



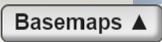
HURREVAC is a hurricane decision support tool for government emergency managers. It is a product of the National Hurricane Program, a partnership program between FEMA, USACE, and NWS dedicated to helping protect communities and residents from hurricane hazards through various projects and activities.

This document contains abbreviated (quick reference) instructions for utilizing the 2020 season version of HURREVAC. For more detailed demonstration of the tools, refer to the recorded webinars under the LEARNING RESOURCES section of the hurrevac.com support site.

GETTING STARTED

- Open a web browser (Firefox, Chrome, or Edge) and go to hurrevac.com
- Click the 'Launch HURREVAC Application' button on the main page of the support site
- On the login page, enter your username and password. If you don't already have a user account, click the link on the login page to [register](#) for an account.

The application opens to a large basemap, with storm tracks from currently active tropical cyclones automatically plotted.

-  Select your preferred **Basemap** from the picklist at bottom right
- At the top of the left column, uncheck any active storm that you do not wish to have showing on the map.

MAP TOOLS

The short, vertical strip of buttons located over top of the map are primarily for map manipulation.



The **Navigation** button is the default when you open HURREVAC. This tool is for panning around the map.



The **Zoom Box** button allows the user to create a frame around a position on the map by holding the left mouse button down as you draw a box around an area to zoom into on the map.

- Additionally, there are +/- buttons next to the Map Tools which allow incremental zooming.
- For zooming in/out, you can also use the mouse wheel. Pinch gestures work on touch screens.



NOTE: *There is no "Zoom Out" box.*



These three buttons have to do with map extents. They are **Go to Previous Map Extent**, **Go to Next Map Extent**, and **Zoom to Full Map Extent**. The **Full Map Extent** button is customizable using Options > Map Settings.



The **Measure** button has line and area capabilities. Double-click to end a measuring session.

- The **Measure Distance** tool draws a line, which can have multiple segments, to measure distance.
- The **Measure Area** tool defines a polygon for area calculation.



Drawing Tools are for adding shapes and text to the map. These are useful for annotating briefing products.

NOTE: *An Eraser button is available which allows the user to remove individual items added by drawing a box around them.*



The **Folder** button contains a few different map-related apps:

- **Geocode Location** finds the coordinates for an address location or given specific coordinates it will find a location.
- **Census** tool for user-definition of a region of the map. This queries for data from an external EPA census tool
- **Weather** tool for getting the NWS local weather forecast for a point location.

BASE LOCATION

The purpose of setting a base location is to mark a place of primary interest. Base location definition is saved to your user profile so that you can more easily generate reports for an area you would use frequently.



Right clicking your mouse is the easiest way set a base location. The second option is to select “Set Base Location” in the Map Location Context Menu and drag the blue dot to any **place over land and in an evacuation zone**.

A flag will indicate where your base location was set, and an information box pops up with information about the area.



The information box can also be accessed from the **Options** at top right of the application window.

***TIP:** To make sure you are in an evacuation zone when placing your base location, go to the Resources tab and load evacuation zones for the area of concern.*

POINTS OF INTEREST

Points of Interest, or POI, are other places you might want to highlight on the map or include in reports. There are several options for how to load single or batch points of interest.



Right-clicking your mouse is the easiest way set a single POI at a specific map location. You can also select “Create Point of Interest” in the Map Location Context Menu and drag the blue dot to a desired location. You can also lookup an address location with the Geocode Location tool and then add it as a POI.

In addition to lat/lon, each POI must be assigned a name and type. These assignments can be any text you want to use.



Management of POIs is handled through the **Options** interface at top right of the application. POIs can also be imported from a Excel spreadsheet containing four columns: lat, lon, name, and type.

STORED MAP SETTINGS

User preferences for certain map display are also accessed from the **Options** button. 

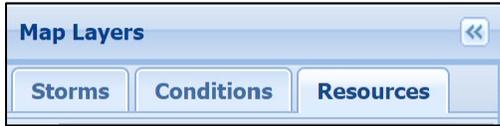
- Units of speed for winds and storm movement (knots or miles-per-hour)
- Units of distance for Range marks and Ruler (statute miles or nautical miles)
- Interval for Range Marks
- Full Map Extent

TROPICAL WEATHER OUTLOOK



The Tropical Weather Outlook, or TWO, shows areas of potential formation within a 5-day period. It should be monitored in addition to the Active Storms that are plotted by advisory.

