ArcGIS Pro: Analysis and Geoprocessing Overview

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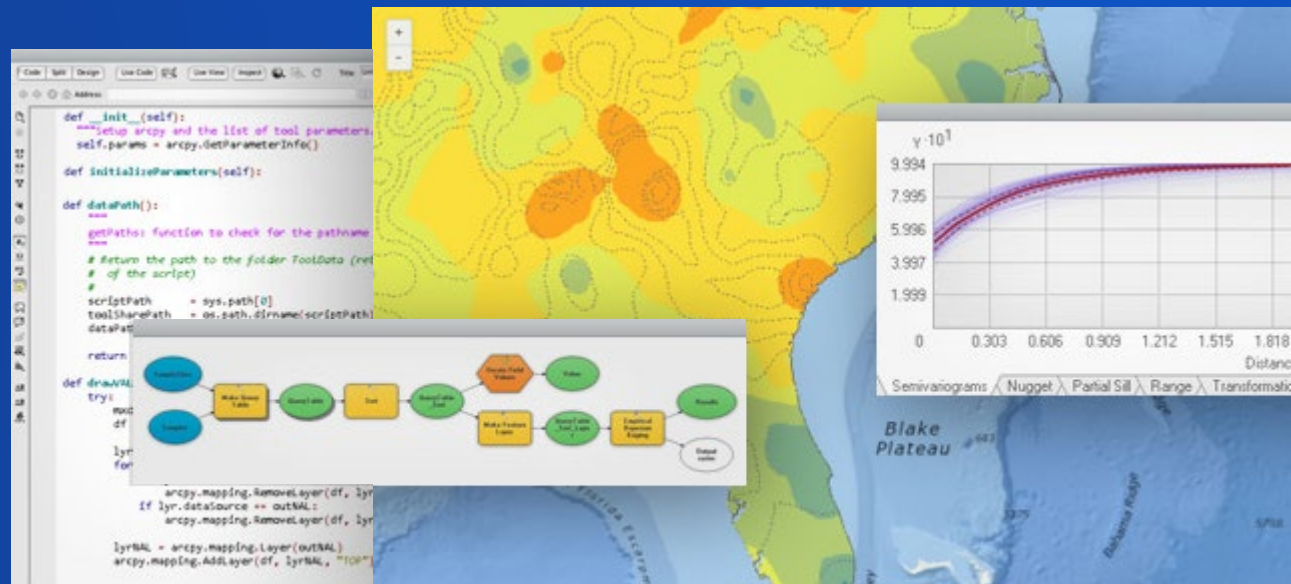
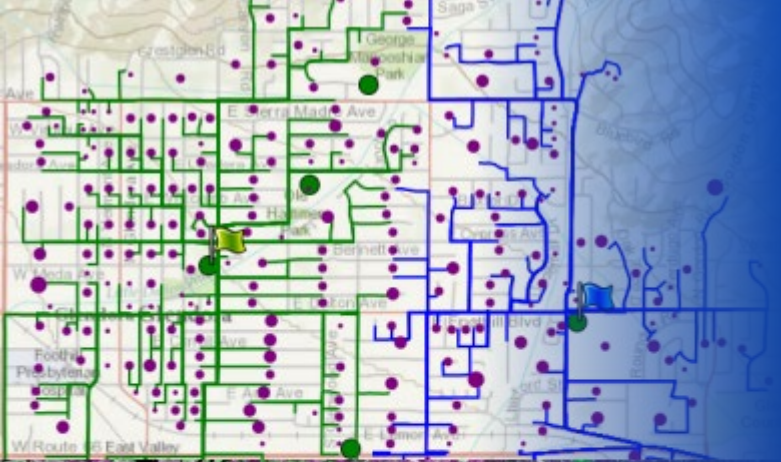
SEE
WHAT
OTHERS
CAN'T

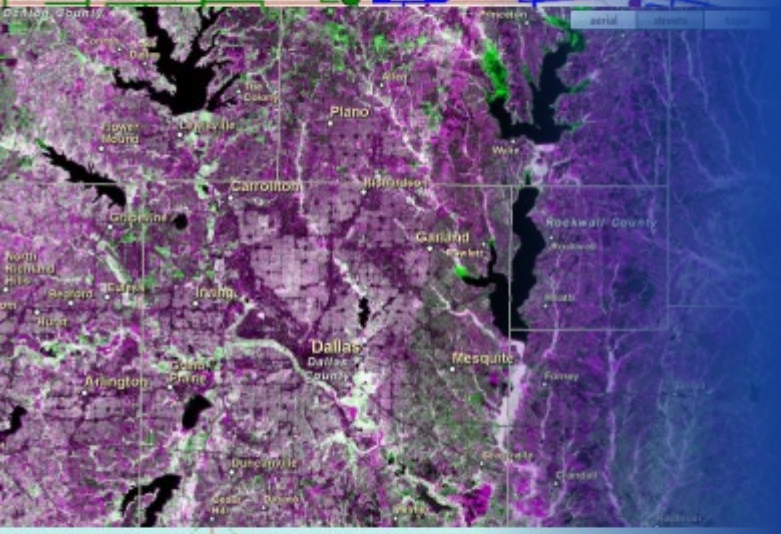
What is analysis?

Analysis transforms raw data into information or knowledge

Spatial analysis does this for geographic or spatial data







Who? What? Where? When? Why?

Spatial analysis is used to answer questions with a *where* component

Where is the most accessible location for a new community center?

Where is an area with statistically high crime rates?

Where has the landscape changed the most in the last 10 years?

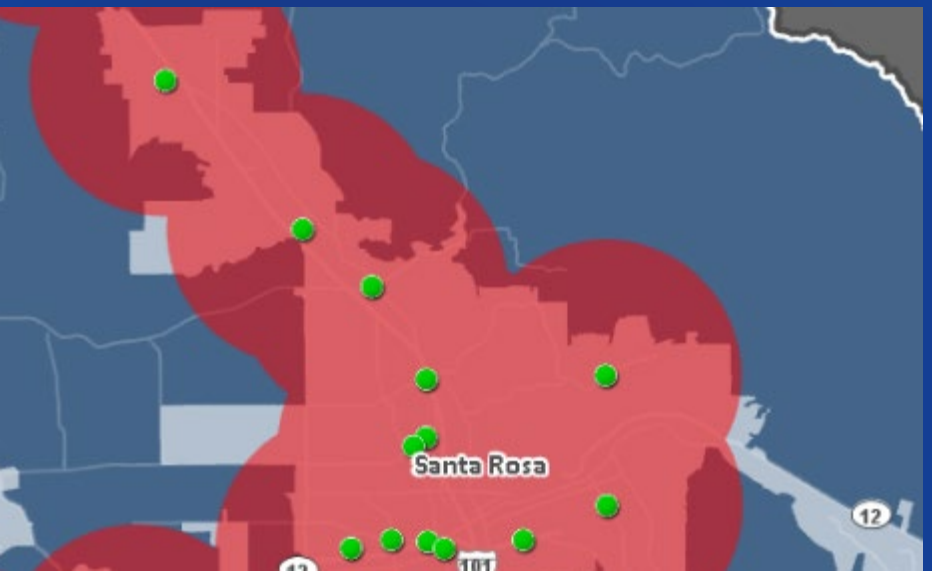
What is geoprocessing?

