AGUACEROWX IN-DEPTH GUIDE

Soundings and Skew-T settings

The sounding viewer draws a Skew-T with a hodograph, parcel and wind tables, lapse rates and dozens of severe, winter and fire parameters. It opens model soundings at any point, area-averaged box soundings, SPC Mesoscale Analysis soundings, observed balloon (RAOB) and aircraft (ACARS) profiles, archived soundings and your own files. Use it to check a storm environment, compare models and runs at one spot, or export the profile for SharpPY or CM1.

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BEFORE YOU START

- Right-click the map (press and hold on a touch screen) and use the **Soundings** group: **Model**, **Meso analysis**, **RAOB**, **ACARS** and **NEXRAD VWP**. The toolbar has **Box sounding**, **RAOB** and **ACARS** buttons.
- Soundings are on every plan. Free can open soundings from the free models only; Enthusiast and up can use every model. **Model Comparison** needs Professional.
- The sounding controls open in the sidebar while the sounding covers the board, and in a panel beside the sidebar when it is docked or floating. On a narrow phone screen the sounding opens full screen without the controls.
- Sign in to keep your hodograph, skew, read-out and unit choices on every device. Parcel, storm motion and preset choices last until you open a sounding somewhere else.

01 Open a model sounding

Right-click any point on a model map for a full Skew-T from the model on that panel, for every hour of the run.

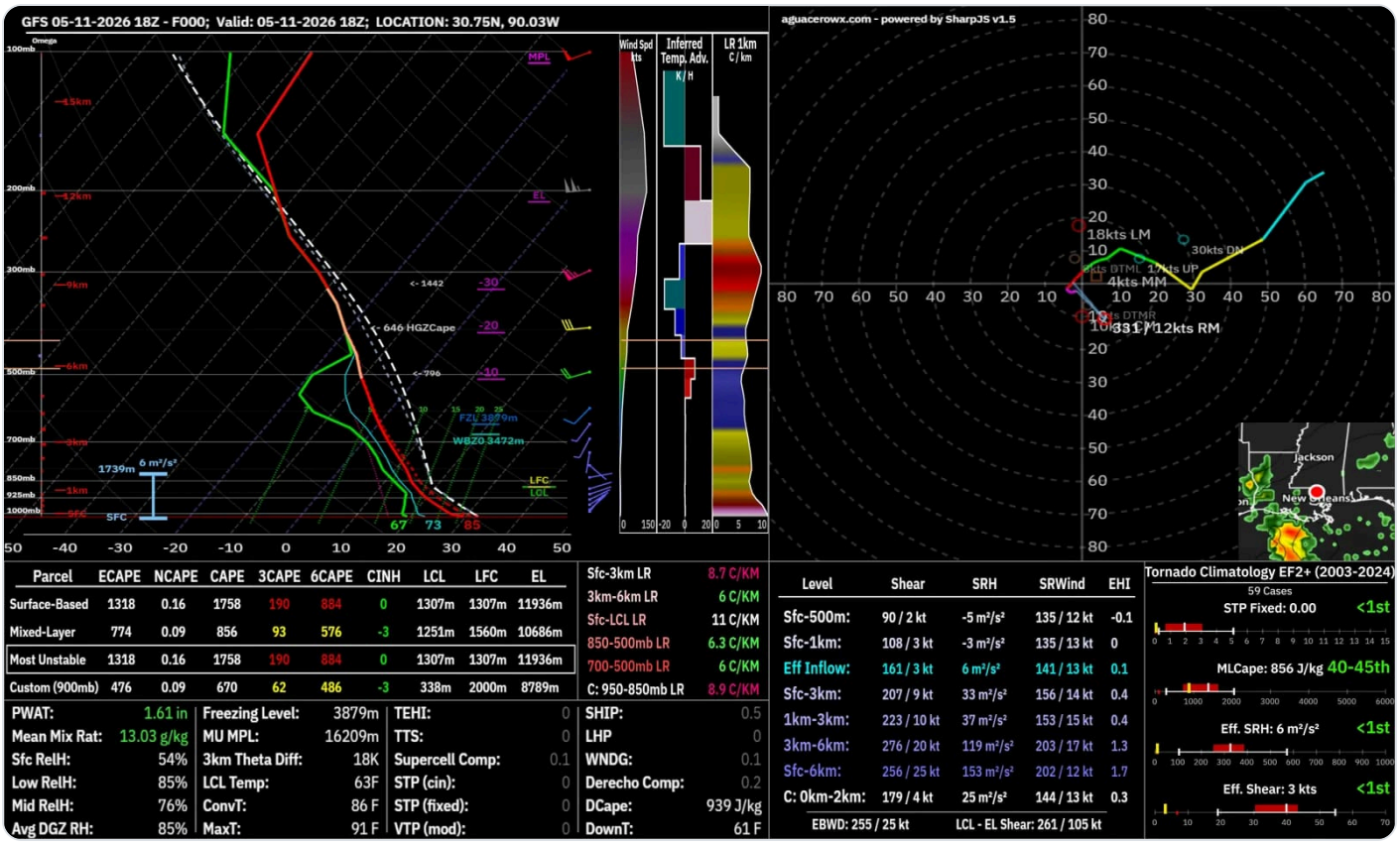
1. Load a model bundle on the map, for example the HRRR or GFS.
2. Right-click the map where you want the sounding. On a touch screen, press and hold.
3. Under **Soundings**, click **Model**. The Skew-T opens over the board (or docked or floating, if that is how you left it) and its controls open under **Model Sounding**.
4. Under **Parcel Selection**, pick the parcel to draw: **Surface-Based**, **Mixed-Layer**, **Most-Unstable** (the default) or **Custom-Pressure**.
5. Under **Storm Motion**, pick the motion used for storm-relative helicity, storm-relative winds and ECAPE. **Right** (Bunkers right mover) is the default.
6. Step through the forecast hours with the time slider. The sounding follows the slider and keeps your choices.
7. Click × (**Close SkewT**) in the corner of the chart to close it.

A model sounding with its controls: parcel, storm motion and presets.

THE SOUNDINGS GROUP OF THE RIGHT-CLICK MENU	
Model	Model sounding at the click, from the model on the panel you right-clicked. Hidden while the Archive Builder has a model archive loaded.
Meso analysis	SPC Mesoscale Analysis sounding at the click, over the contiguous US. It switches the time slider to the analysis hours. Not available in archive mode.
RAOB	Nearest observed balloon sounding. See **Observed balloon soundings (RAOB)** below.
ACARS	Nearest aircraft sounding. See **Aircraft soundings (ACARS)** below.
NEXRAD VWP	The VAD wind profile from the nearest NEXRAD radar, drawn as a hodograph. See the radar guide.

