Illustrative Visualization of Hurricane Advisory Information

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Motivation

The National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center's (NHC) Tropical Cyclone Advisories contain several heterogeneous data types that are difficult to encode in a single image.

Objective

To develop new illustrative visualizations of NHC Advisories using a single, comprehensible image that conveys past and present information for tropical storm(s).

NOAA NHC Advisories

✧ The NHC currently offers some advisory information in separate color images.
✧ Advisory contains tidal information and forecast of storm positions, intensities, and wind fields.
✧ Focus of the current work is on the wind quadrant radii (wind swaths).
✧ Advisories contain the wind swaths for tropical storm force winds (34 knots), storm force winds (50 knots), and hurricane force winds (64 knots).
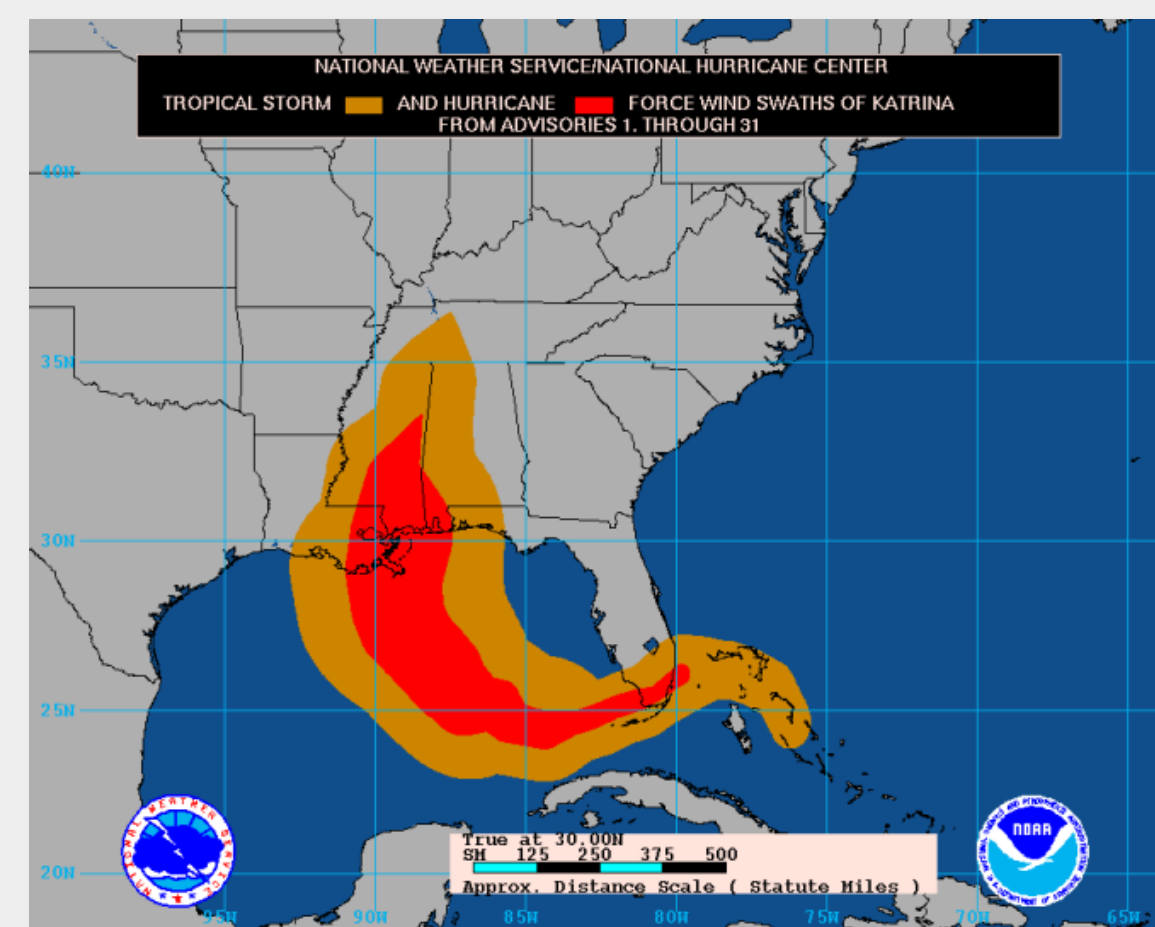

