THE GEO PROJECT
GEOSPATIAL EDUCATION & OUTREACH

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GEO TUTORIAL

USING TIME-ENABLED DATA TO CREATE
A TIME SERIES ANIMATION (GIF)

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The Geospatial Education and Outreach Project (GEO Project) is a collaborative effort among the Geosystems Research Institute (GRI), the Northern Gulf Institute (a NOAA Cooperative Institute), and the Mississippi State University Extension Service. The purpose of the project is to serve as the primary source for geospatial education and technical information for Mississippi.

The GEO Project provides training and technical assistance in the use, application, and implementation of geographic information systems (GIS), remote sensing, and global positioning systems for the geospatial community of Mississippi. The purpose of the GEO Tutorial series is to support educational project activities and enhance geospatial workshops offered by the GEO Project. Each tutorial provides practical solutions and instructions to solve a particular GIS challenge.

USING TIME-ENABLED DATA TO CREATE A TIME SERIES ANIMATION (GIF)

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REQUIRED RESOURCES
- ArcGIS Pro (v. 3.0 or higher)
- Internet access

FEATURED DATA SOURCES
- NOAA Sea Level Rise Data Download: https://coast.noaa.gov/slrdata/

OVERVIEW

This exercise introduces using time series in ArcGIS Pro for visualization purposes. This is useful for identifying areas or features that change within certain timeframes. Sea level rise (SLR) data were chosen for its wide availability and uniformity.

Time-based analyses of geospatial data allow the user to analyze changes over time. Common uses for time-based analyses include but are not limited to changes in demographics and environments.

This is only one example of using ArcGIS Pro to produce a quick visual. Time intervals in the tutorial are *simplified and fictional* for the purpose of this exercise. However, you can use data with actual time stamps while following this generalized workflow.

To perform the steps listed below, any available data with a time or date field can be used. This tutorial is designed to work with the featured data source. If you use your own datasets, the steps, figures, and results could vary. In this case, it is recommended that you download the NOAA sea level inundation data using the link provided in the *Data Sources* section.

STEP 1. DOWNLOAD THE DATA

In this step, you will access and download the data.

o Access the NOAA SLR data download using the link provided in Featured Data Sources section and download the sea level rise data for **Guam**. Download the data, save it to a location you will remember, and unzip.

STEP 2. DATA PROCESSING

In this step, you will add a time field and adjust symbology for each layer.

o In ArcGIS Pro, import* **the SLR layers into the project database and add them to the map** (i.e.: main_Guam_slr_0_0ft to main_Guam_slt_10_0ft). *Importing the layers into the geodatabase allows you to complete some of the next steps*.

o For visual purposes, **set the drawing order** as 0ft down to 10ft. This allows the layers to be drawn in ascending order.

o For each layer, **add a time field** named "Year" with a **Custom format of YYYY**. See Image.

o **Calculate the Year field** for each inundation level using the following data (see Table). *For the date to format correctly, an actual date will need to be used as input for the calculate field tool (See image).*
Reminder: The time intervals in the tutorial are simplified and fictional for the purpose of this exercise.

o **Adjust the symbology** for each layer to use graduated colors from dark to light. For this tutorial, the symbology was adjusted using graduated colors from dark to light blue, as used by NOAA's sea level rise viewer. You can also use the default colors provided by the software.
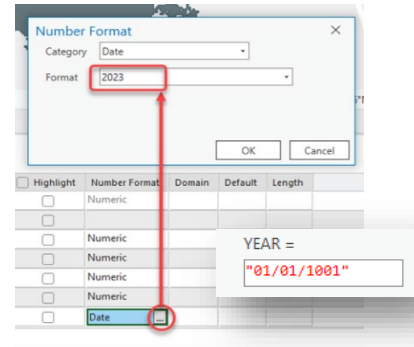
SLR Level	Year*	Date entered
0 ft	1000	01/01/1000
1 ft	1001	01/01/1001
2 ft	1002	01/01/1002
3 ft	1003	01/01/1003
4 ft	1004	01/01/1004
5 ft	1005	01/01/1005
6 ft	1006	01/01/1006
7 ft	1007	01/01/1007
8 ft	1008	01/01/1008
9 ft	1009	01/01/1009
10 ft	1010	01/01/1010