TIPS

- The sounding loads every hour of the run, so stepping the slider redraws at once. While an hour is still loading, the last sounding stays on screen.
- On a board with several panels, the sounding uses the model on the panel you right-clicked.
- You can hide or reorder the right-click items in Settings under **Context menu**.



A model Skew-T with its hodograph, parcel table and severe parameters.

02 Read the Skew-T and hodograph

What every line, marker and label on the Skew-T and hodograph means.

The Skew-T fills the left side. The wind barbs and three vertical bars sit to its right, the hodograph in the middle, the wind table and side panel on the right, and the parcel table, lapse rates and inset parameters along the bottom. The title across the top names the model, run, forecast hour and point, and adds **(Modified)** after you edit the profile.

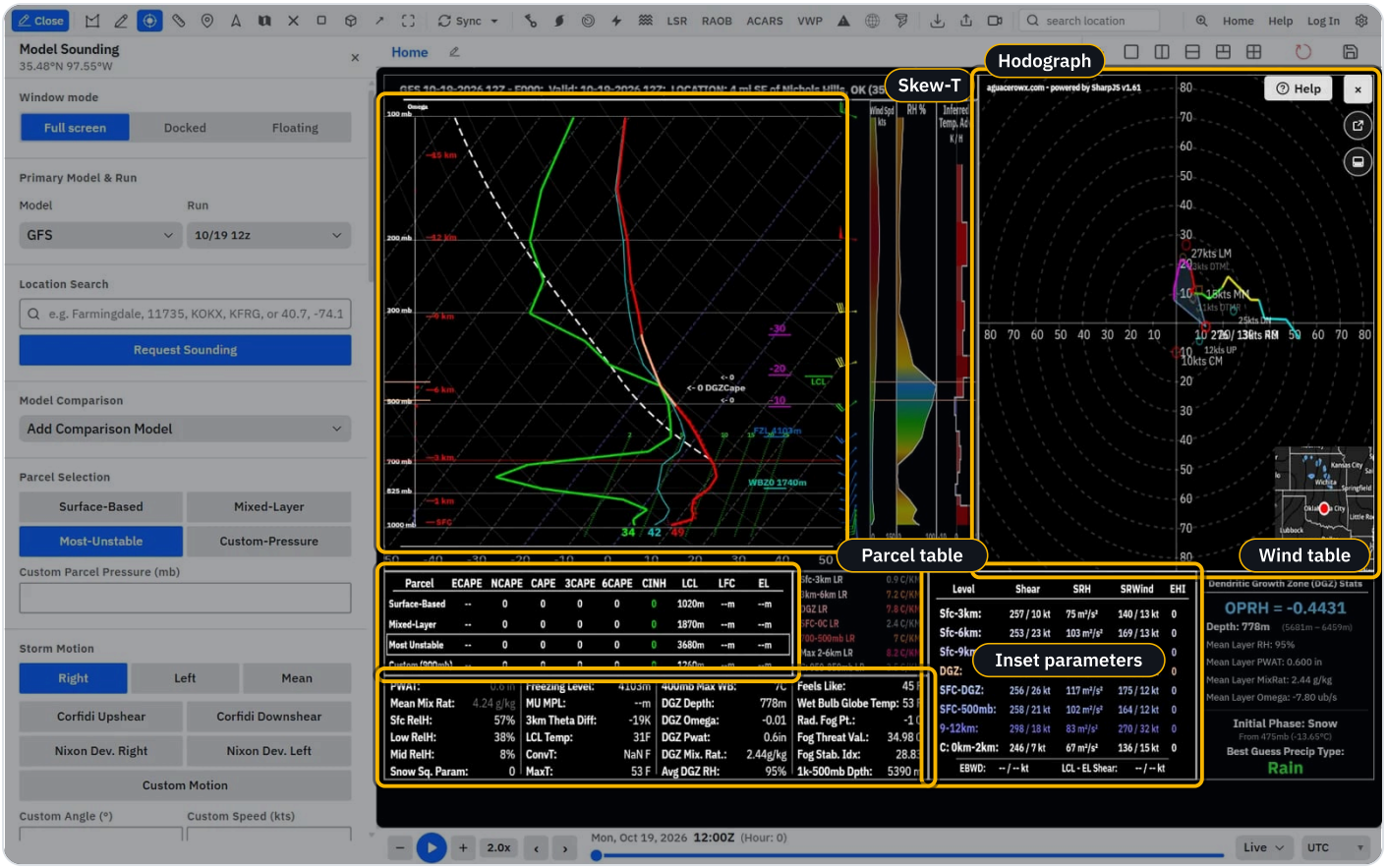
On the Skew-T, the red line is temperature and the green line is dew point. The thin cyan line is the wet-bulb temperature and the faint dashed red line the virtual temperature. The dashed white line is the selected parcel,

the light blue dashed line is its ECAPE (entraining) parcel, and the dotted magenta line is the DCAPE downdraft parcel. Dotted dark green lines are mixing ratios of 2, 5, 10, 15, 20 and 25 g/kg, and the 0 °C and −20 °C isotherms are drawn heavier.

LABELS ON THE SKEW-T	
SFC, 1 km … 15 km	Red height marks on the left at the surface and 1, 3, 6, 9, 12 and 15 km above ground.
Omega	Bars along the left edge show vertical motion: blue for rising air, red for sinking air. Observed soundings have no omega.
LCL / LFC / EL / MPL	Marks on the right edge for the selected parcel's lifted condensation level, level of free convection, equilibrium level and maximum parcel level.
FZL / WBZ0	The freezing level and the wet-bulb zero height, with their heights.
−10, −20, −30	Ticks at the −10, −20 and −30 °C heights (°F in Imperial units).
HGZCape / DGZCape	CAPE in the hail growth zone (−10 to −30 °C), with the CAPE below and the total. With the Winter vertical preset it shows CAPE in the dendritic growth zone (−12 to −18 °C) instead.
Effective inflow bracket	A blue bracket marks the effective inflow layer, with its base and top heights and its storm-relative helicity in m^2/s^2.
Surface numbers	At the bottom, the surface temperature (red), dew point (green) and wet-bulb (cyan) in °F, or in °C with Metric units.

MARKS ON THE HODOGRAPH	
Trace	The wind profile, colored by height with the color table you pick under **Sounding Design**. Rings are every 10 kt, labeled in mph with Imperial units.
Red circles	Bunkers right and left movers and your custom motion. The one in use is brighter.