Geoprocessing is a rich suite of tools for processing geographic data

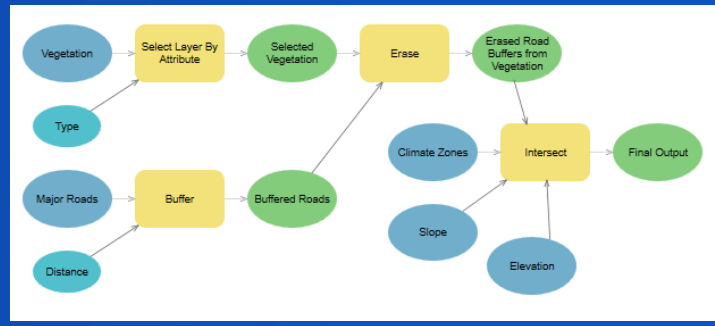
Spatial Analysis + Data Management + Conversion + More

A typical geoprocessing tool processes input data and produces an output

For example, Buffer a map layer to create proximity areas around the layer's features



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



Demo

Geoprocessing

Analysis in ArcGIS Pro

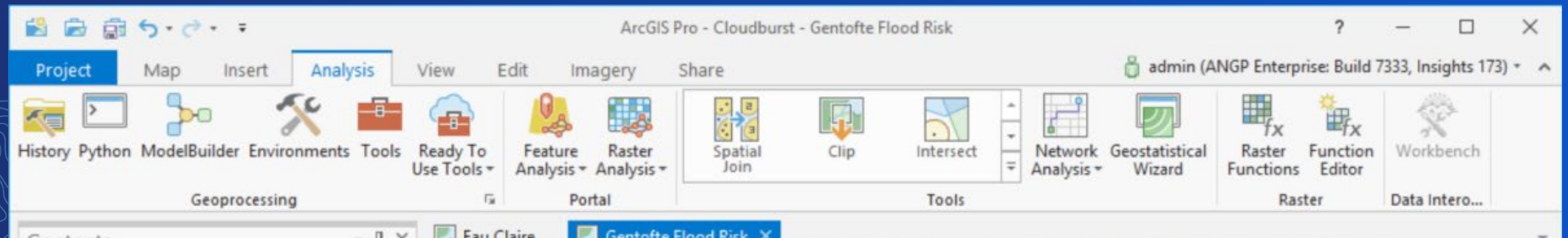
Pro 2.2 – UC 2018
Pro 2.3 – Jan 2019
Pro 2.4 – Now!

ArcGIS Pro provides analysis capabilities in 2D, 3D, and 4D (time)

- Scalable 64-bit execution, non-blocking threading, 70+ parallel tools

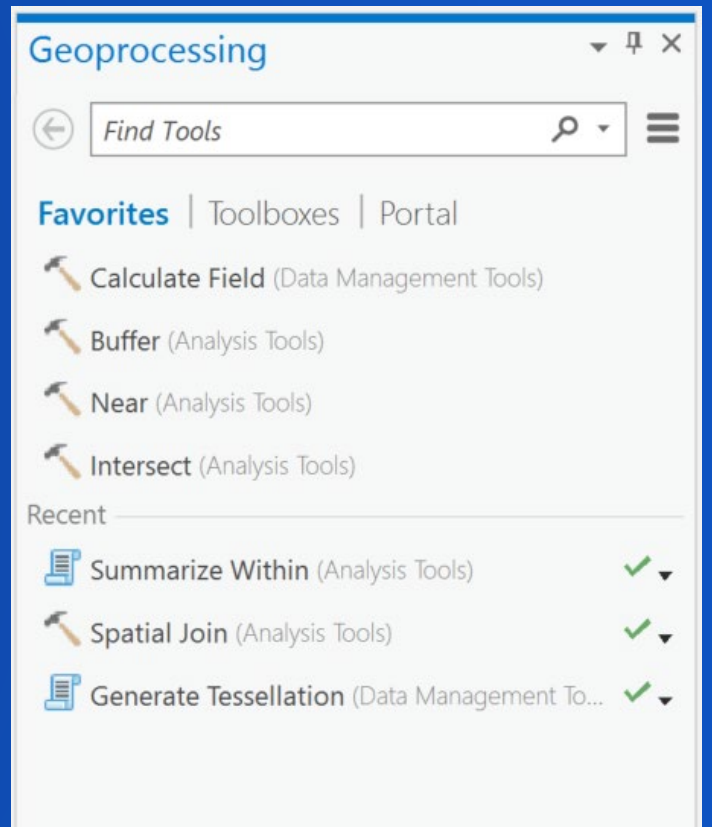
The *Analysis* ribbon tab provides access to

- Gallery of commonly-used tools
- Suite of all 1,400+ geoprocessing tools
- ArcGIS Enterprise and Online analysis tools
- Geoprocessing History
- Python command line
- ModelBuilder
- Network Analysis
- Geostatistical Wizard
- Raster Functions
- Data Interoperability Workbench



Geoprocessing in ArcGIS Pro

- User experience driven through the Geoprocessing pane
  - Search for tools or explore Toolboxes
  - Open tool(s) and set parameter and environment settings
  - Run the tool and track progress
  - View recently run tools and history
- Supports most* tools, models, and Python scripts that in ArcMap; esriurl.com/MissingTools
  - *Custom .Net tools are not supported
- Supports traditional feature and raster data sources as well as web layers; *memory* workspace
- New GeoAnalytics Desktop Toolbox
  - Spatio-temporal analysis tools that leverage Spark for parallel processing