- When the TWO control is expanded, the text window shows the current “TWO description” organized by basin. The user may tab through the regions (Atlantic, East Pacific, Central Pacific, West/South Pacific and Indian Ocean).
- Date and time of the TWO will be matched to the time of whatever storm advisory is currently displayed. If no storm advisory is plotted, then the most recent TWO will show by default.
- The graphical interface shows both the 2 and 5-day potential for storm formation on a single map.
 - The X shows the 0-2 day location and is color-coded by probability.
 - The shaded region shows the 2-5-day regions of potential storm formation color-coded by probability.
- Shaded regions and X location symbols drawn on the map can be clicked to show specific NHC guidance related to that feature.



Data layers in HURREVAC are organized on three tabs located at the top left of the application: **STORMS**, **CONDITIONS**, and **RESOURCES**.

STORMS

The STORMS tab is for selecting current and archived storms for display.

- Headings include Active Storms, Current Year Storms, and Archived Storms from years dating back to 2005.
- The **Search Box** is the fastest way to access a historic storm by name.



***NOTE:** Atlantic storms from 2018 and later contain the most complete data and are recommended for full program functionality when practicing with archived storms.*

CONDITIONS

The CONDITIONS tab is for browsing map services of current weather observations and forecasts. No archived or historical data is available for these layers.

- Headings include Forecast Rain, Observed Rain, Excessive Rainfall Outlook, and Rivers/Tides.
- Information about each layer is provided in the **Legend** at the bottom of the map. You can minimize this information display by clicking the down arrow at the top right-hand corner of the legend
- **Opacity** of all layers together is controlled by a slider at the bottom of the Map Location Context Menu (which can also be accessed by right clicking your mouse). Layers are always shown on top of previous layers as they are added. Turning on/off a layer causes it to display on top of all other layers.
- The **Quick Layers** button allows you to select multiple layers from the Conditions Tab and manage their individual opacity
 - You can pin  your layers of preference so that they show up in the tool the next time you log into your account.



- The Quick Layers functionality is only available for CONDITIONS layers, not STORMS or RESOURCES.

RESOURCES

The RESOURCES tab provides access to evacuation zones, infrastructure layers, the HES library, and other non-weather layers.

- Headings include Evacuation Zones, State/County Boundaries, FEMA Regions, Forecast Regions, USACE Districts, Operational SLOSH Basins, Timing Grid, Watch/Warning Breakpoints, and Library.
- **Evacuation zones** are quite different from state to state, since local emergency managers decide how the zones are drawn, based on factors such as topography and population concentration. You can click on the map for zone name.
- Further information about evacuation zones, clearance times, and storm surge vulnerability are available within individual Hurricane Evacuation study (HES) documents stored in the **Library** folder.

STORM ADVISORIES

The National Hurricane Center issues numbered advisories for a storm on a 6-hour schedule. Issuance times in EDT are 5AM, 11AM, 5PM, and 11PM. You can advance forward and back through storm advisories using the **Storm Status Bar** shown below.



- The Storm Status Bar indicates the ‘working’ storm name, advisory number, forecast hour, and time of the currently selected and displayed storm.
- It also allows the user to change forecast hour to navigate through time by clicking on the +0h text.
- If multiple storms are checked on, the user can switch to another ‘working’ storm by clicking on the current storm name and selecting from the drop-down menu. When no storm is checked on, the Storm Status Bar area is blank.

TIP: Use the keyboard arrow keys to move back (left arrow) and forth (right arrow) from advisory to advisory and forward (up arrow) and

*backward (down arrow) in forecast hours. The track and other active products will update with each change. You can also directly-select an advisory on the map by clicking on the location and choosing **Navigate To** from the information box that pops up with advisory details.*

TEXT ADVISORY PRODUCTS



Text products corresponding to the ‘working’ storm and advisory are accessed from this button along the far-right edge of the application.

Tabs of the text viewer offer the following:

- **Public Advisory:**
 - Includes storm information, watches and warning, 72 hours track, and intensity discussion. Also provides 48 hour hazard information
 - Meant to be a “Rip and Read”, plain-language text
 - Issued at 5am/pm EDT and 11am/pm EDT
 - When watches/warnings are in effect:
 - Intermediate advisories become available, indicated by an “A” after the advisory number. Intermediate Advisories are issued at 8am/pm EDT and 2am/pm EDT
- **Forecast Discussion:**
 - Explains the reasoning for the analysis and forecast.
 - Issued at 5am/pm EDT and 11am/pm EDT
 - A special discussion can be issued at any time.
- **Wind Speed Probabilities:**
 - Provides text version of wind speed probabilities based on track intensity, wind structure forecasts and uncertainties.
 - Issued at 5am/pm EDT and 11am/pm EDT.
- **Forecast Advisory:**
 - Includes watches and warnings information, cyclone position, intensity, and wind field.
 - Issued at 5am/pm EDT and 11am/pm EDT

STORM INFO BOX



You can place storm name, advisory #, initial location, maximum sustained winds, and movement information anywhere on the map by selecting “Storm Info Box Here” in the Map Location Context Menu and dragging the blue dot to the desired location. You can also do this by right clicking the mouse anywhere on the map.