Cyan circles	Corfidi upshear and downshear vectors.
Brown circles	Nixon deviant tornado motions, right and left.
Orange square (MM)	The 0–6 km mean wind, labeled with its speed.
Map inset	The bottom-right corner shows a snapshot of the map around the point, or the box you drew.
Legend	With comparisons on, the top-left corner lists each overlay in its color.



The parts of a sounding: Skew-T, hodograph, wind table and parcel table.

TIPS

- Click **Help** on the hodograph (desktop) for the mouse and keyboard controls.
- With comparisons on, the parcel, ECAPE, wet-bulb and virtual temperature lines are hidden so the overlays stay readable. The tables still show the main sounding.

03 Change the model, run or point

Switch the sounding to another model or run, or move it to a place you type, without going back to the map.

1. Under **Primary Model & Run**, open **Model** and pick another model. Only models that have soundings are listed, and the latest run loads.
2. Open **Run** to pick an older run of that model.
3. Under **Location Search**, type a city, zip code, airport or station code, or coordinates such as 40.7, -74.1.
4. Click **Request Sounding**.

SETTINGS	
Model	The model the sounding comes from. It also changes the model on the active panel. If the point is outside the new model's area, the app says so and keeps the old model. Premium models are locked on Free.
Run	The model run. The sounding reloads for every hour of that run.
Location Search	Moves the sounding to a typed place and recenters the map there. An airport or station code puts the site name in the title instead of coordinates. Hidden for NEXRAD VWP and in archive mode.

Primary Model & Run shows only for model soundings. RAOB, ACARS and uploaded soundings have no model to change.

04 Pick a parcel and read CAPE and ECAPE

Lift a surface-based, mixed-layer, most-unstable or custom parcel, and compare their CAPE, ECAPE, CIN and levels in the parcel table.

1. Under **Parcel Selection**, click a parcel. The Skew-T draws its path, and its row in the parcel table gets an outline.

2 For a parcel from a set level, type the pressure in **Custom Parcel Pressure (mb)**, then click **Custom-Pressure**.

PARCEL SELECTION	
Surface-Based	Lifts the surface air.
Mixed-Layer	Lifts the mean temperature and moisture of the lowest 100 mb.
Most-Unstable	Lifts the level with the highest theta-e in the lowest 300 mb. The default for every new sounding.
Custom-Pressure	Lifts the air at the pressure in **Custom Parcel Pressure (mb)**. Blank uses 900 mb. The value is kept between the top of the sounding and the surface pressure.

PARCEL TABLE COLUMNS	
Parcel	Rows for **Surface-Based**, **Mixed-Layer**, **Most Unstable** and **Custom** with its pressure. All four rows always show; the outlined row is the parcel drawn on the chart.
ECAPE	Entraining CAPE in J/kg. It accounts for dry air mixing into the updraft and uses the storm-relative inflow from the storm motion you pick. Shows -- when the parcel has no equilibrium level or reaches the top of the profile.
NCAPE	Normalized CAPE: CAPE divided by the depth from the LFC to the EL.
CAPE	Total CAPE in J/kg, colored by size.
3CAPE / 6CAPE	CAPE in the lowest 3 km and the lowest 6 km.
CINH	Convective inhibition in J/kg.
LCL / LFC / EL	Heights of the lifted condensation level, level of free convection and equilibrium level, in m (ft in Imperial units). -- when the parcel never reaches the level.

The effective inflow layer is the layer whose parcels have enough CAPE and little enough CIN to feed a storm. The app finds it on every sounding: the blue bracket on the Skew-T marks it, the **Eff Inflow** row of the wind table gives its shear and helicity, and the parcel-based Bunkers motion uses it. There is no separate effective parcel button.

TIPS

- ECAPE changes with the storm motion. Switch from **Right** to **Left** or **Mean** and watch the ECAPE column.
- The **Parcel Temp** line of the cursor read-out gives the selected parcel's temperature at any level.

05 Choose a storm motion

The storm motion sets storm-relative helicity, storm-relative winds, EHI, ECAPE and where storm-relative hodographs center.

1. Under **Storm Motion**, click a motion. The hodograph highlights it and the wind table, ECAPE and read-outs update.
2. For your own motion, type **Custom Angle (°)** and **Custom Speed (kts)**, then click **Custom Motion**.
3. To list every motion with its direction and speed, click **Storm Motions: Hidden** under **Sounding Design** so it reads **Storm Motions: Shown**.

STORM MOTION	
Right	Bunkers right mover, the default. When the most-unstable parcel has over 100 J/kg of CAPE it uses the parcel-based method (the effective inflow base up to 65% of the EL height); otherwise the 0–6 km method.
Left	Bunkers left mover, the mirror of **Right**.
Mean	The pressure-weighted 0–6 km mean wind.
Corfidi Upshear	The 850–300 mb mean wind minus the 0–1.5 km mean wind: where back-building MCS cells move.
Corfidi Downshear	The 850–300 mb mean wind plus the upshear vector: where forward-propagating MCSs move.

Nixon Dev. Right	Deviant tornado motion: halfway between the 0–500 m mean wind and the Bunkers right mover.
Nixon Dev. Left	The same, using the Bunkers left mover.
Custom Motion	Uses **Custom Angle (°)** (the direction the storm comes from, 0–360) and **Custom Speed (kts)** (0–100). Blank boxes use 0° and 10 kt. The hodograph labels it **Custom Motion**.

Stepping through time recomputes the motions but keeps the one you picked. A sounding at a new point or from a new run goes back to **Right**.

08 Shade the hodograph, skew and units

Color the vertical bars by height, change how the Skew-T is plotted, and switch between default, metric and imperial units.

The hodograph settings sit under **Sounding Design** and **Presets**. Each **Sounding Design** button cycles through its choices each time you click it, and its label shows the current one.

SOUNDING DESIGN

Vertical Bars	**Full** (default) shows all three bars beside the Skew-T. **No Wind**

SETTINGS

Hodograph Height Numbers	**On** marks the trace at 1 to 12 km above ground with numbered dots. Default **Off**.
Hodograph Color Table	**Default**: magenta 0–1 km, red 1–3 km, green 3–6 km, yellow 6–9 km, cyan 9–12 km. **SounderPY**: purple, red, orange, gold and pale yellow for the same layers. **Rainbow**: a smooth blend from white at the ground through purple, blue, green and orange to red at 12 km. **Greyscale**: dark near the ground to near white at 12 km.
Hodograph Scale	**None** (default) keeps the origin in the center at a fixed scale. **Storm Relative** shifts the view toward the storm motion. **Dynamic** also zooms so the strongest wind fills the plot.
Hodograph Mode	Under **Presets**. **Hodo-Relative (Centered)** (default) plots ground-relative winds. **Storm-Relative (Fixed)** subtracts the storm motion so the storm sits at the center, and labels the plot **Storm-Relative**.