*Year values are fictional and for training purposes only

STEP 3. ENABLE TIME PROPERTIES

In this step, you will enable the time properties for each layer to visualize it stepping through time. For each time-enabled layer, you will specify how the time values have been stored in the attribute table.
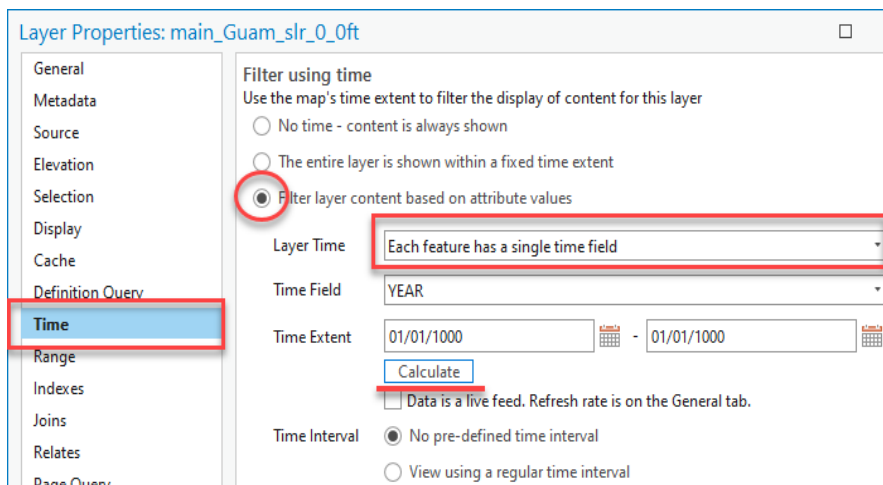
o On the Layer Properties window for each layer, **select Time**.
o Verify the time field is set to the name of the column you just calculated: Year. It should automatically fill in the time extent for you. *If you notice the wrong dates here, select the calculate button. It should adjust the dates to what is present for that field in the attribute table.*

STEP 4. CONFIGURE THE TIME TAB

You will notice that as soon as you enabled the time properties for the layers, the Time Tab was activated on the ribbon. This is a dynamic ribbon tab.

- o On the Time Tab, in the Full Extent Group, **Select <all visible time enabled data>.** In this same group, set the Start time as the time field from the 0ft layer and the End time as that of the 10ft layer.
- o In the **Playback Group**, set the speed bar to your preference and **set Time Snapping** to Years.
- o In the Current Time group, **type in** the Start date as "01/01/1000" with a **Span of 1 Year**.
- o **Click on the lock** next to the Start date to lock the start date. *The End time should have filled in to 1 year after the start date.*
- o When your ribbon matches the graphic below, click the play button on the time bar or in the Playback group. It should animate through the time periods you created.
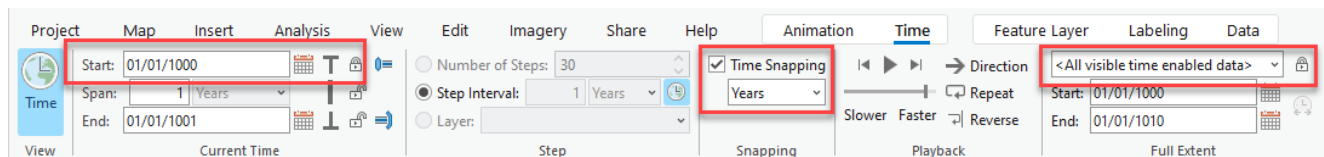
STEP 5. EXPORT TO VIDEO FILE (GIF)

In this step, you will add an animation to the map and then export the time series as an animated GIF. Before starting this step, select an area of the data to focus on and zoom in on it.

- o On the View Tab in the Animation Group, click the Add button. This will activate the Animation Tab.
- o **Import the Time Slider Steps** by selecting Import in the Create Group and then Time Slider Steps. This will populate the Animation Timeline with the time periods you created earlier.

- o **Play the animation** by selecting the Play button in the Playback section on either the Animation Tab or on the Animation Timeline.
- o To **export the animation**, in the Export Group, select the Movie button and select GIF from the Movie Export Presets. Name the file as you wish and **select Export**.
- o This may take some time to generate.
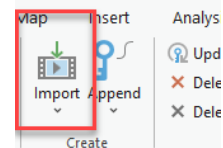
This concludes our GEO Tutorial. A sea level inundation time series has been successfully created. If you would like to make improvements or change the file format, those can be completed using the dynamic Animation Tab. An alternate approach for completing this task is to add animation using the View Tab. Prior to creating the animation using the alternate approach, be sure that map time properties are set, and that time is enabled in your primary work window.