Geoprocessing History

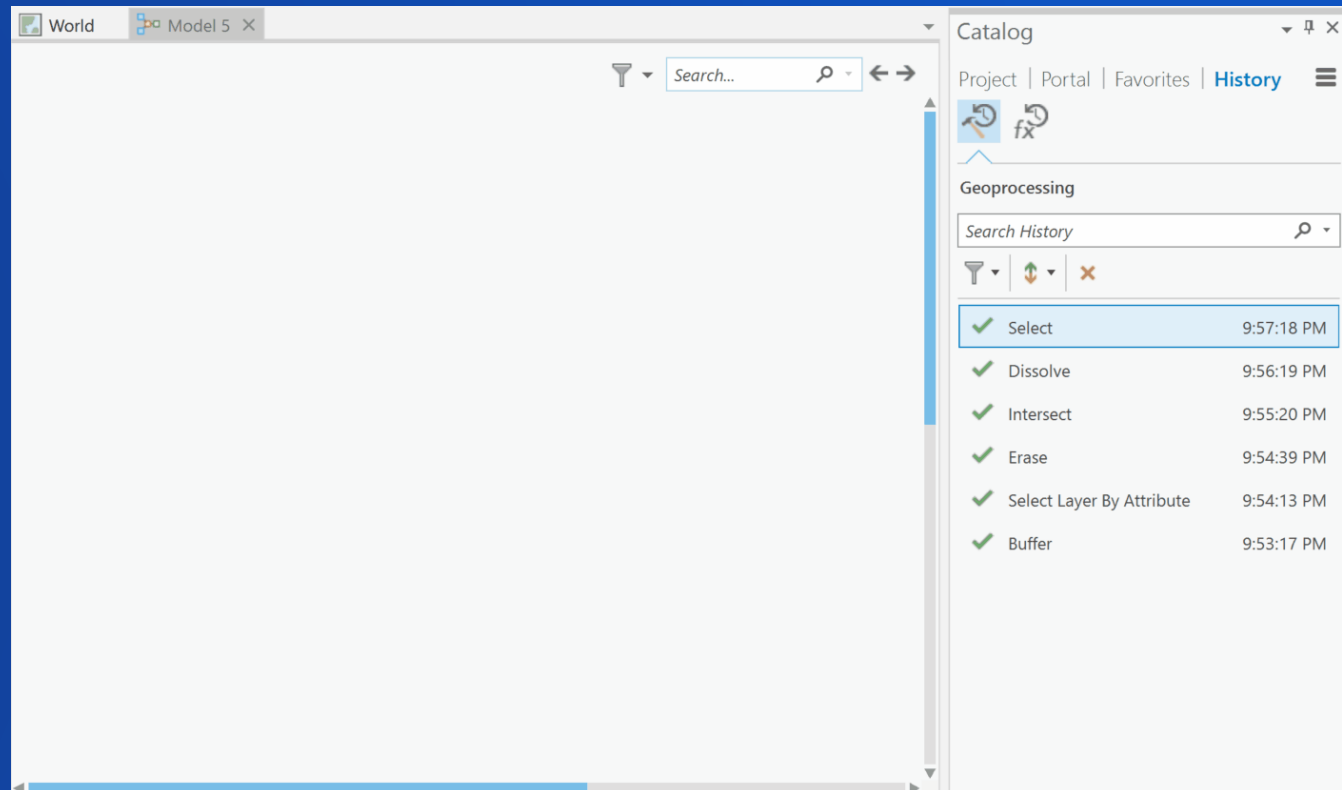
Every tool you run in a Pro project is logged in Geoprocessing History

Helps you understand the work done in a project

Stores detailed info about each tool

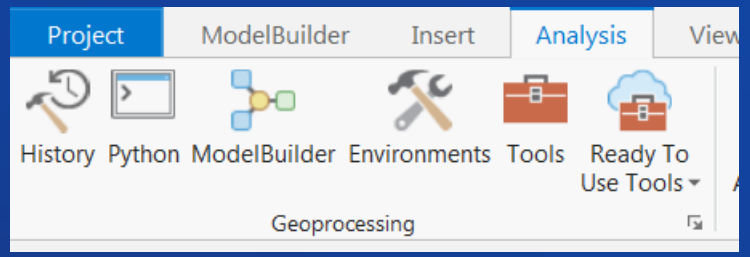
- Parameters, Environments, messages, warnings, errors, etc.

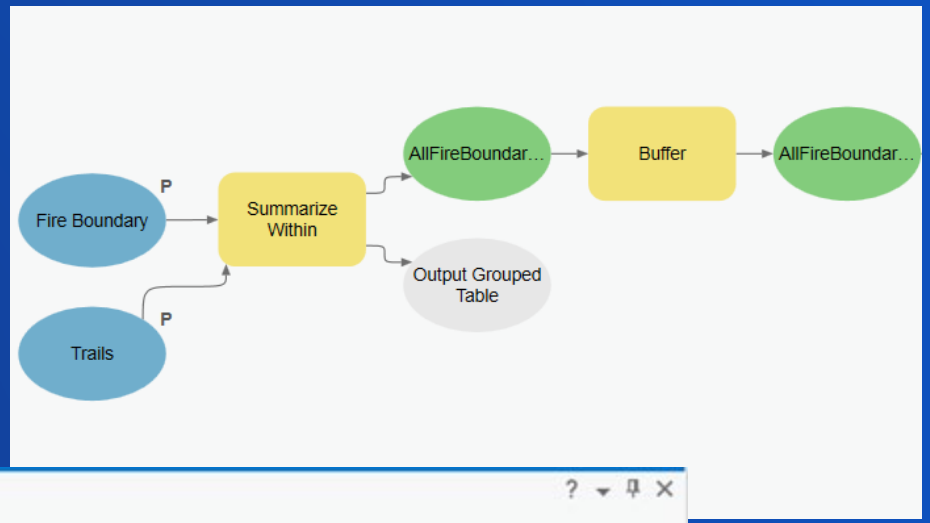
Use history to automate and share workflows

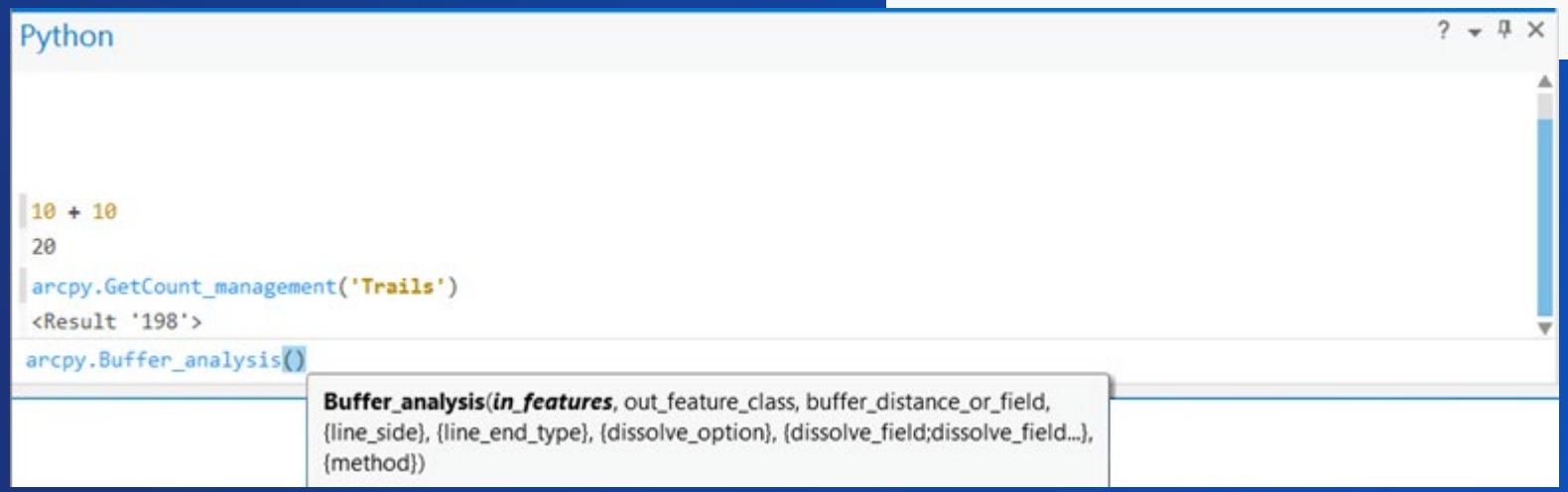


Modeling and Scripting

Use ModelBuilder or Python to automate geoprocessing workflows or extend functionality