Image courtesy NOAA NHC

Case Study: Illustrative Visualization of 2005 Hurricane Season Advisories
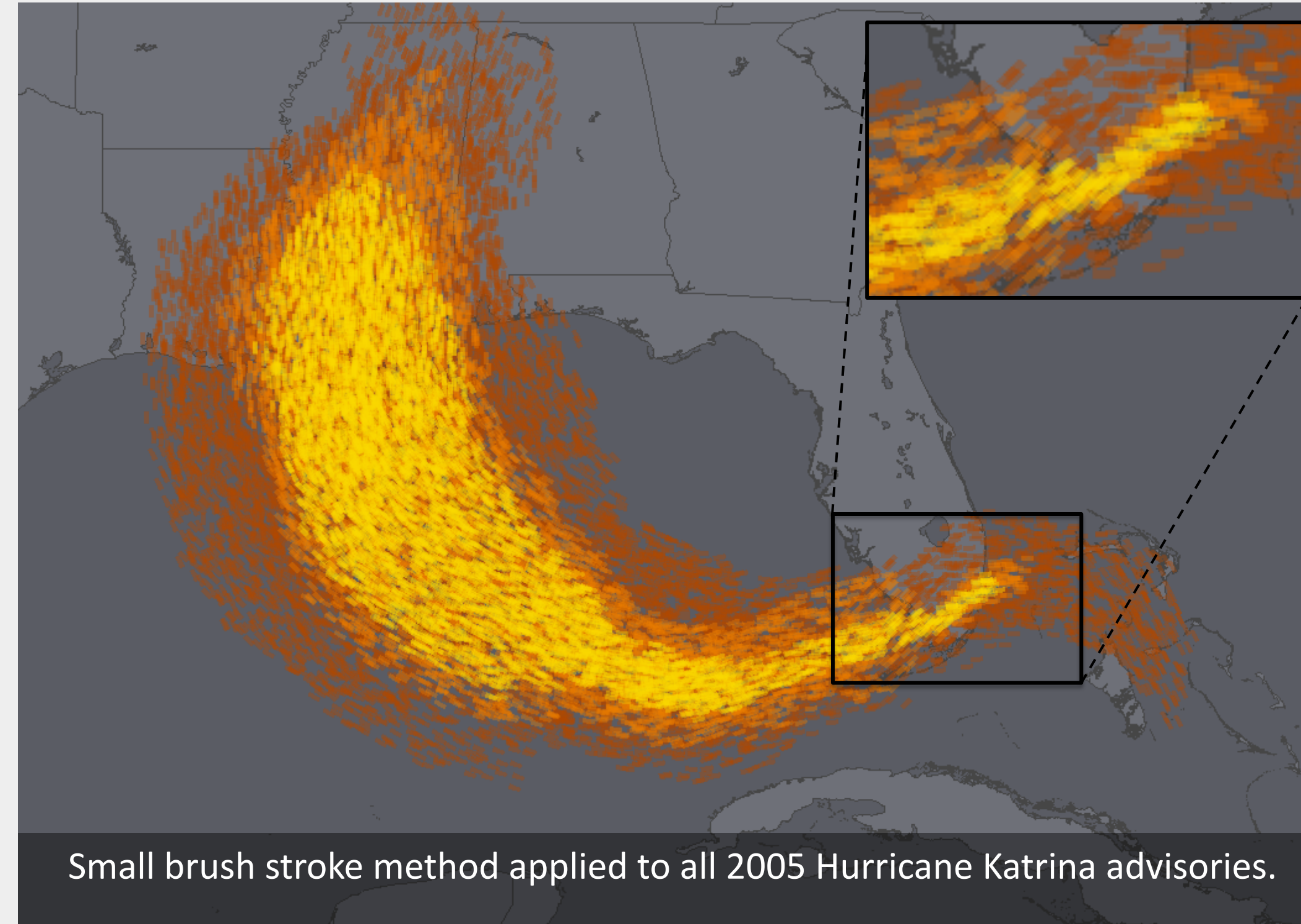
Small brush stroke method applied to all 2005 Hurricane Katrina advisories.
