THE GEO PROJECT
GEOSPATIAL EDUCATION & OUTREACH

www.geoproject.msstate.edu

GEO TUTORIAL

#QGIS
Dealing with Coastal Flooding series, part 8:
3D MAP ANIMATIONS

Krzysztof Raczynski
Claire Babineaux
John Cartwright

Geosystems Research Institute
Mississippi State University

MAY 2025

This work was supported through funding by the National Oceanic and Atmospheric Administration Regional Geospatial Modeling Grant, Award # NA19NOS4730207.

GRI
MISSISSIPPI STATE UNIVERSITY EXTENSION
NGI Northern Gulf Institute

Geosystems Research Institute, Mississippi State University, Box 9627, Mississippi State, MS 39762-9652

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.

3D MAP ANIMATIONS

Krzysztof Raczynski [1, 2, 4, 5, 6, 8] chrisr@gri.msstate.edu
Claire Babineaux [3, 7] claireb@gri.msstate.edu
John Cartwright [7, 9, 10, 11] johnc@gri.msstate.edu

Geosystems Research Institute
Mississippi State University

CRediT: 1: Conceptualization; 2: Methodology; 3: Verification; 4: Resources; 5: Data Curation; 6: Writing - Original Draft; 7: Writing - Review; 8: Visualization; 9: Supervision; 10: Project administration; 11: Funding acquisition

REQUIRED RESOURCES

– QGIS 3+

FEATURED DATA SOURCES

– Click here to access dataset used in this tutorial (30.19 MB).

OVERVIEW

Coastal areas across the United States face increasing challenges from changing water levels, which can lead to more frequent flooding and infrastructure strain. In communities like Bay St. Louis, Mississippi, rising water can make roads impassable, damage property, and disrupt daily life—posing serious concerns for homeowners and local economies.

As part of a planning team, your role is to assess how changing sea levels may impact the safety, infrastructure, and long-term growth of this Gulf Coast community. The focus is on protecting property, ensuring economic stability, and strengthening community resilience. This is the theme of the *Dealing with Coastal Flooding* tutorial series, which includes the following topics:

– Part 1: Creating Raster DEM from LiDAR Data
– Part 2: Spatial Predicates: Preparing Residential Data
– Part 3A: Using Unsupervised Machine Learning for Land Use Land Cover Classification
– Part 3B: Using Supervised Machine Learning for Land Use Land Cover Classification
– Part 4: Hydrologic Raster Preparation: Resampling and Burning Stream Network
– Part 5: Generating Flooding Extent with Raster Calculator
– Part 6: Calculating Spatial Statistics of Inundated Areas
– Part 7: Creating 3D Maps of Flooding Projections
– **Part 8: 3D Map Animations**
– Part 9: Creating and Animating Timeseries

In the previous tutorials, we processed sea level rise scenarios for the Bay St. Louis area and created a 3D map. In this tutorial, we will create an animation presenting an overview of our finalized project. Make sure to check the remaining tutorials in the series to learn more about the entire analysis process.

DATA

For this tutorial, we will use the data prepared in the previous parts. If you don't have this data, you can use the Featured Data Sources link above to download the tutorial dataset. The ***animation_project***, available in the source files, was made with QGIS version 3.32 version and contains a predefined 3D view. You can use this set, or prepare your own version, according to Part 7 of this tutorial series.