TROPICAL STORM CRISTINA Advisory #25 • Initial Location: 20.7 N 125.5 W Sunday, July 12, 2020 5PM EDT - Maximum Sustained Winds: 40 mph - Movement : 13 mph W

TIP: Right click your mouse again to return the storm info box to the legend.

TOGGLE FORECAST

You can look at past forecasts tracks by left mouse-clicking on a past advisory and then clicking on the “Toggle Forecast” button. Place multiple past forecast tracks on the map (in different colors) by selecting “Toggle Forecast” on multiple past advisories.

TIP: To selectively turn off past forecast tracks, left mouse click on the advisory and de-select the “Toggle Forecast” button. To turn off all extra forecast tracks at once, use the RESET button instead.

STORM TOOLS

Details about a storm's forecast can be learned by working with the various STORM TOOLS



Forecast Wind Field

- Colors depict the strength of the winds (see Legend)
- Shapes of the wind rings are based on the maximum extent of that wind threshold over an entire quadrant (NE, SE, SW, and NW). For a quadrant that straddles both land and water, the over-land portion will be an overestimation.



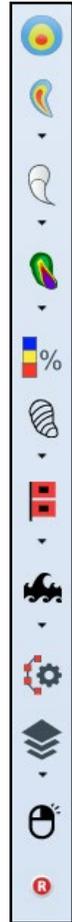
Wind Swath

- **Forecast - Deterministic**
 - Shows the forecasted wind impact area over the next 72 hours (3 days).
 - Based on the official forecast and does not account for any forecast uncertainty or error.
- **Forecast - Probabilistic**
 - Shows the larger region that has at least a 10% chance of experiencing those wind speeds in the next 72 hours (3 days). Note that not all of this area will be impacted, but there is some chance of experiencing winds at all locations within it.
- **Past - Actual**
 - A wind swath derived from initial (issuance hour) wind fields of all previous advisories.



Potential Track Area

- **Error Cone**
 - The Center of the storm is most likely to track within the white cone for the first 3 days of the forecast period and the gray cone within the extended, 4-5 day period.
 - The cone size increases in later forecast period due to growing uncertainty/historical forecast error.
- **Error Cone plus Fringe Winds**
 - Depicts a larger area with potential impacts from winds of tropical storm strength or greater. The size of the fringe



winds area is determined by the adding the Forecast Wind Field (for Tropical Storm force winds) to the outer cone edges.



Graphical Wind Probabilities

- Areas that have a 5% chance or greater of a certain threshold of wind--Tropical Storm, Strong Tropical Storm, or Hurricane--within the 5-day forecast period.
- Colors depict the percent chance of winds (see Legend)

***NOTE:** Do not be alarmed if you see multiple graphics showing up on the map. They are just showing the other storms active at the time of the selected storm.*



Location-Based Wind Probabilities

- Percent chance of a location reaching the tropical storm, strong tropical storm, and hurricane wind thresholds within the 5-day forecast period.
- Matches the last column of the wind probability text advisory product.

***NOTE:** This is zoom-dependent. When you are zoomed out it shows the highest chances of all the locations in the cluster.*



Tropical-Storm-Force Wind Timing Graphic (TOA)

- **Most Likely Arrival**
 - Less than 50% chance of earlier onset, with a time before or after which the onset of Tropical Storm force winds is equally likely.
 - This graphic is appropriate for users who are willing to risk not having completed all their preparations before the storm arrives.
- **Earliest Reasonable Arrival**

- Less than 10% chance of earlier onset
- Preparations should ideally be completed for those with a low tolerance for risk by the earliest reasonable time of arrival.

Tip: *The Wind Timing Graphics and Graphical Wind Probabilities are often shown together to communicate both timing and chance of occurrence. To layer the Wind Timing Graphic on top of the Graphical Wind Probabilities, turn the Wind Timing Graphic on after turning on the Graphical Wind Probabilities.*

- **Wind Timing Flags**

- With either the Earliest Reasonable or Most Likely TOA graphic turned on, right click the mouse on the map to 'Add Wind Timing Flag'. This can also be performed by selecting "Place Wind Timing Flag" in the Map Location Context Menu and dragging the blue dot to the desired location.
- Flags correspond to whatever TOA Graphic is displayed and can be used to label locations in between the timing lines.