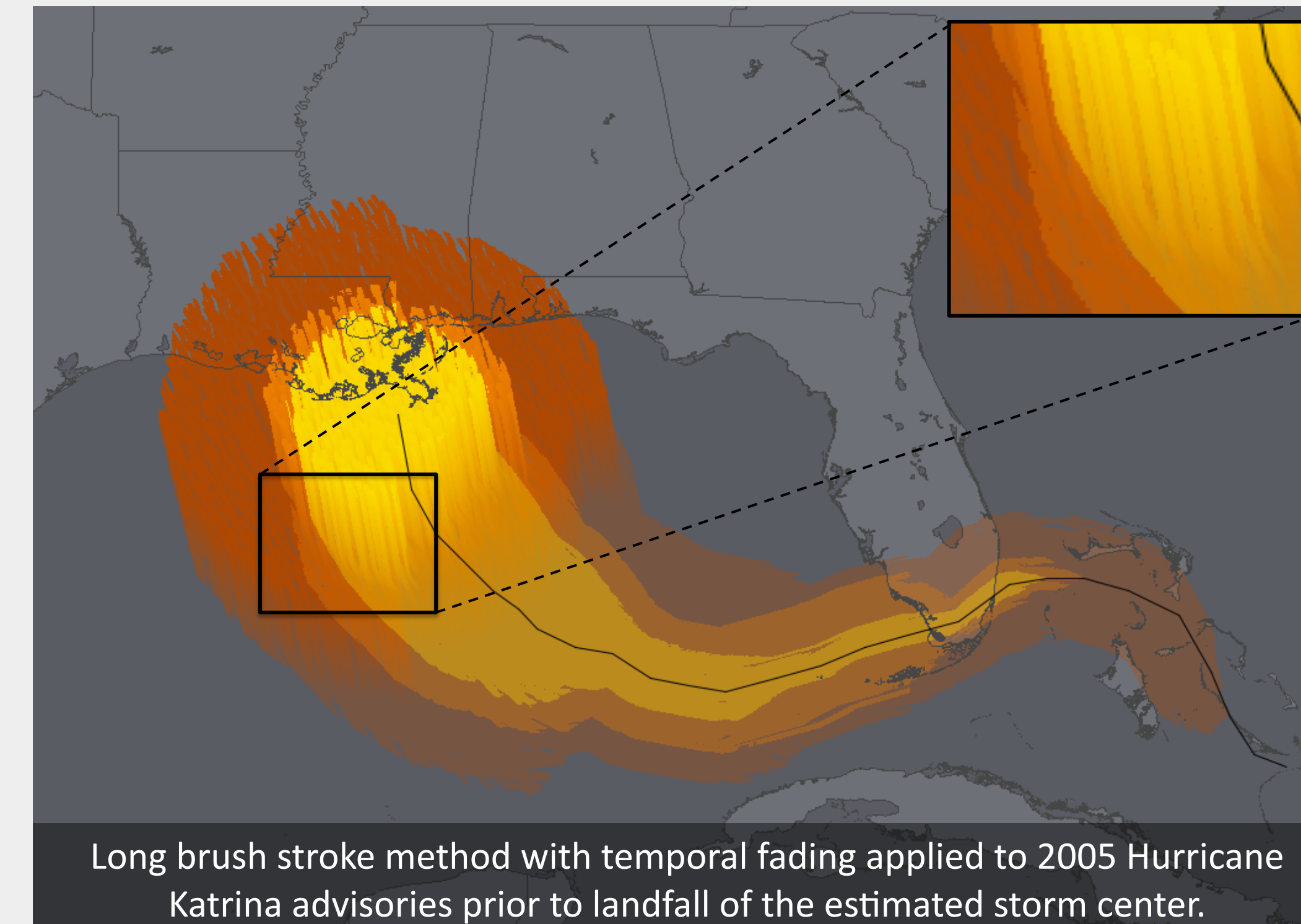
Long brush stroke method with temporal fading applied to 2005 Hurricane Katrina advisories prior to landfall of the estimated storm center.