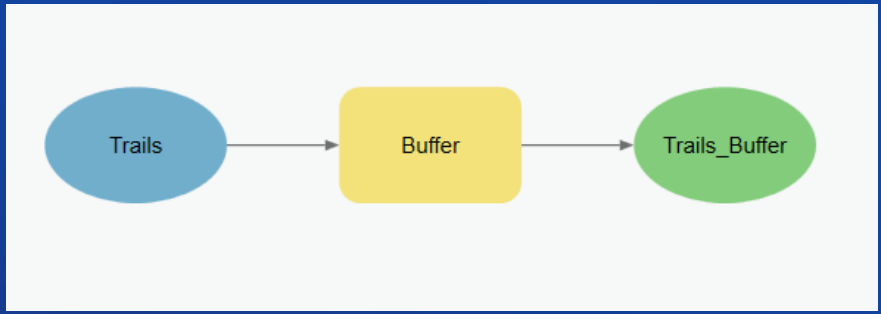


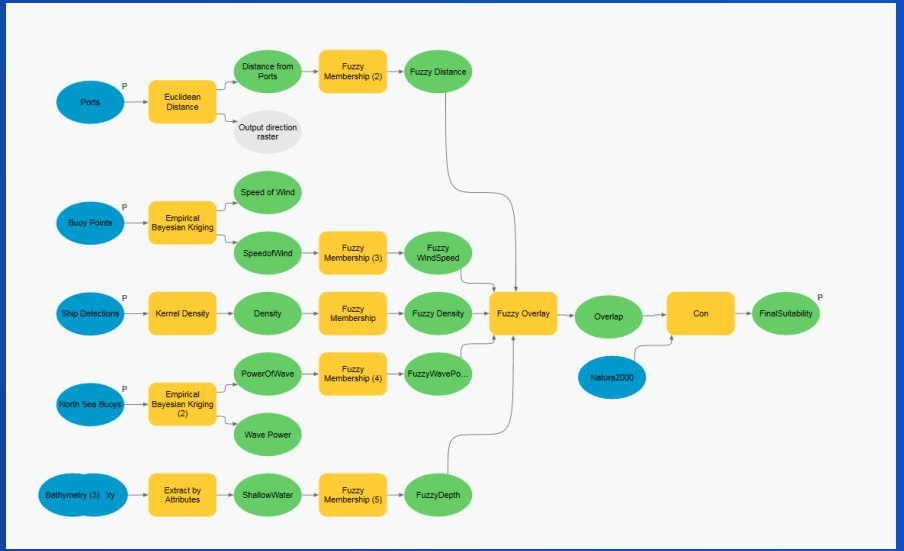


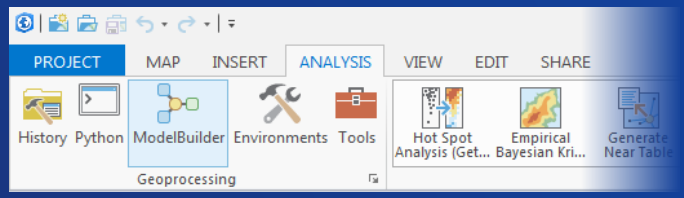


ModelBuilder in ArcGIS Pro

A sequence of geoprocessing tools as a workflow that can be reused and shared





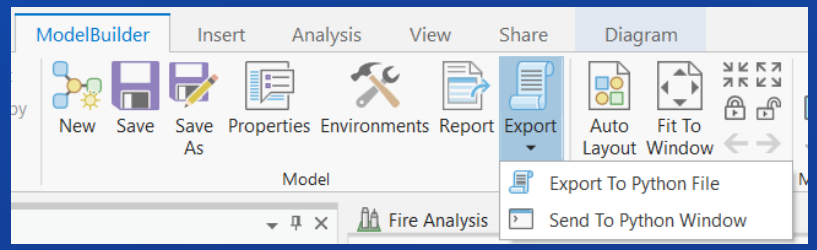


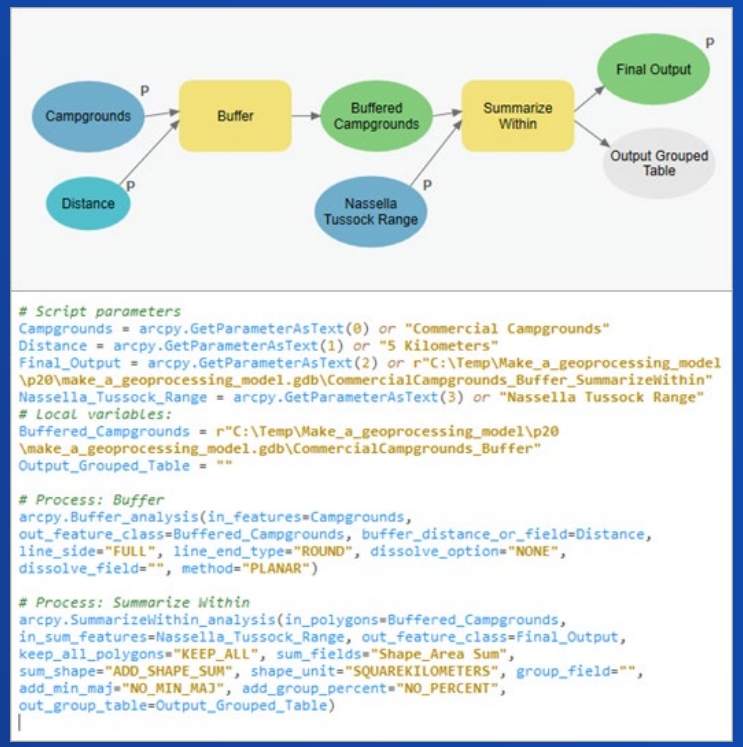
A visual programming language for automating geoprocessing workflows