Hodograph wind	For RAOB, ACARS and uploaded soundings only. **Trimmed (bulk shear)** (default) thins the many observed levels into smooth segments; **Full resolution** draws every wind level.
3D Hodograph	**Shown** replaces the flat hodograph with a 3D one: the trace rises with height, colored by layer, over range rings with a mark every kilometer. Drag to rotate it. Default **Hidden**. Not available for the NEXRAD VWP view.
3D Hodograph Arrows	Shows only while **3D Hodograph** is **Shown**. **Shown** draws a cyan arrow from the storm motion to the trace every 500 m.
	you are signed in. They follow you to other devices. Signed out,

SHORTCUTS

Scroll over the hodograph	Zoom in or out, 1× to 8×
Click the hodograph	With **Draw front** on, draw a boundary line (see **Cursor tools**)

This session	**Vertical Bars**, **Storm Motions**, **Hodograph Mode**, **Export Sounding Format**, the tornado filter and zoom last until you reload.

TIPS

- **Reset Hodograph** under **Cursor Options** undoes wind edits and resets the storm motion to **Right**. It doesn’t change the zoom.
- For hodographs across the whole map, add the **Hodograph** layer instead.

08 Switch presets and read the parameter tables

Presets swap the wind, lapse rate and parameter tables, the vertical bars and the side panel between tornado, severe, hail, winter, fire and fog setups.

When a new sounding opens, the app picks presets that fit it: Winter presets and **Winter Stats** when the surface is colder than 5 °C, Fire presets when surface humidity is under 20%, the tornado climatology panel when the most-unstable CAPE is over 500 J/kg in the US, **Elevated Severe/MCS** when the inflow layer starts well above the ground, **Dryline/Confluence** for a deep, dry mixed layer, and **Fog/Ambient** for fog, extreme heat or cold, or a quiet profile. Change any preset yourself and your choices stay while you step through time.

PRESETS	
Wind/Lapse	The rows of the wind table and the lapse rate box: **Tornado** (default), **Surface-Based Severe/MCS**, **Dryline/Confluence**, **Elevated Severe/MCS**, **Winter** or **Fire**.
Inset Parameters	The parameter table under the hodograph: **Tornado** (default), **Severe/MCS**, **Hail Heights (kft)**, **Fog/Ambient**, **Winter** or **Fire**.
Vertical Levels	The vertical bars, the fourth side-panel graph and the HGZ or DGZ CAPE marks: **Severe/Tornado** (default), **Winter** or **Fire**.
Side Panel View	The panel under the wind table: **Graph w/ Height** (default), **Tornado Climatology (CONUS only)** or **Winter Stats**. The tornado choice is greyed out outside the US climatology grid.
Tornado Filter	Shows only with the tornado climatology panel. **Significant (EF2+)** (default) or **All Tornadoes (EF0+)**.
Hodograph Mode	Ground-relative or storm-relative hodograph. See **Style the hodograph**.

WIND TABLE (LEVEL, SHEAR, SRH, SRWIND, EHI) ROWS BY WIND/LAPSE PRESET	
Tornado	Sfc-500m, Sfc-1km, Eff Inflow, Sfc-3km, 1km-3km, 3km-6km, Sfc-6km and your custom layer.
Dryline/Confluence	Sfc-500m, Sfc-1km, Eff Inflow, Sfc-3km, Sfc-MLLFC, Sfc-SBLCL, Sfc-6km and custom.
Elevated Severe/MCS	Eff Inflow, Sfc-1km, Sfc-3km, Sfc-6km, Eff Bot-1km, Eff Bot-3km, Eff Bot-6km and custom.
Surface-Based Severe/MCS	Sfc-3km, Sfc-6km, Eff Inflow, HGZ, Sfc-9km, Sfc-12km, 9-12km and custom.
Fire	Sfc-500m, Sfc-1km, Eff Inflow, Sfc-3km, 1km-3km, Sfc-700mb, Sfc-500mb and custom.

Winter	Sfc-3km, Sfc-6km, Sfc-9km, DGZ, SFC-DGZ, SFC-500mb, 9-12km and custom.
EBWD / LCL - EL Shear	Under every set: the effective bulk wind difference and the shear from the LCL to the EL.

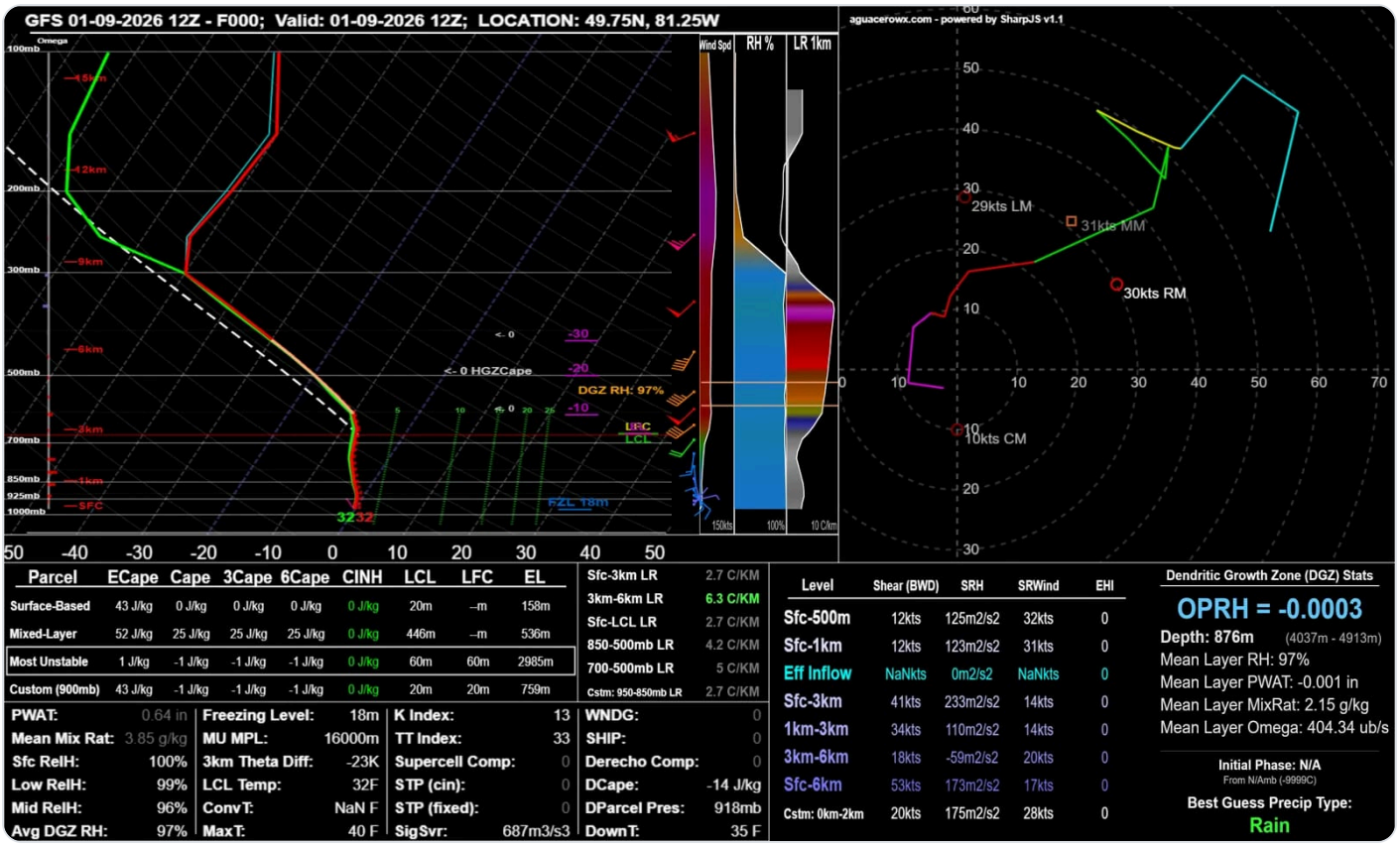
In each row, **Shear** is the bulk shear (direction / speed), **SRH** is storm-relative helicity in m²/s², **SRWind** is the mean storm-relative wind in the layer, and **EHI** is the energy-helicity index with the selected parcel.