Short brush stroke method applied to 10 storms from the 2005 season.

Long brush stroke method applied to 10 storms from the 2005 hurricane season using the storm advisories through the Sep. 23rd Hurricane Rita advisory.

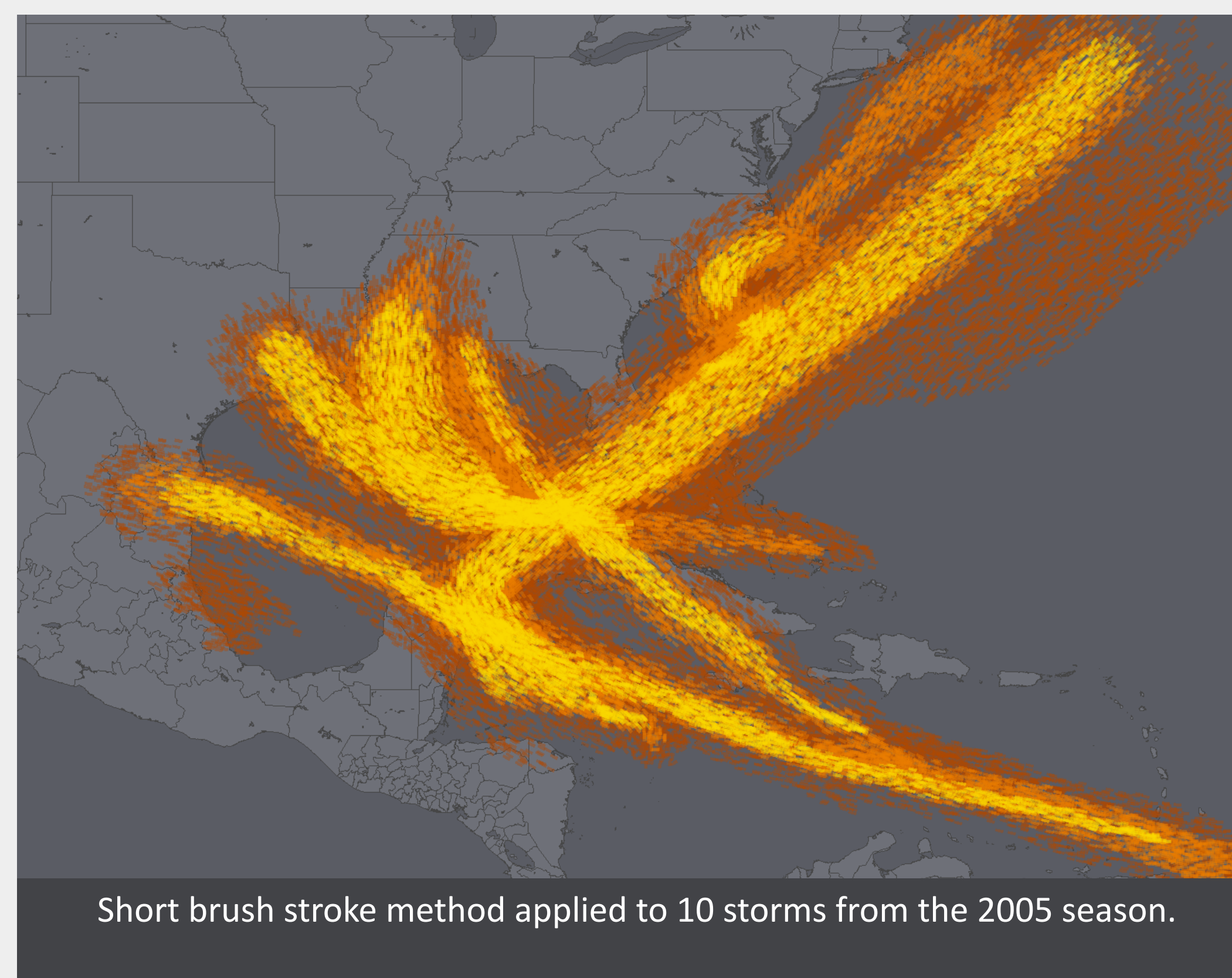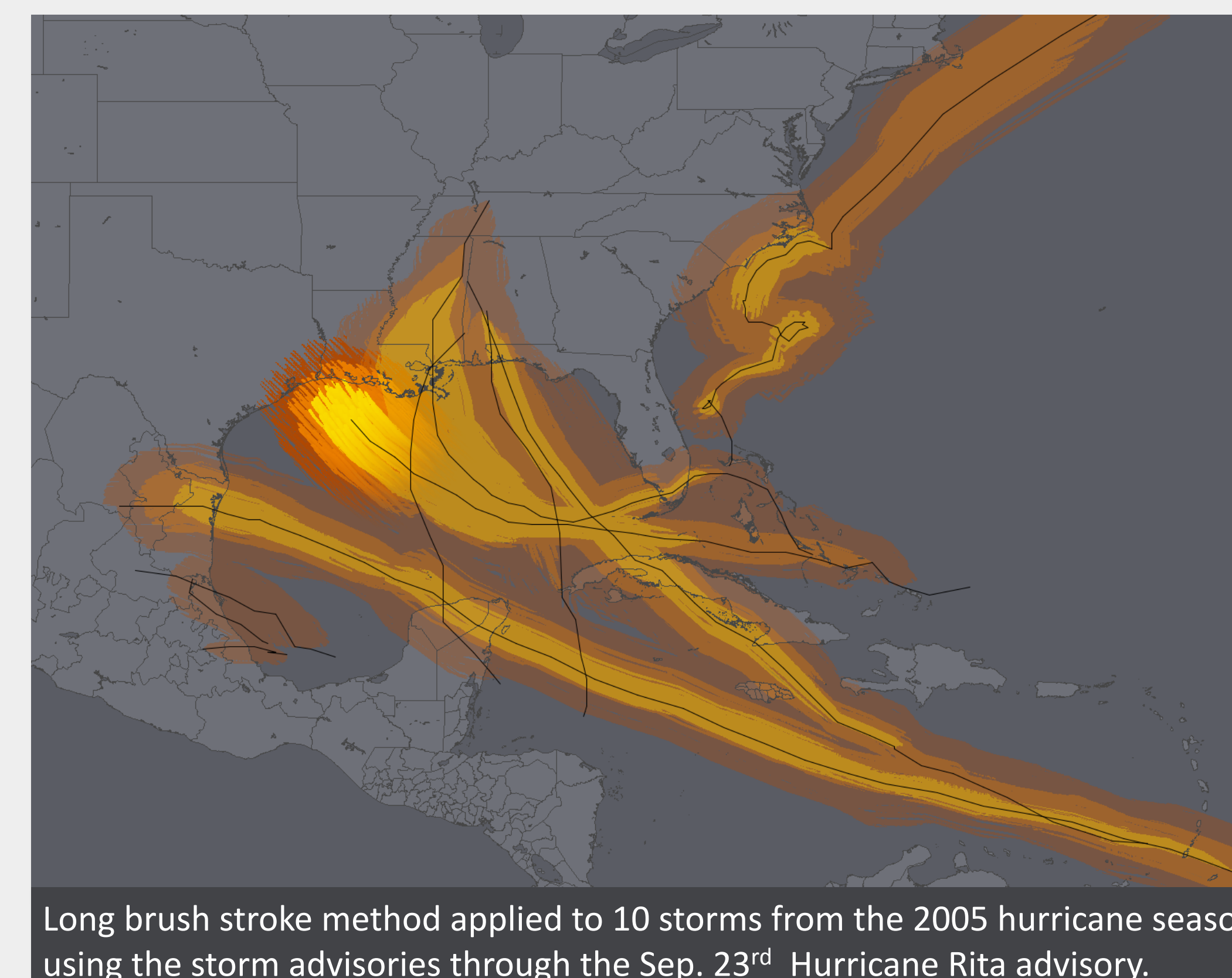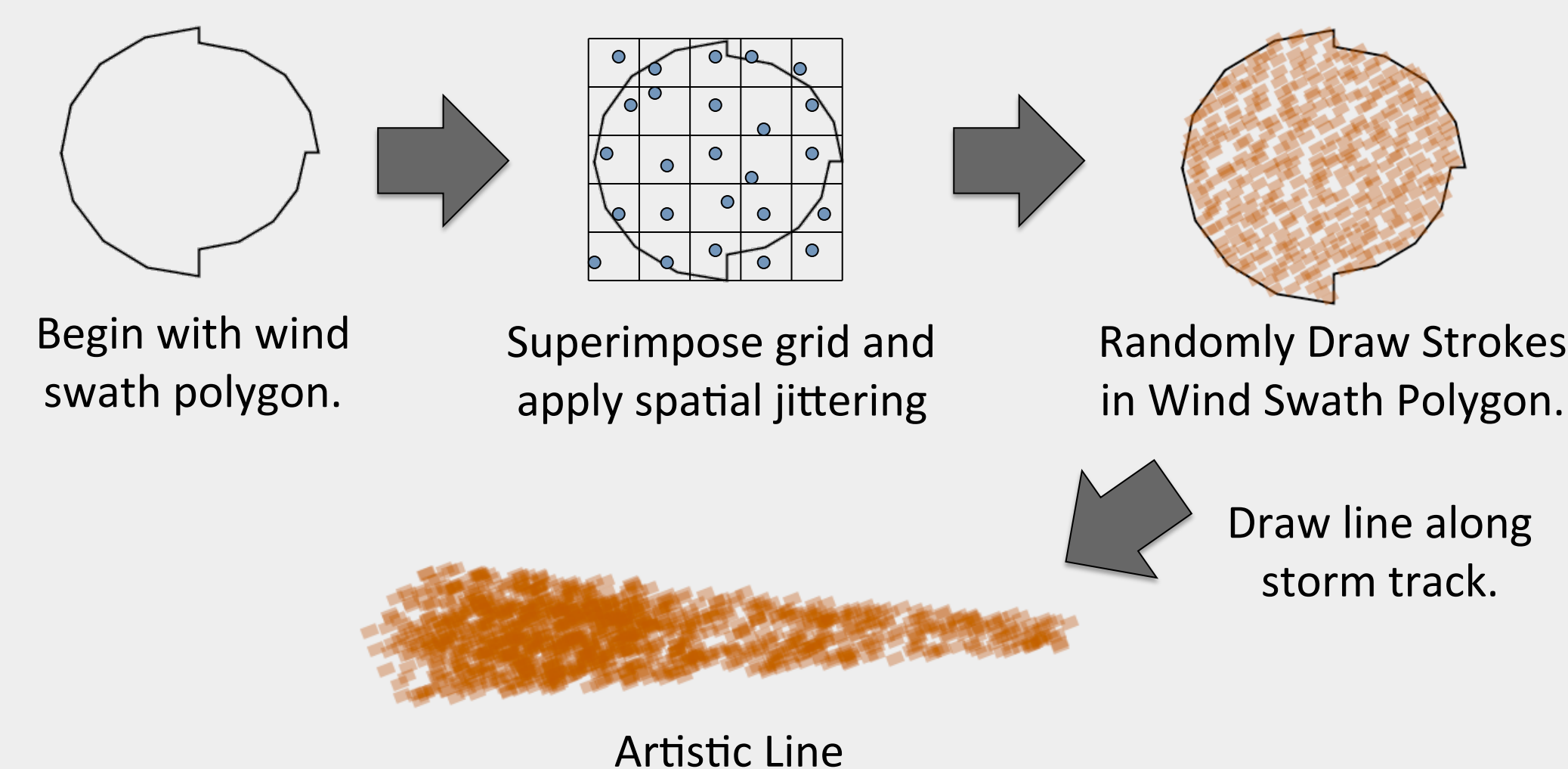