ModelBuilder in ArcGIS Pro

New in Pro 2.4

Export Model to Python



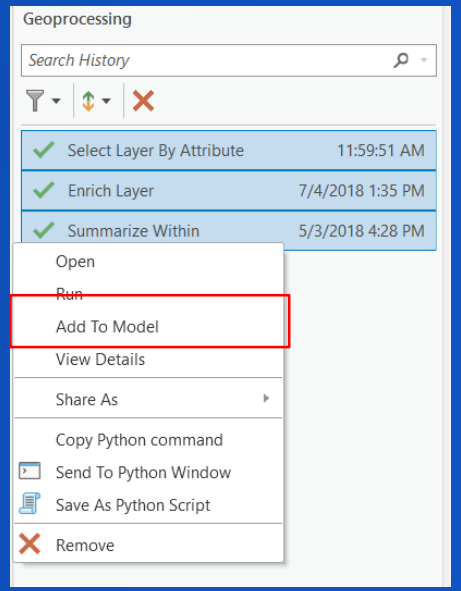



```
# Script parameters
Campgrounds = arcpy.GetParameterAsText(0) or "Commercial Campgrounds"
Distance = arcpy.GetParameterAsText(1) or "5 Kilometers"
Final_Output = arcpy.GetParameterAsText(2) or r"C:\Temp\Make_a_geoprocessing_model
\p20\make_a_geoprocessing_model.gdb\CommercialCampgrounds_Buffer_SummarizeWithin"
Nassella_Tussock_Range = arcpy.GetParameterAsText(3) or "Nassella Tussock Range"
# Local variables:
Buffered_Campgrounds = r"C:\Temp\Make_a_geoprocessing_model\p20
\make_a_geoprocessing_model.gdb\CommercialCampgrounds_Buffer"
Output_Grouped_Table = ""

# Process: Buffer
arcpy.Buffer_analysis(in_features=Campgrounds,
out_feature_class=Buffered_Campgrounds, buffer_distance_or_field=Distance,
line_side="FULL", line_end_type="ROUND", dissolve_option="NONE",
dissolve_field="", method="PLANAR")

# Process: Summarize Within
arcpy.SummarizeWithin_analysis(in_polygons=Buffered_Campgrounds,
in_sum_features=Nassella_Tussock_Range, out_feature_class=Final_Output,
keep_all_polygons="KEEP_ALL", sum_fields="Shape_Area Sum",
sum_shape="ADD_SHAPE_SUM", shape_unit="SQUAREKILOMETERS", group_field="",
add_min_maj="NO_MIN_MAJ", add_group_percent="NO_PERCENT",
out_group_table=Output_Grouped_Table)
```

Create a model from a sequence of tools in the geoprocessing history



Python in ArcGIS Pro

Automate and extend geoprocessing in a Python script

To get started, run the tool in UI, then *Copy Python,*

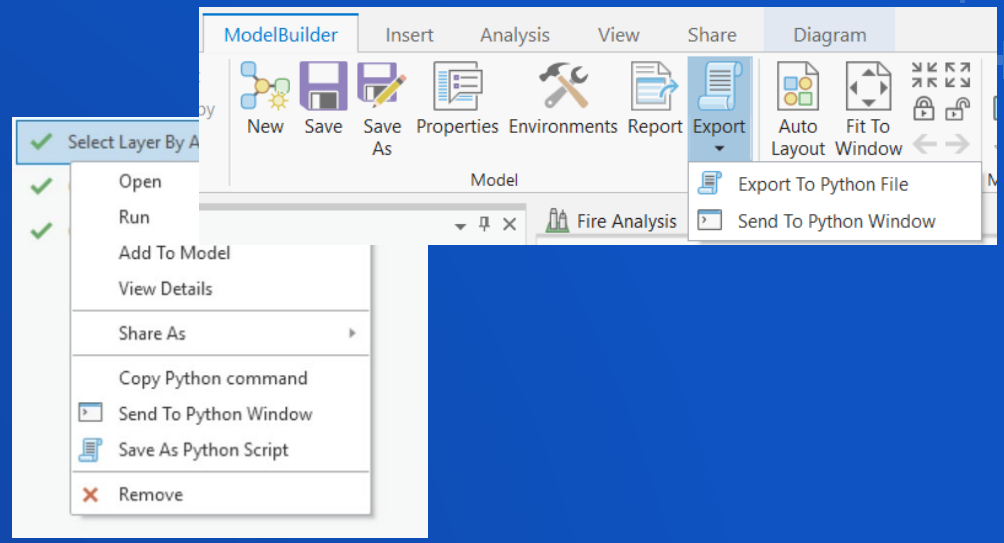
or use ModelBuilder Export>Python

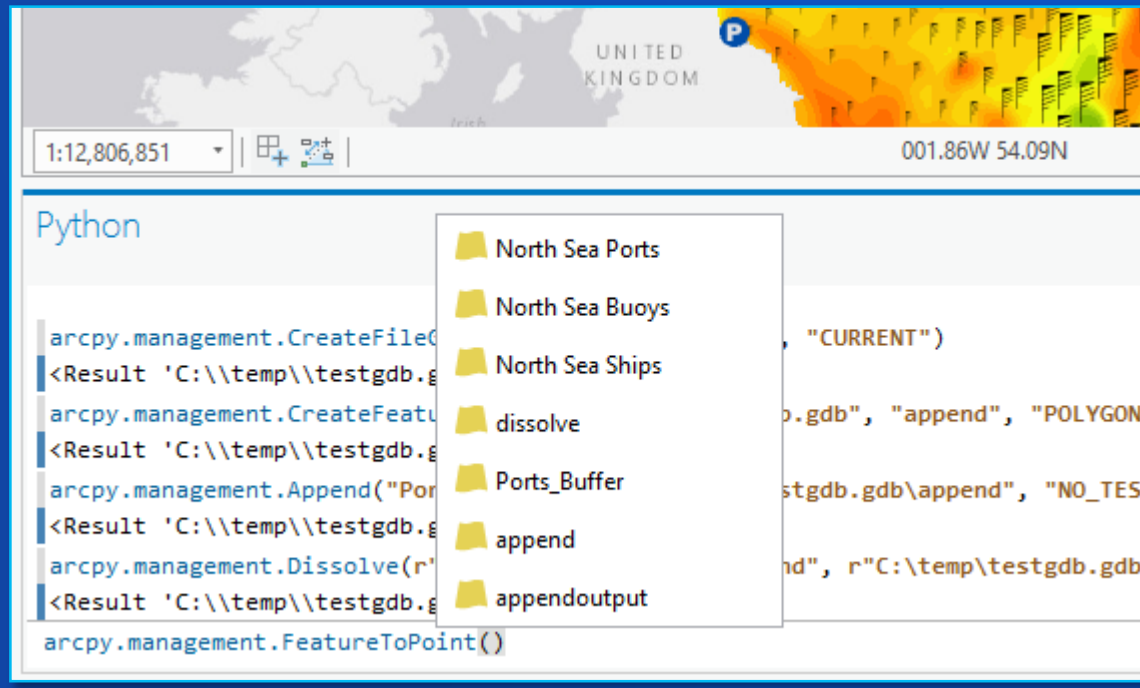
Python window command line with syntax help and intellisense

Access all geoprocessing tools and a wide variety of other functionality in ArcPy