- **Watches and Warnings (wind)**

- Plots coastal wind watch and warning areas that are described in the advisory text products.
 - **Hurricane (or Tropical Storm) Watch** – An indication that conditions are possible within the watch area, generally within 48 hours.
 - **Hurricane (or Tropical Storm) Warning** – An indication that conditions are expected within the warning area, generally within 36 hours.
- The lead time for watches and warnings is tied to the anticipated arrival time of tropical storm force winds.
- See Legend for color depicting each watch/warning type.



- **Track and Swath Options**

This is where you can set preferences for how storm information is displayed on the map, including track plot, track labels, and ring/swath fill.

NOTE: *To save preferences for future sessions by clicking “Save these Preference for Future Sessions”*



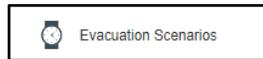
Reset

Clears all the Storm Tool graphics on the map

EVACUATION DECISION SUPPORT

HURREVAC’s evacuation decision support tools assist with timing of protective actions. For example: if 10 hours are needed to evacuate the vulnerable population from a coast area and storm hazards are predicted to begin at 8PM, then the evacuation must start no later than 10AM that same day.

EVACUATION SCENARIOS



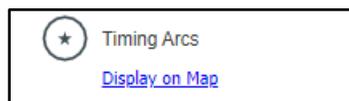
- Provides a record of all evacuation scenarios modeled within a Hurricane Evacuation Study for a selected county and state.
- The tool begins with a range of clearance times from low to high. Filters guide the user to drill down to a specific evacuation scenario (and clearance time), which is then saved for use in evacuation timing reports and Timing Arcs
- Any number of specific scenarios can be saved within your user profile.

TIMELINE ACTIONS



- A user-input record of other actions to be taken relative to the timing of various storm events.
- Individual timeline items are manually input by specifying a (county) location and then entering the action(s) to be taken either before or after the storm event.
- Check with your agency for hurricane preparedness plans or guidelines on timeline items to enter.

TIMING ARCS



- Timing arcs are graphical depictions of when protective action should be taken in advance of an approaching storm. The size (radius) of each arc is determined by multiplying the number of hours needed for that action by the average forward speed of the storm in the hours before the storm's closest approach.
- Timing Arcs can be based off of saved Evacuation Scenarios, Timeline Actions, or both.
- Timing Arcs only display on the map as long as a storm is still approaching a location. Once the storm is past, forward speed can no longer be computed, and the Timing Arc will disappear.

SINGLE LOCATION REPORTS

Right-click the mouse on the map to access location-specific information about winds. You can also access these reports by selecting them in the Map Location Context Menu.



Wind Timing Report - This report provides Cumulative (120-hr) Wind Probabilities, Time of Arrival, and Time of Departure information for a single location. If the selected location is inside of the deterministic wind swath, the report also includes deterministic timing. Only 34kt and 50kt winds are included.

Wind Probability Report – This report provides individual and cumulative wind probabilities in 6-hour increments, for the 120-hour forecast period.

MULTIPLE LOCATION REPORTS

Accessed through the Reports button along the right edge. These reports are generally county-based, however Points-of-Interest can be incorporated as well by selection that option from the ‘Include’ menu. 



- Scope and/or the Filter box can be used to reduce the number of locations reporting data.
- The Export button sends a copy of the report table to a separate browser tab.
- The Update button is for re-running the report when a new advisory is received or selected.

Storm Summary – This creates a briefing document that includes a screen capture of the current map, plus the text of the Public Advisory and Discussion.

Storm Statistics – Report includes past wind speeds, forward motion, and pressure of the life of the storm to date, plus forecast of wind speed and forward motion out 120 hours.

Closest Approach – Report shows the closest that the center of the storm is expected to get to each county, based on the official forecast

- ***Azimuth*** is the angle measured from the specified location to the hurricane from due north.
- ***Direction*** is the direction of approach
- ***Closest*** is the closest the eye of the storm will get to that location

Probabilistic Wind Timing – Report provides Time-of-Arrival information for the 34kt and 50kt wind thresholds. Deterministic timing and cumulative wind speed probabilities are also included. Double-clicking on any one location in the table will launch a single-location report with details about Time-of-Departure as well.

Deterministic Wind Timing – Report shows when (and for how long) specific wind thresholds are expected to be exceeded at a particular location. Timing is based on the explicit (deterministic) forecast wind swath.