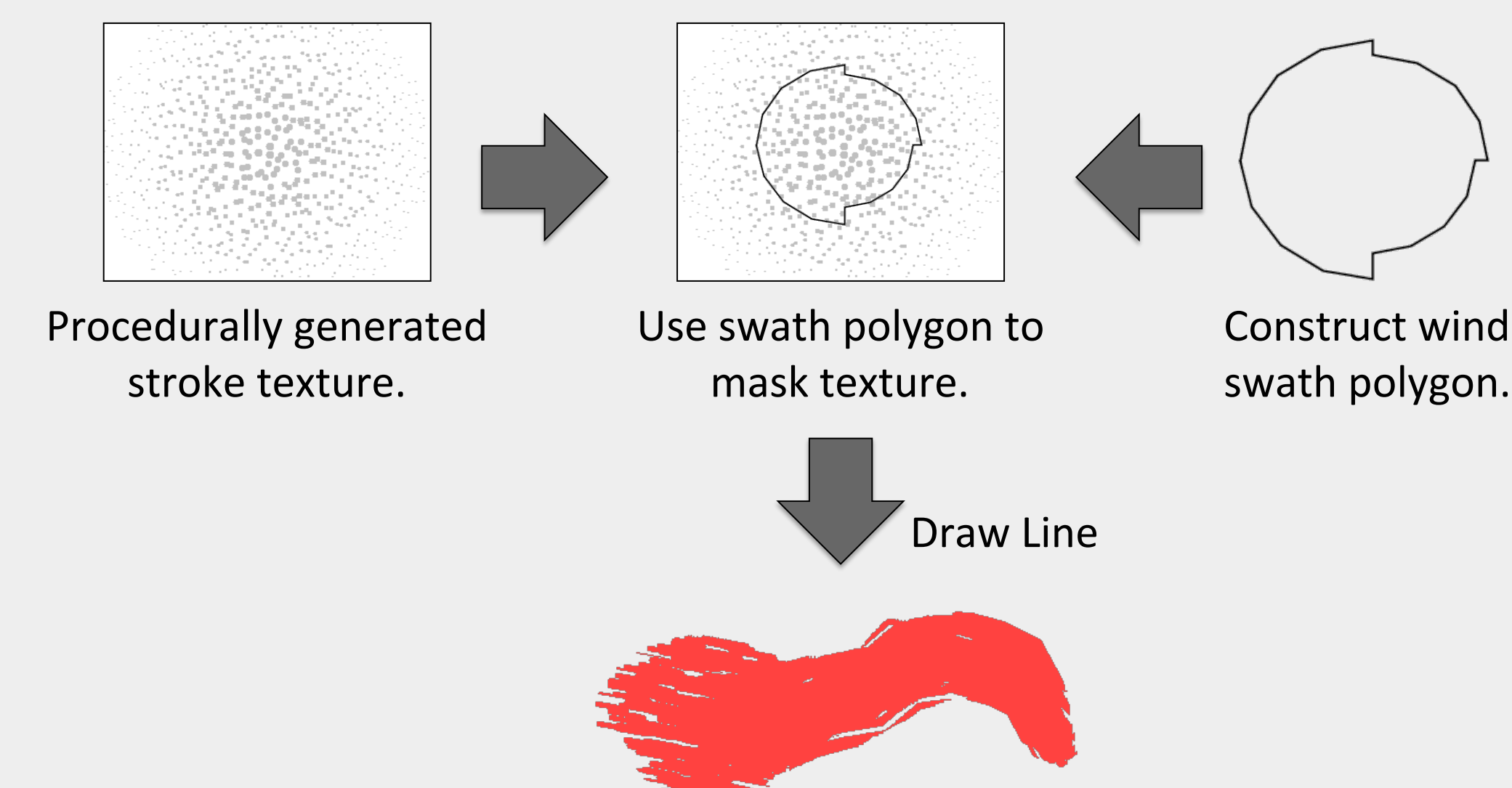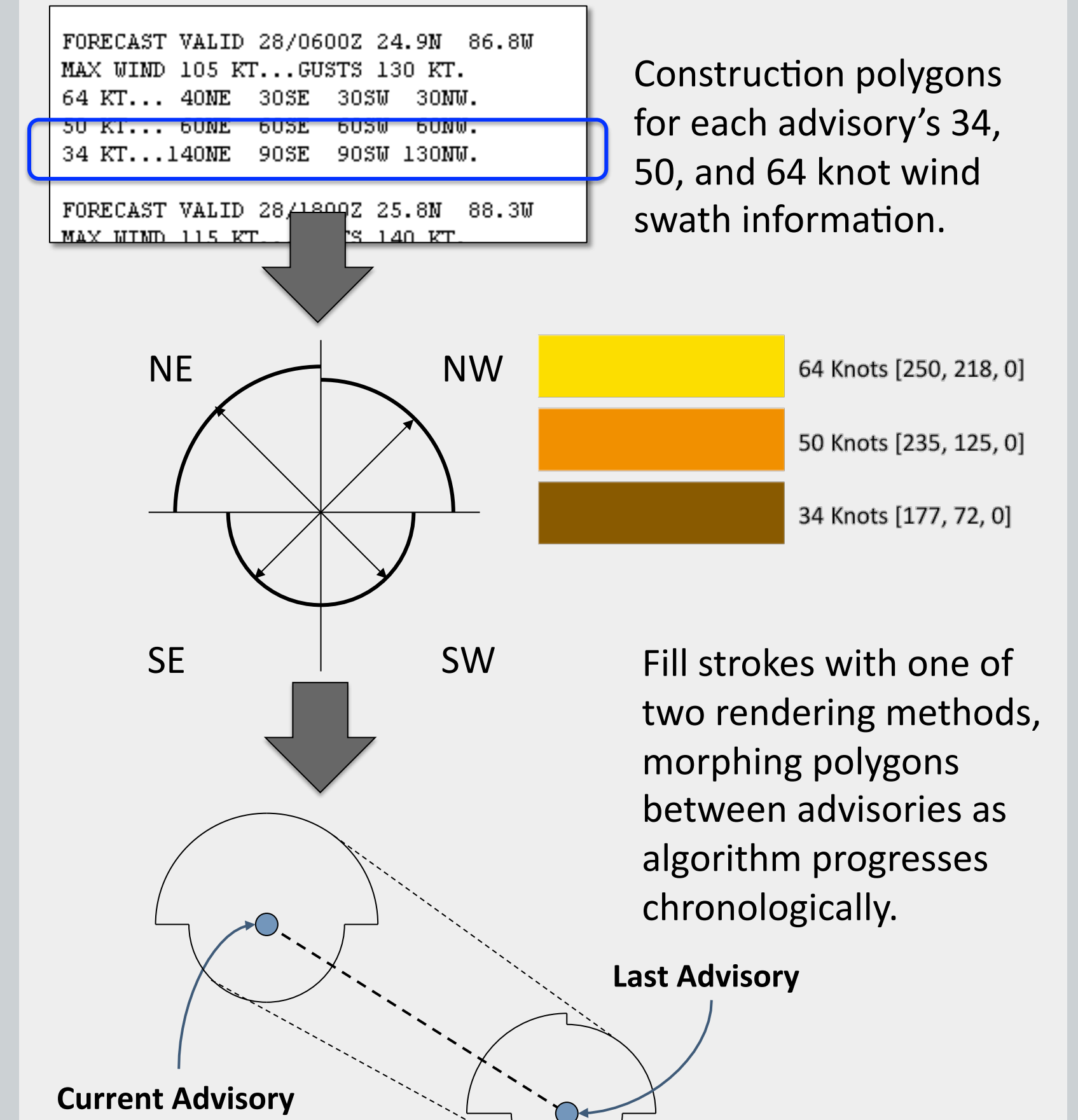## Storm Track Drawing