Uses Conda to install and manage Python packages

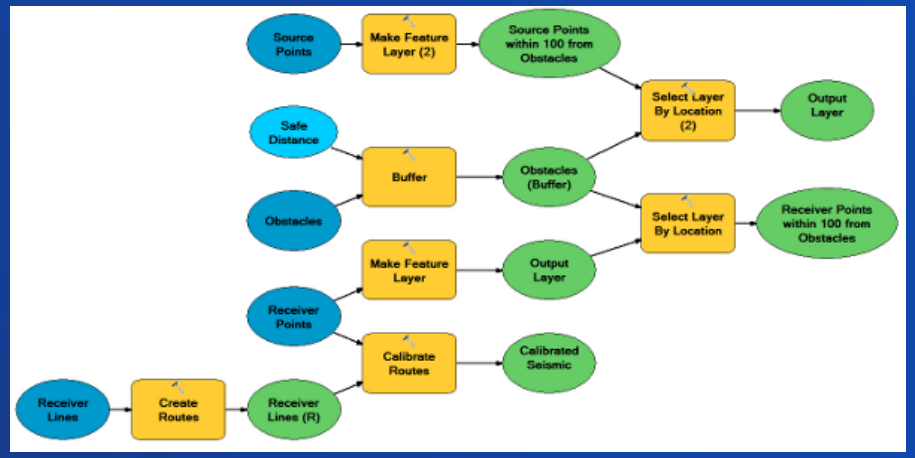
Pro includes data analysis packages Pandas, SciPy, NetCDF4, and the ArcGIS API For Python





Migrating ArcMap models and scripts

Most ArcMap models, tools, and scripts still work in ArcGIS Pro



Python3

esriurl.com/ModelBuilderMigrationPro

esriurl.com/PythonMigrationPro

Interactive Feature Input

Another option when defining input features/AOI for many tools

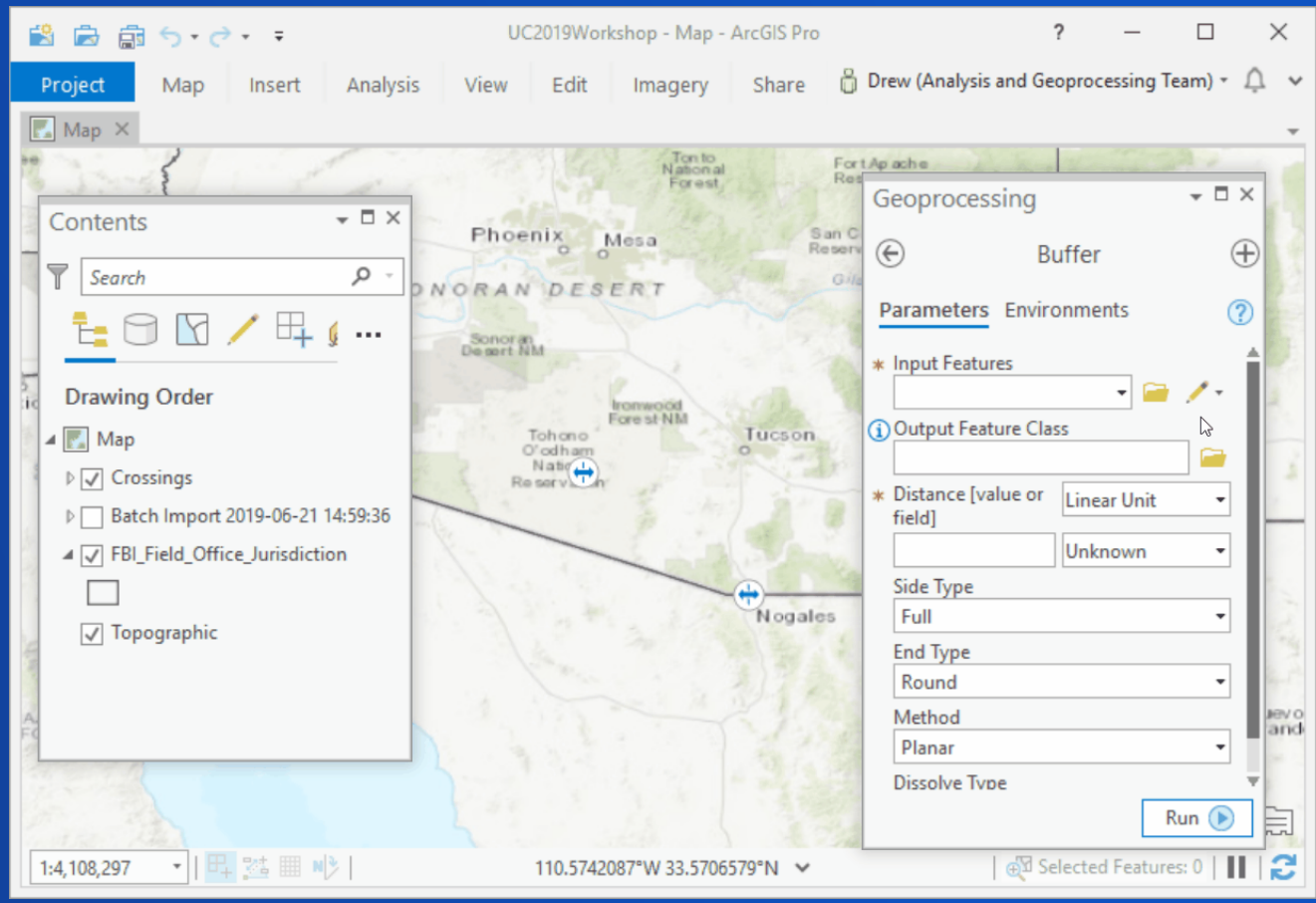
Buffer, Clip, Erase, Enrich, etc.

Creates a new layer and feature class, and activates editing

Includes several default attribute fields for data entry

Model and script tools can use customized Feature Sets

Interactive table entry also supported (Record Set)



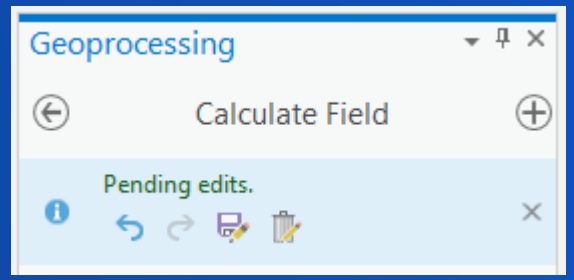
Undo Geoprocessing Tools

Many tools modify the input datasets rather than generating new output

Calculate Field, Append, Integrate, Snap, etc.