LAPSE RATE BOX ROWS BY WIND/LAPSE PRESET	
Tornado, Dryline/Confluence	Sfc-3km, 3km-6km, Sfc-LCL, 850-500mb, 700-500mb, Max 2-6km and custom.
Severe/MCS, Elevated	Sfc-3km, 3km-6km, LFC-EL, 850-500mb, 700-500mb, Max 2-6km and custom.
Fire	Sfc-1km, Sfc-3km, Sfc-LFC, 850-500mb, 700-500mb, Max 2-6km and custom.
Winter	Sfc-3km, 3km-6km, DGZ, SFC-0C, 700-500mb, Max 2-6km and custom.

INSET PARAMETER TABLE BY INSET PARAMETERS PRESET	
Every preset	The first column always starts with PWAT, Mean Mix Rat (surface to 1 km), Sfc RelH, Low RelH (1 km) and Mid RelH (3 km).
Tornado	Avg DGZ RH; Freezing Level, MU MPL, 3km Theta Diff, LCL Temp, ConvT, MaxT; TEHI, TTS, Supercell Comp, STP (cin), STP (fixed), VTP (mod); SHIP, LHP, WNDG, Derecho Comp, DCape, DownT.
Severe/MCS	As **Tornado**, with K Index, TT Index, Supercell Comp, Bulk Rich. Num., STP (fixed) and SigSvr in the third column.
Hail Heights (kft)	MUCAPE; the heights of the freezing level (FZL) and the −10, −20 and −30 °C levels in kft; then the same third and fourth columns as **Severe/MCS**.

Winter	Snow Sq. Param; the same second column as **Tornado**; 400mb Max WB, DGZ Depth, DGZ Omega, DGZ Pwat, DGZ Mix. Rat., Avg DGZ RH; Feels Like, 1k-500mb Dpth, Wet Bulb Globe Temp, DCape, DParcel Pres, DownT.
Fog/Ambient	As **Winter**, with Feels Like, Wet Bulb Globe Temp, Rad. Fog Pt., Fog Threat Val., Fog Stab. Idx and 1k-500mb Dpth in the last column.
Fire	Avg DGZ RH; the same second column as **Tornado**; HDWI, RFTI, Fosberg, 3km °change, 1km Min TD Dep., Sfc-LCL RH; then the same last column as **Winter**.

VERTICAL BARS AND SIDE PANEL	
Vertical bars	Wind speed (kt) always. **Severe/Tornado** adds inferred temperature advection (K/h) and the 1 km lapse rate; **Winter** adds RH % and inferred temperature advection; **Fire** adds RH % and the 1 km lapse rate.
Graph w/ Height	Four small plots: storm-relative wind against height (0–16 km), mixing ratio with the effective-layer RH, theta-e against pressure, and a fourth set by **Vertical Levels**: streamwise vorticity percentage (SW% ω_s) for severe, vapor pressure deficit (VPD) for fire, or a precipitation type estimate for winter.
Tornado Climatology (CONUS only)	Tornado cases near the point from 2003 to 2024, with where this sounding's STP (fixed), mixed-layer CAPE, effective SRH and effective shear rank among them, in percentile bins. Fewer than 5 cases shows **Insufficient Cases!**.
Winter Stats	Dendritic growth zone stats: OPRH, depth, mean RH, PWAT, mixing ratio and omega, the initial precipitation phase and a best guess precipitation type.



A winter GFS sounding with the dendritic growth zone statistics panel.

09 Measure a custom layer or test new surface values

Add your own lapse rate and wind shear layer to the tables, and try a warmer, moister or windier surface.

1. Under **Calculate Custom Lapse Rate**, pick **Mode**: **Height (km)** above ground or **Pressure (mb)**.
2. Type **Bottom Level** and **Top Level**, then click **Load**. The last row of the lapse rate box changes to your layer, labeled with a C.
3. Under **Calculate Custom Wind Shear**, do the same and click **Load**. The last row of the wind table shows the layer's shear, SRH, storm-relative wind and EHI.
4. Under **Modify Surface Parameters**, type **Temperature** and **Dewpoint**, pick their **Unit**, and click **Load Temps**. The parcels, CAPE and parameters recompute and the chart reads **Custom Surface Data**.
5. Type **Wind Direction (°)** and **Wind Speed (kts)** and click **Load Wind** to change the surface wind. The storm motions, SRH and hodograph update.

CALCULATE CUSTOM LAPSE RATE AND CALCULATE CUSTOM WIND SHEAR	
Mode	**Height (km)** (default) reads the levels as km above ground; **Pressure (mb)** as pressure levels. A pressure below the surface uses the surface.
Bottom Level / Top Level	The layer. Blank heights use 0 km and 3 km for the lapse rate, and 0 km and 6 km for shear. Blank pressures use the surface and 100 mb above it.
Load	Adds the layer to the table. It stays as you step through time.
Reset	Puts back a standard layer: 0–3 km for the lapse rate, 0–6 km for shear. A new sounding starts with 950–850 mb and 0–2 km rows.