Wind Probabilities – Report shows the chances of sustained winds for locations and time periods over the next 5 days (in 12 and 24-hour intervals)

Evacuation Timing – Report shows the earliest reasonable and most likely times of onset of tropical storm force winds, and the earliest and latest times for making evacuation decision based on scenarios from your Hurricane Evacuation Study and parameters entered in the clearance time viewer.

Wind History – Similar in format to the Deterministic Wind Timing report, but analysis is based on the past wind swath.

STORM SURGE EXPLORER



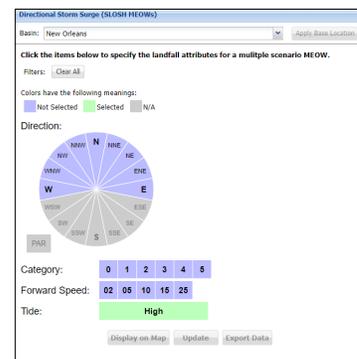
The storm surge explorer is a tool for viewing generalized storm surge model output (not tied to any one storm).

- Model output is reported in feet Above Ground Level (AGL).
- Model output is for high tide.

Maximum Storm Surge (SLOSH MOMs) – For visualizing worst-case inundation for a given category of storm. The MOM is an ensemble product of maximum storm surge heights for all hurricanes of a given category regardless of forward speed, storm trajectory, landfall location, etc. There are 5 MOMs for all basins south of the VA/NC border, and 4 MOMs for all basins north of VA/NC border

Directional Storm Surge (SLOSH MEOWs) – Short for Maximum Envelop of Water, the MEOW is a composite product representing the maximum height of storm surge water in a given basin grid cell using hypothetical storms run with the same 1)Category (intensity), 2)Forward speed, and 3)Storm trajectory (Direction).

- The Explorer allows mixing of multiple storm directions for a given storm basin



- This product is always available but more useful once you have better information on direction, forward speed and intensity.

NOTE: The surge explorer panel will open with the storm surge basin that is currently representative of the base location that the user has set (see Storm Toolbar above). The user may choose a different storm surge basin to explore, and when they do the "Apply Base Location" button will become enabled (bold), if clicked this button will revert back to the base location storm surge basin. If you have a base location established, then in the surge explorer click on the "Apply Base Location" button so the correct storm surge basin is applied. Otherwise you can manually select the storm surge basin.

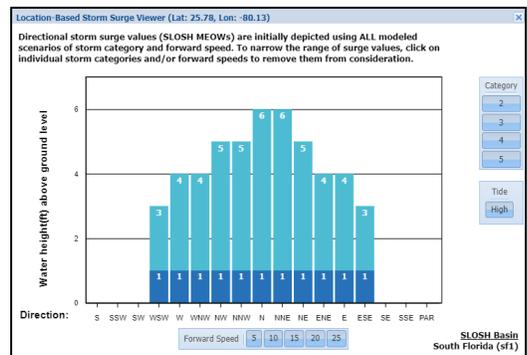


STORM SURGE FLAGS - Storm surge flags can be placed to label a MEOW's water depth at specific locations. This can be performed by right clicking on the mouse or selecting "Place Surge Flag" in the Map Location Context Menu and then dragging the blue dot to the desired location.

NOTE: You cannot place surge flags in the MOM grids



SURGE VIEWER - A bar chart showing all MEOW scenarios at a specific location within a modeled storm surge basin. This can be performed by right clicking on the mouse or selecting "Show Surge Viewer" in the Map Location Context Menu and then dragging the blue dot to the desired location.



STORM FORECAST ADVISORY-SPECIFIC SURGE INFORMATION

When a storm becomes close and threatening (typically within 72 hours of onset of hazardous conditions), NHC begins issuing additional products related to storm surge hazards with each new advisory



WATCHES AND WARNINGS (SURGE)

- Storm surge watches and warnings are new products that weren't available prior to 2017

- ***Storm Surge Watch*** - A possibility of life-threatening inundation, generally within 48 hours
- ***Storm Surge Warning***- A danger of life-threatening inundation, generally within 36 hours
- The Legend shows the difference between watch and warning.



OPERATIONAL STORM SURGE PRODUCTS

- **Potential Flooding with Tidal Mask** – Probabilistic surge modeling (reasonable worst-case scenario), with a gray mask applied to areas of the coast that are already subject to flooding at high tide.
- **Potential Flooding without Tidal Mask** – Same as above, but with a greater portion of the coastline depicted as flooded due to storm surge.