You have the option to Enable Undo so the processing done by these tools can be undone

Activates and runs in Edit Session



After running you can undo, redo, save, discard

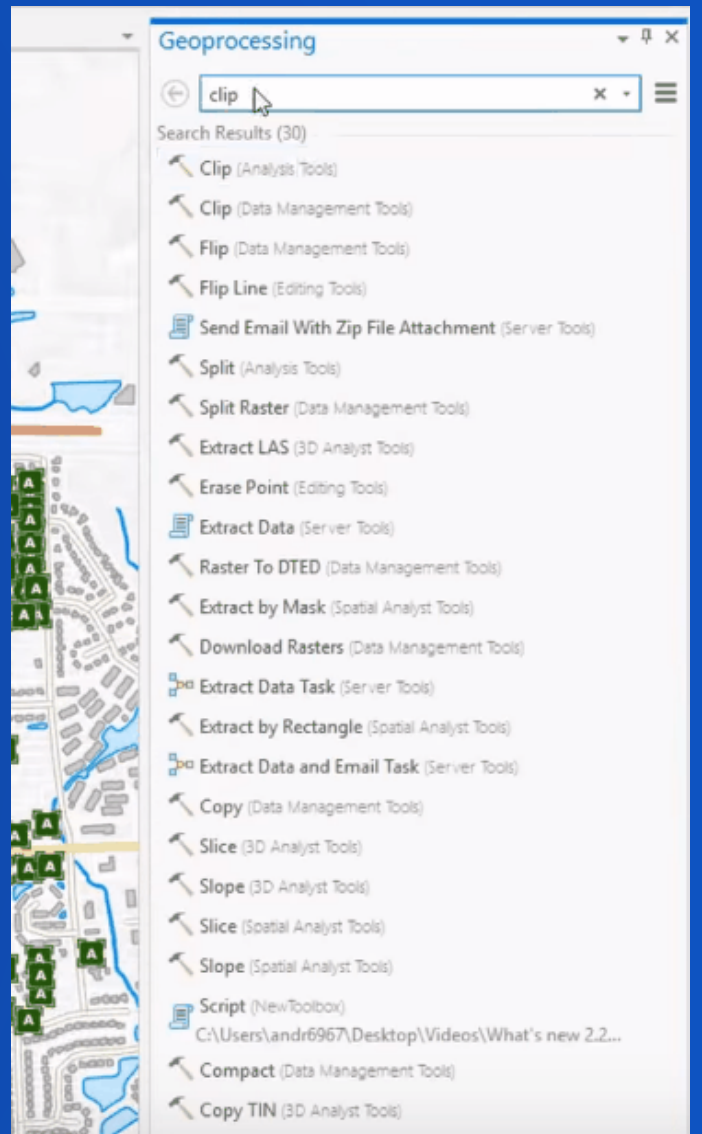
Enable undo is not automatically on because this is slower and runs in foreground

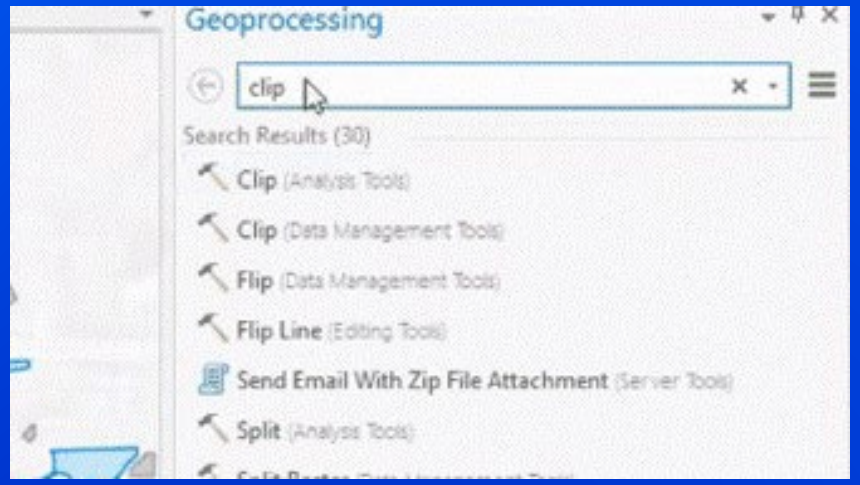
Batch Geoprocessing

Allows you to run a tool multiple times using many input datasets or different parameter settings

Makes it possible to run a given tool as many times as needed with very little interaction

Builds a model in the background so you can learn and extend your batch process





Demo

Batch geoprocessing

Sharing Analysis

Methodology and tradecraft within your community and organization

Share Analysis

Two primary ways to share your geoprocessing and analysis work

Geoprocessing Package

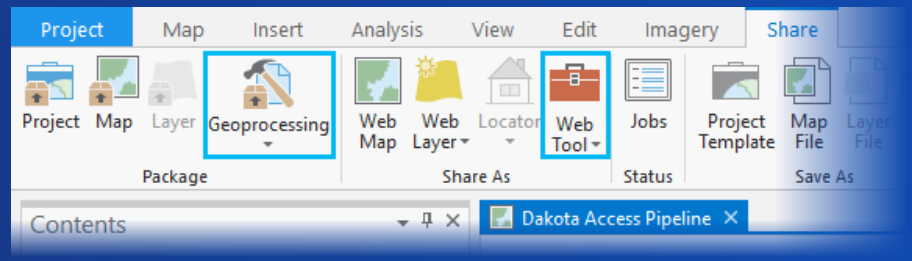
Web Tool/Geoprocessing Service

Both start with a geoprocessing history entry

Others should be guaranteed able to run the analysis you share with them, so you must successfully run before sharing

New in Pro 2.4, you can publish a geoprocessing service to Server

Use the *Share* ribbon tab or geoprocessing history



Online Analytics

Leverage ArcGIS Online and Enterprise

Integration with Web GIS

ArcGIS Pro is designed to be connected to ArcGIS Online and ArcGIS Enterprise

Access information and layers stored in your Web GIS

Share custom analytics as web tools to ArcGIS Enterprise

Leverage the full analytic power of ArcGIS, including ArcGIS Online and ArcGIS Enterprise tools and services

Leverage ArcGIS Online and ArcGIS Enterprise Analysis Tools

NEW

Ready to use tool hosted in ArcGIS Online

Change for Elevation & Hydro Service tools:

~~Credits~~

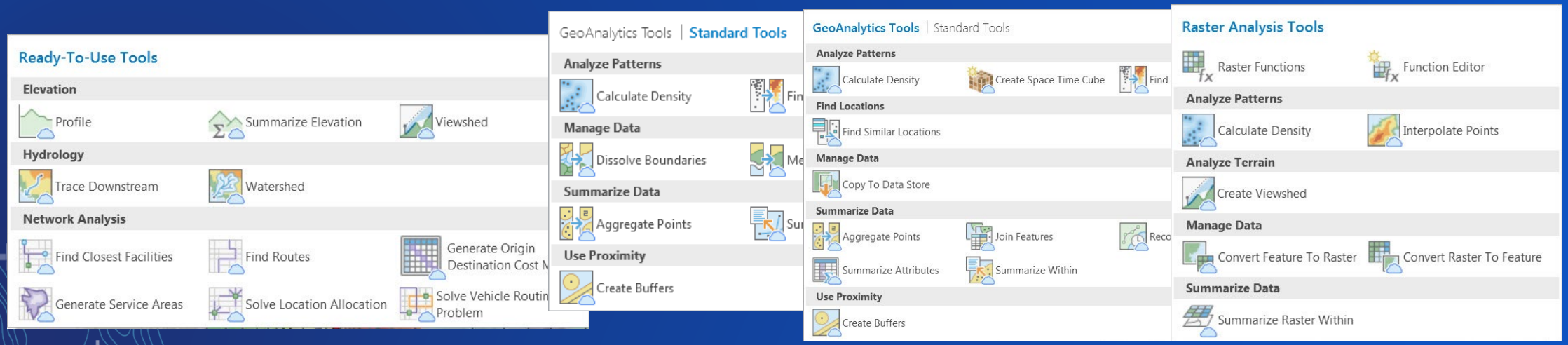
ArcGIS Enterprise Standard Feature tools