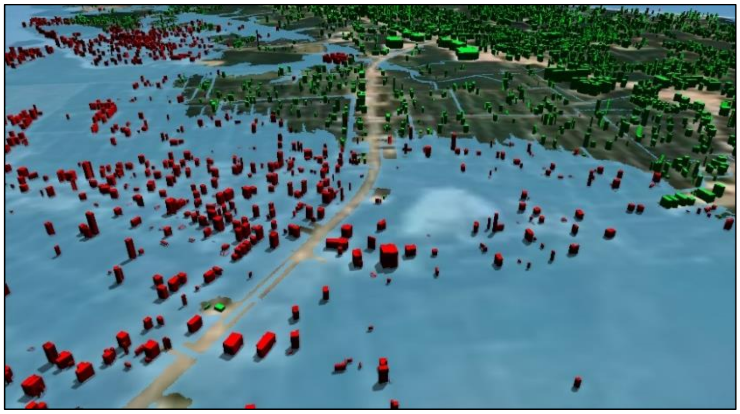

Fig. 1. *The 3D view of 2100 SLR projection.*

WORKING WITH ANIMATOR

Creating animations in 3D Map View in QGIS is straightforward. First, open the 3D Map (Fig. 1) by navigating to *View*, then *3D Map Views*. If you are using the *animation_project* provided in this tutorial dataset, the 3D Map View might already be open and docked on your screen. In the 3D Map View, click the *Animations* button ▶. A new element, *Keyframe axis*, will be displayed (Fig. 2).

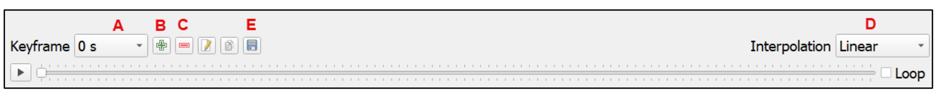

Fig. 2. *Keyframe axis is used to create 3D animations in 3D map view.*

Set the keyframe to 0s from the dropdown menu (Fig. 2–A) and adjust the view in your main 3D Map window (Fig. 3); this setting will be used as the initial keyframe of your animation.

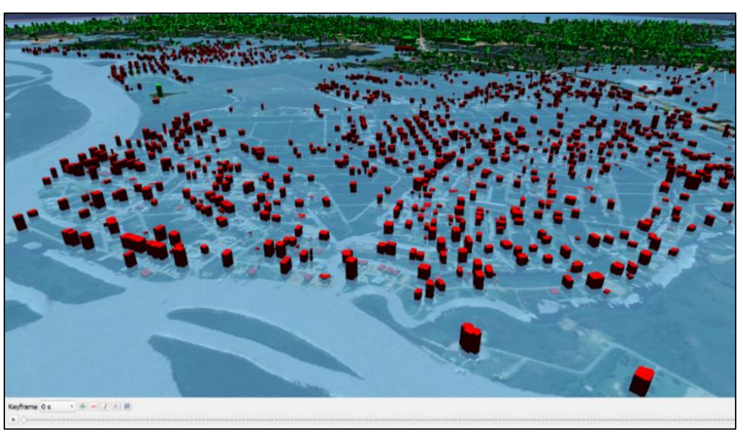

Fig. 3. *The 0-second keyframe indicated the beginning position of the animation.*

The process of animation creation comes down to adding a new (Fig. 2–B) desired keyframe and setting the 3D Map view, then following this process until you are satisfied. If some keyframes are not needed (like, e.g., the preset 5-second frame), use the Delete button (Fig. 2–C).

Now that the first frame is set, switch to 5-second keyframe, or remove it and add a new custom one, e.g. 7-second. Once the new frame is set, adjust the 3D map view (Fig. 4). **Remember to first set the new frame and then modify the view; otherwise, you will modify the previous frame, not the new one.**

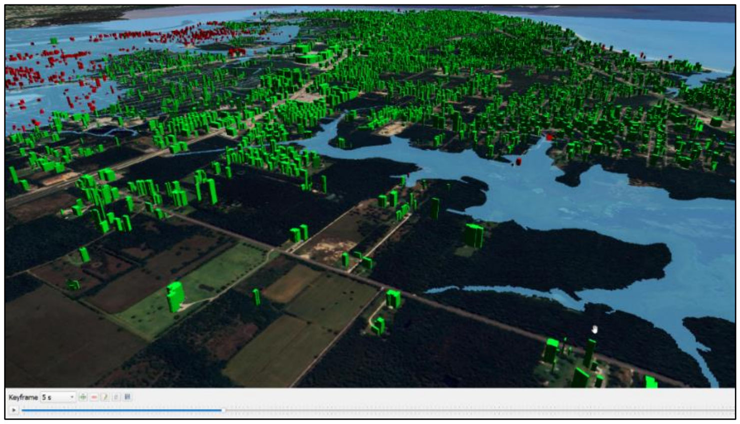

Fig. 4. *The 5-second keyframe indicating the next view of the animation.*

Repeat the process by adding the 10-second keyframe and adjusting the view (Fig. 5).