MODIFY SURFACE PARAMETERS	
Temperature / Dewpoint	New surface values. Blank keeps the current value. The dew point can’t go above the temperature.
Unit	**Fahrenheit** (default), **Celsius** or **Kelvin** for the two boxes.
Load Temps / Reset Temps	Apply the values, or put back the sounding’s own surface temperature and dew point.
Wind Direction (°) / Wind Speed (kts)	A new surface wind. Blank boxes use 180° and 10 kt.
Load Wind / Reset Wind	Apply the wind, or put back the original. The hodograph reads **Custom Surface Data** while a custom wind is on.

10 Read values with the cursor, draw a front or edit the profile

The cursor tools read any level, draw a boundary on the hodograph, or let you drag and type new values into the sounding.

CURSOR OPTIONS	
Read-out	On by default. Hover the Skew-T for the pressure, height, theta-e, temperature, dew point, wet-bulb, RH, virtual temperature, parcel temperature, omega (μb/s) and lapse rate at that level. The hodograph marks the same level with its wind direction, speed, height and pressure. Click the Skew-T to freeze the read-out, and click again to let it follow.
Draw front	Click the hodograph to draw a line through that point, labeled with its direction and speed, to compare a front or outflow boundary with the shear. Off by default.
Modify sounding	Opens the **Modify Sounding Data** table and lets you edit the profile with the mouse and keys. Turning it on turns **Read-out** and **Draw front** off. Desktop only.
Reset SkewT	Undoes temperature and dew point edits.
Reset Hodograph	Undoes wind edits and resets the storm motion to **Right**.

1. Turn on **Modify sounding**. The **Modify Sounding Data** table lists every level.
2. Click a temperature, dew point, wind direction or wind speed cell, type a new value and press `Enter`. Press `Esc` to cancel.
3. Or drag a box over part of the temperature or dew point line on the Skew-T to select those points, then use the keys below.
4. Drag a box over part of the hodograph trace to select winds, then move them with the arrow keys.
5. Turn **Modify sounding** off when you are done, and turn **Read-out** back on.

SHORTCUTS

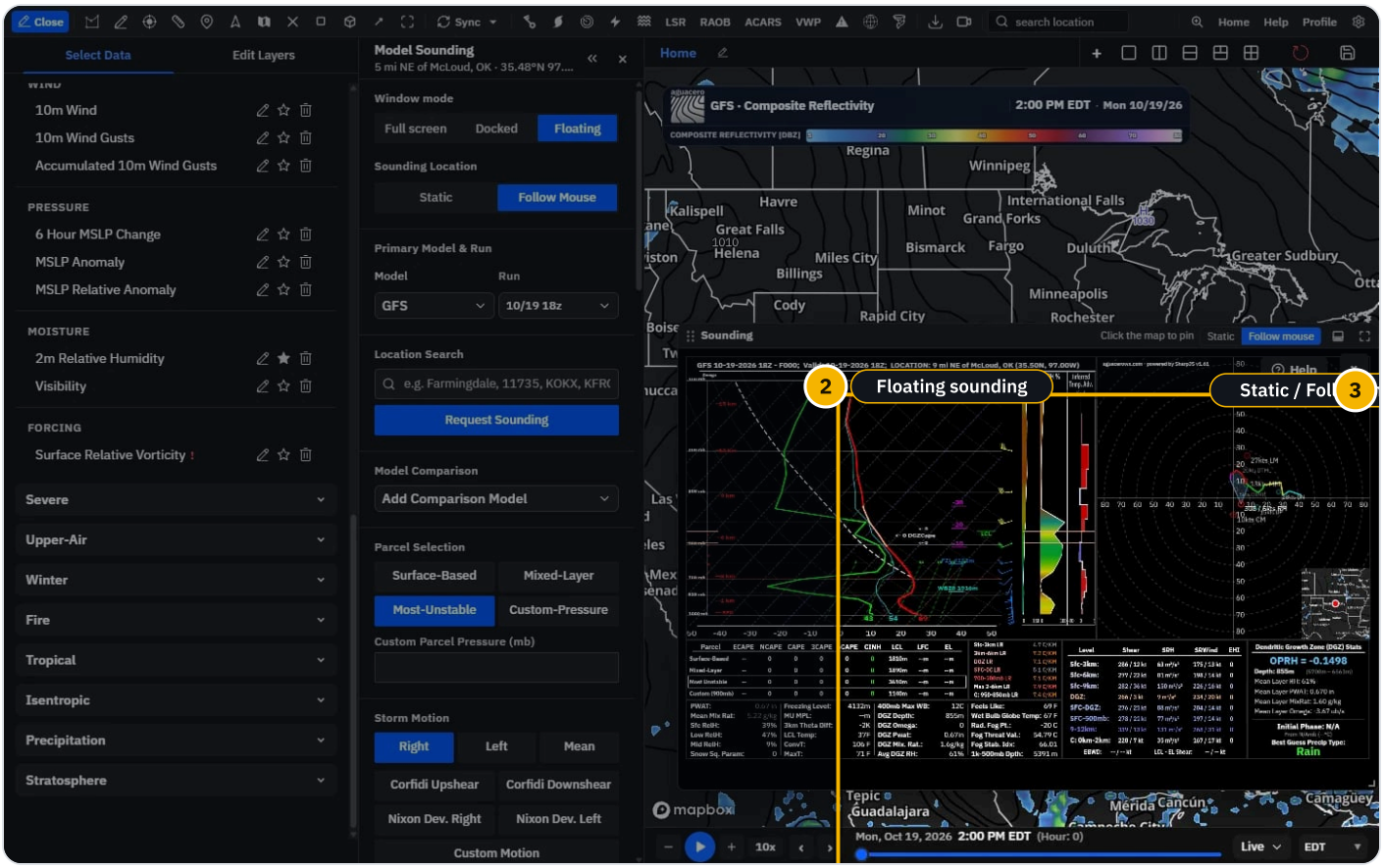
Scroll over the Skew-T	Zoom in or out, 1× to 3×
`Alt` + drag	Move the zoomed Skew-T
`←` / `→`	Modify on, Skew-T points selected: lower or raise them by 1 °C
`m`	Modify on, Skew-T points selected: moisten the dew point toward the top point's temperature
`l`	Modify on, Skew-T points selected: straight line from the lowest to the highest point
`n`	Modify on, Skew-T points selected: mix down from the top point (dry adiabatic temperature, constant mixing ratio)
`←` `→` `↑` `↓`	Modify on, hodograph points selected: move them 1 kt west, east, north or south
`i` / `o`	Modify on, hodograph points selected: add or remove 1 kt of speed

Edits change only what you see. The title adds **(Modified)**, and **Download Sounding Data** saves the edited profile.