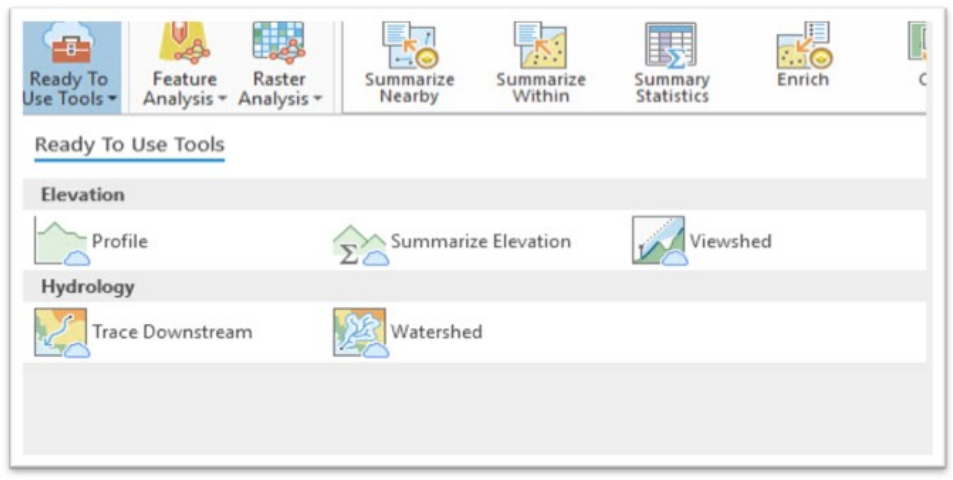
ArcGIS Enterprise GeoAnalytics Server

Process large feature data with both spatial and temporal components in distributed environment

ArcGIS Enterprise Image Server Raster Analytics

Enables distributed processing and analysis of imagery and raster data





Demo

Ready to use tools

Analysis Extensions

Extend core analysis capabilities

Analysis Extensions

Extensions build on the core analysis capabilities of ArcGIS Pro

3D Analyst	Business Analyst	Geostatistical Analyst
Image Analyst	Network Analyst	Spatial Analyst

Comprised of additional geoprocessing toolboxes and interactive capabilities

Extension licensing is consistent between ArcMap and ArcGIS Pro

Same licensing models for ArcGIS Pro are used for extensions
(Named User, Single Use, Concurrent Use)

Learn more about spatial analysis & geoprocessing in Pro

esriurl.com/ProAnalysis

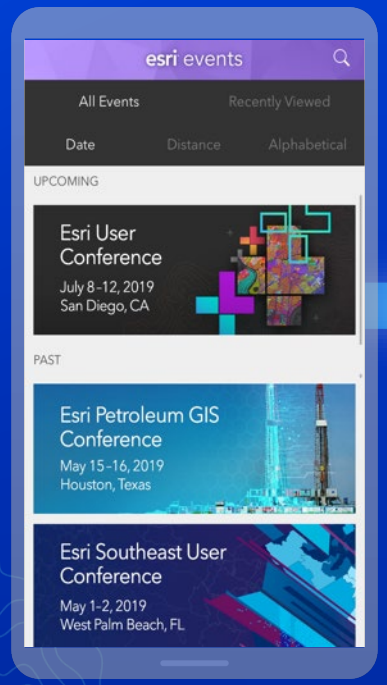
esriurl.com/AnalysisCaseStudies

esriurl.com/ArcGISAnalyticsBlog

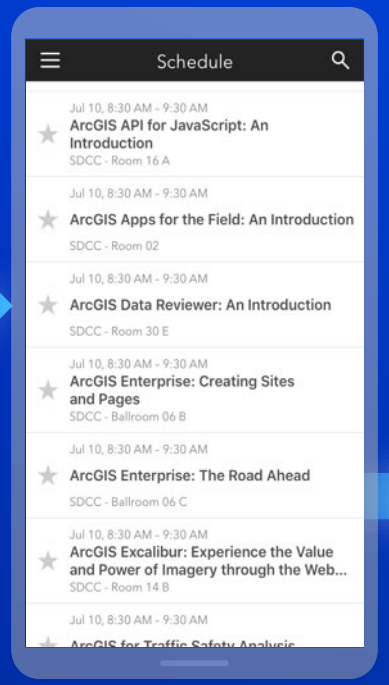
Many more analysis sessions this week!

Please Share Your Feedback in the App

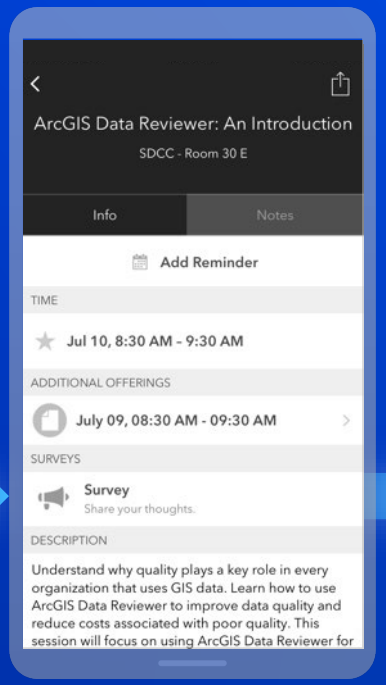
Download the Esri Events app and find your event



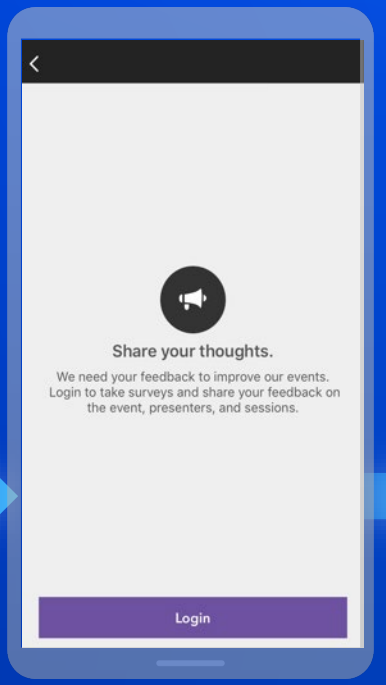
Select the session you attended



Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"