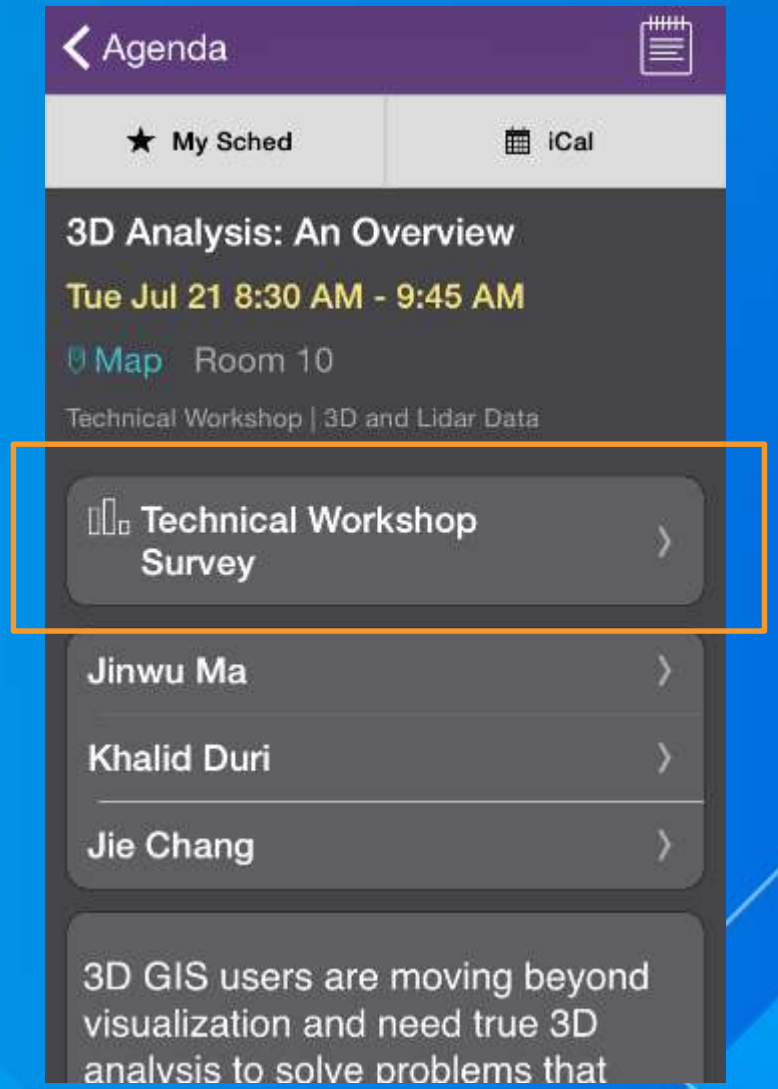
Thank you!

Please fill out the session survey using the mobile app

- **Session ArcGIS Pro: Analysis and Geoprocessing**
- **Click "Technical Workshop Survey"**
- **Answer a few short questions and enter any comments**

Paper – pick up and put in drop box

- Some paper surveys available for those without devices



Learn more about spatial analysis

http://desktop.arcgis.com/en/analytics
http://desktop.arcgis.com/en/analytics/casestudies/

Many more analysis sessions this week…

Spatial Analyst: Getting Started

3D Analyst: An Overview

Network Analyst: Introduction

Geostatistical Analyst: An Introduction

Applying Spatial Statistics: The Analysis Process in Action

Python: An Introduction

ModelBuilder: Getting Started

Introduction to ArcGIS Online Spatial Analysis

Applying Spatial Analysis Techniques to Make Better Decisions

…And more! esriurl.com/analysisUC15

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Understanding our world.