11 Dock the sounding and move it with the mouse

Dock or float the sounding so the map stays in view, then drag its marker or let it follow your cursor. The profile redraws as it moves.

1. Open a model sounding.
2. Under **Window mode**, click **Docked** to put it under the map, or **Floating** for a window over the map.
3. In the sounding's title bar, click **Static** to get a marker you drag on the map, or **Follow mouse** to have the sounding track your cursor.
4. With **Follow mouse**, move over the map. Click to pin the sounding at a spot; click again to follow the cursor.
5. Step through time. A pinned or dropped point loads every hour, like a right-click sounding.



A floating sounding with the Static and Follow mouse switch in its title bar.

WINDOW MODE AND SOUNDING LOCATION	
Full screen	Covers the board. The controls take over the sidebar.
Docked	Under the map. Drag its top edge to change the height. The controls move to a panel beside the sidebar, so **Select Data** and **Edit Layers** stay open.
Floating	A window over the map. Drag the title bar to move it and the edges to resize it. Double-click the title bar to go back to full screen.
Static	A marker sits at the sounding point on every panel map. Drag it to move the sounding. The title bar reads **Drag the marker to move**.
Follow Mouse	The sounding follows the cursor over the map. A left-click pins it (**Pinned · click the map to follow**); the next click lets it follow again. Those clicks do nothing else on the map. When the cursor leaves the map, the sounding stays at the last point.

TIPS

- The same **Static** / **Follow Mouse** switch is under **Sounding Location** in the controls, below **Window mode**.
- Comparison overlays hide while the point moves and come back when the new point loads.
- For **Meso analysis** soundings, follow-mouse loads the profile each time the cursor enters a new grid cell, so it updates a little slower.

Docked, floating and moving soundings are on desktop only. Moving works for single-point model and Meso analysis soundings, not for box, RAOB, ACARS, NEXRAD VWP or uploaded soundings.

12 Average a box (area soundings)

Draw a rectangle for one sounding averaged over every model column inside it, from the model or the SPC Mesoscale Analysis.

1. Load a model bundle on the active panel.
2. Click **Box sounding** on the toolbar, or hold `B`.
3. Drag a rectangle over the area.
4. In the **Box sounding** menu, click **Model** or **Meso analysis**.
5. Read the averaged sounding. The tool turns itself off; the map inset shows your box.

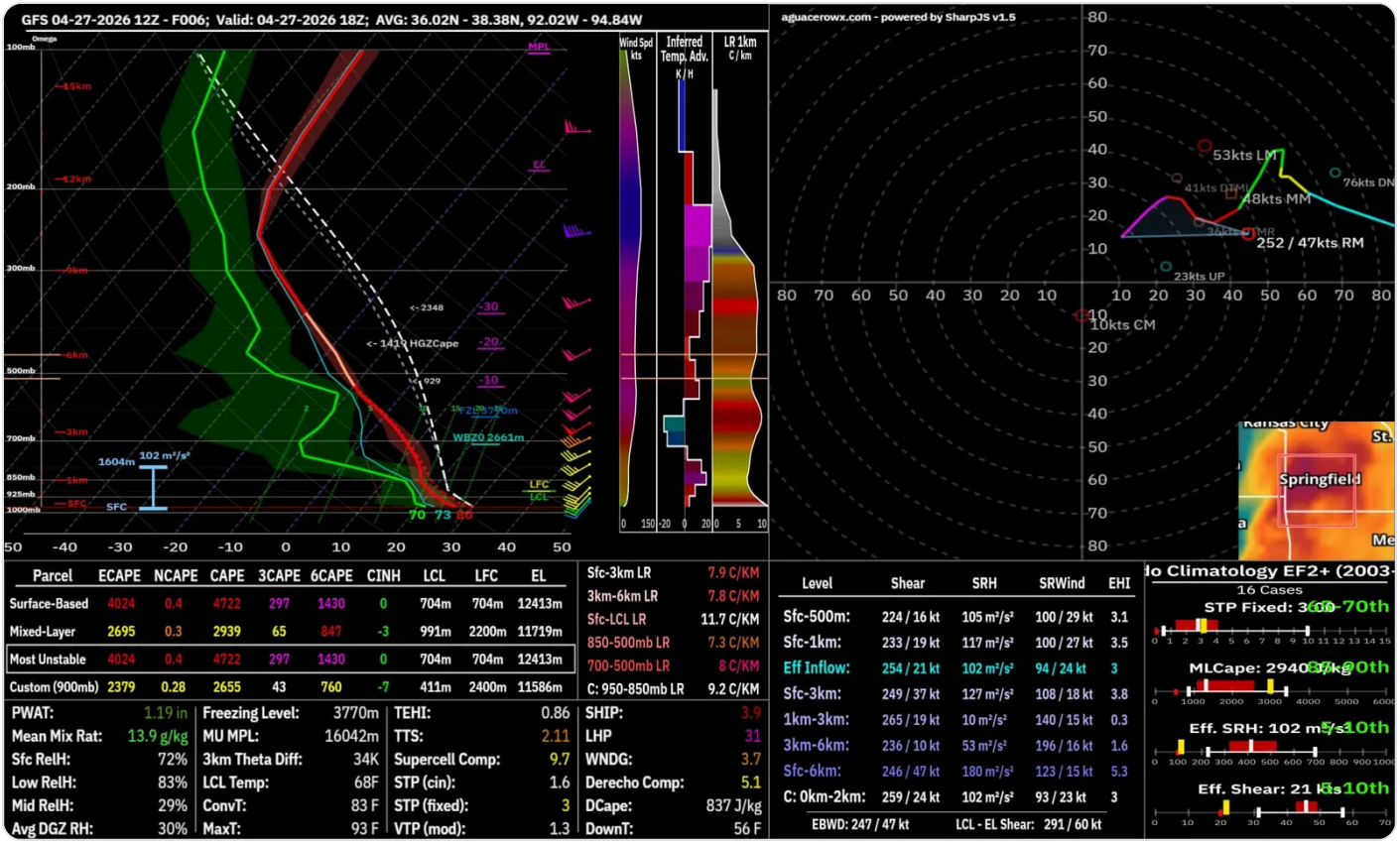
SHORTCUTS

Hold `B` + drag	Draw a box sounding without the toolbar button
`Esc`	Cancel a box you are drawing

TIPS

- Every sounding setting works on a box sounding, and the time slider steps it through the run.
- Change the hold key, or bind a key to the toolbar button, in Settings under **Keyboard shortcuts** (**Draw box sounding** and **Toggle box sounding tool**).