Construction polygons for each advisory's 34, 50, and 64 knot wind swath information.

64 Knots [250, 218, 0]
50 Knots [235, 125, 0]
34 Knots [177, 72, 0]

Fill strokes with one of two rendering methods, morphing polygons between advisories as algorithm progresses chronologically.

NE   NW   SE   SW

Last Advisory

Current Advisory
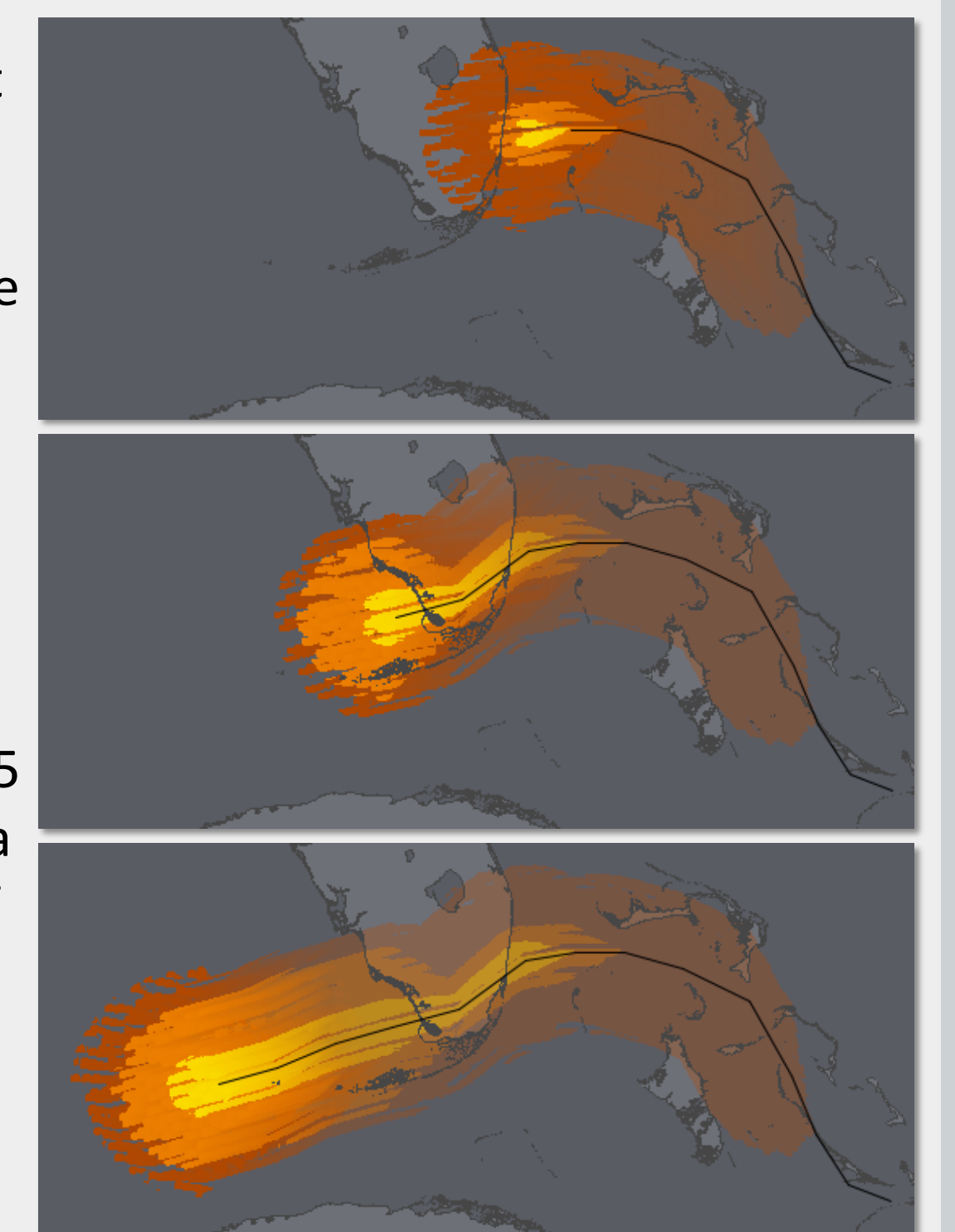
Temporal Stroke Fading

Emphasizes most recently affected regions, while also providing the context of the past storm track. The sequence of figures at right show the temporal fading effect as the 2005 Hurricane Katrina crosses the tip of Florida.

Small Stroke Rendering

Begin with wind swath polygon.

Superimpose grid and apply spatial jittering

Randomly Draw Strokes in Wind Swath Polygon.

Draw line along storm track.

Artistic Line

Long Stroke Rendering

Procedurally generated stroke texture.

Use swath polygon to mask texture.

Construct wind swath polygon.

Draw Line

References

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2. M. Kirby, H. Marmanis, and D. H. Laidlaw. Visualizing multivalued data from 2D incompressible flows using concepts from painting. In *Proceedings of IEEE Visualization*, pages 333–340, 1999.
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