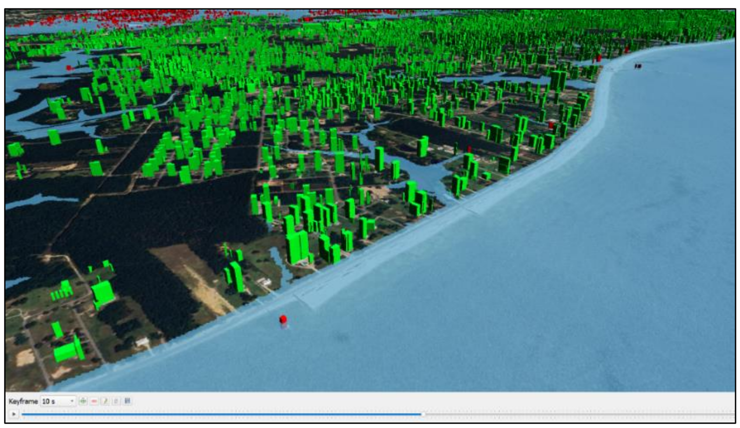

Fig. 5. *The 10-second keyframe of the animation.*

You can add as many keyframes as you want (Fig. 6, 7). Once all frames are set, QGIS will automatically interpolate camera movement between set keyframes using one of the predefined interpolation methods (Fig. 2–D). You can preview the effects by clicking the play ▶ button.

Once the animation is set, click the *Save* (Fig. 2–E) button to save the final files. Each saved file represents one frame within the animation and is, by default, a *JPEG* (*.jpg*) file. The number of files generated will be dependent on the length of your animation and the desired FPS (frames per second) setting adjusted during save. For example, a 30 second animation with 30 FPS will result in 901 files. The files must be combined to make an animated resource. You can use free software like *Resolve* to add frames and generate a *video* file (advanced option) or use any of the online tools to generate either a *video* or *GIF* file. For example, ***ezgif*** or ***imgflip*** allow you to simply upload the resulting frames and then create an animated graphic file (*GIF*).

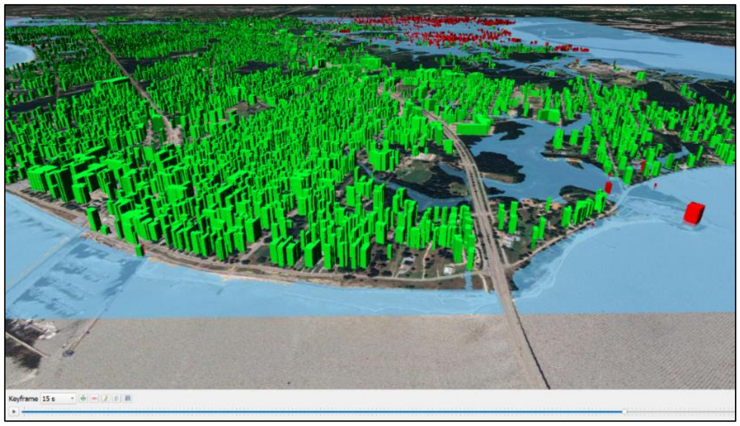

Fig. 6. *The 15-second keyframe of the animation.*

Fig. 7. *The 20-second keyframe of the animation.*

CONCLUSION

Congratulations on completing this GEO Tutorial! This tutorial demonstrated the process of creating a 3D animation using QGIS of projected SLR impacts in Bay St. Louis, Mississippi. By setting the keyframes and adjusting the 3D map views, we visualized flooding scenarios over time. This animation technique enhances understanding of potential inundation risks, making complex spatial data more accessible for planners and decision makers. This approach allows for clearer communication of risks and supports coastal resilience efforts. By combining animations such as this with other analyses from the 'Dealing with Coastal Flooding' tutorial series, you can create compelling visual narratives to assist in informed decision making.