The middle of the box must be inside the model's area. Meso analysis isn't available in archive mode.



An area-averaged GFS sounding with its hodograph and severe parameters.

13 Observed balloon soundings (RAOB)

Show radiosonde launch sites around the world and open a station's recent soundings, then step through its launches.

1. Click **RAOB** on the toolbar. Launch sites show as red dots; hover one for its name.
2. Click a site. Its most recent soundings load, up to the last 48 launches, and the controls title reads **RAOB / ACARS Sounding**.
3. Step through the launches with the time slider. The sounding shows the launch nearest the slider, within 12 hours.

TIPS

- Right-click the map and click **RAOB** under **Soundings** for the nearest station without turning on the sites.
- Overlay a model on the balloon sounding with **Model Comparison**: it loads the model at the station for each launch time.
- Observed profiles have many levels. **Hodograph wind** under **Sounding Design** switches between a trimmed and a full-resolution hodograph.
- With an archive window loaded, the sites and soundings come from that window.

Some sites list no recent launch times; clicking one shows **Sounding unavailable** with the reason.

14 Aircraft soundings (ACARS)

Profiles measured by airliners as they climb out of and descend into airports, often between balloon launches.

1. Click **ACARS** on the toolbar. Airports with recent aircraft profiles show as grey-green dots; hover one for its code.
2. Click an airport. Its profiles from up to the last 72 hours load.
3. Step through the profiles with the time slider.

TIPS

- Right-click the map and click **ACARS** under **Soundings** for the nearest airport with data. If the nearest has none, the app tries the next closest airports.
- ACARS soundings use the same controls as RAOB, including **Model Comparison**.

In archive mode, ACARS is available for windows from January 1, 2019. Earlier windows grey out the button and remove **ACARS** from the right-click menu.

15 Compare models, runs and observations PROFESSIONAL

Overlay other models and runs on one Skew-T and hodograph, on top of a model, RAOB or ACARS sounding.

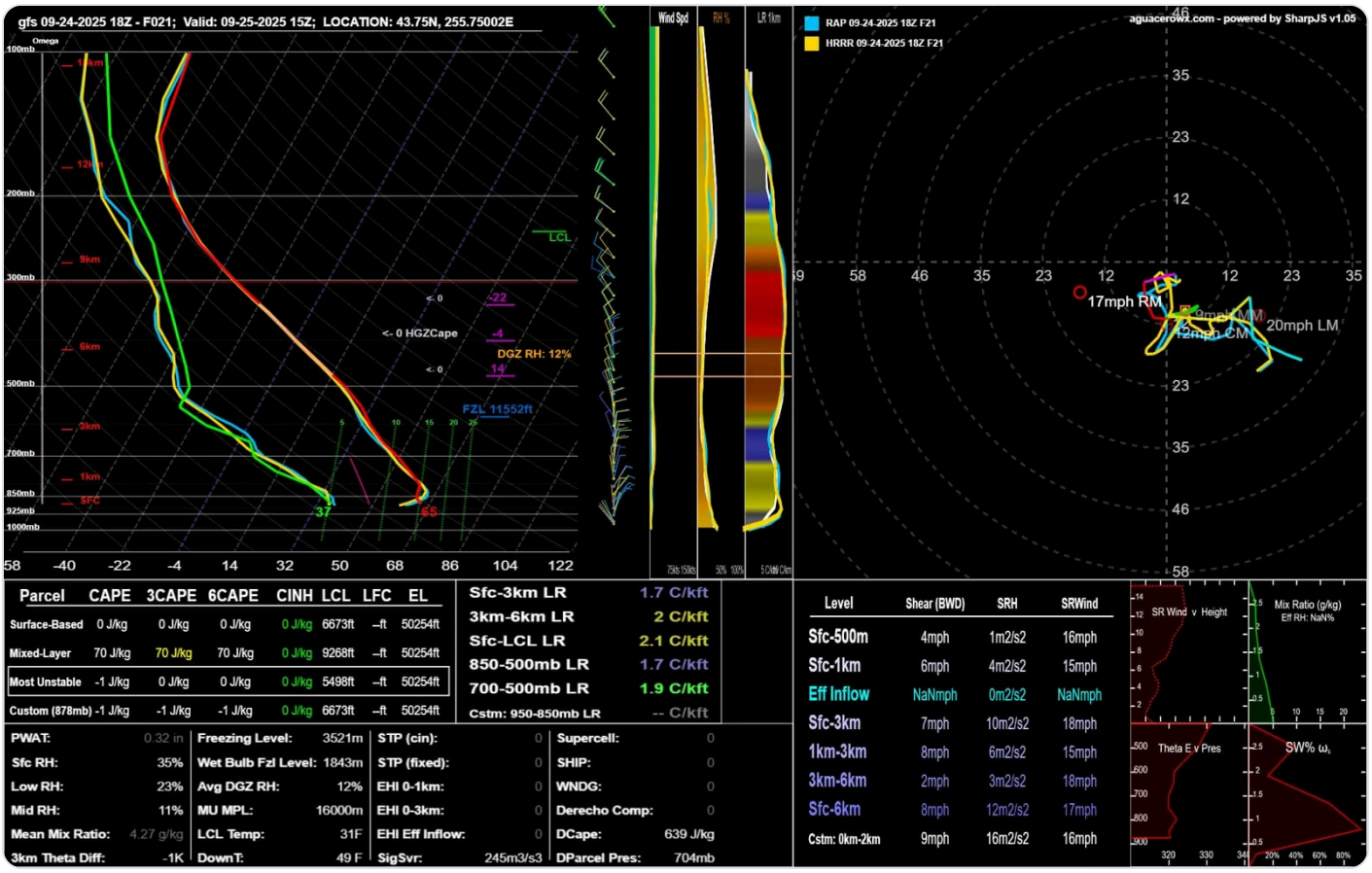
1. Open a model, RAOB or ACARS sounding.
2. Under **Model Comparison**, click **Add Comparison Model** and pick a model. Only models that cover the point are listed. Its latest run loads and its temperature and dew point lines appear in a new color.
3. To compare runs, add the same model again. Each time it takes the next older run not already shown.
4. Click a comparison's name (**Click to change run**) to pick a specific run.
5. Click its color swatch (**Change color**) for another color, the eye (**Hide** / **Show**) to hide it, or **×** (**Remove**) to remove it.

SETTINGS

Add Comparison Model	Adds a model at the same point and valid times as the main sounding. Hours the other run doesn't have are skipped. Hurricane models aren't listed.
Change color	New overlays cycle through sky blue, gold, pink, purple and orange.
Click to change run	Starts in automatic mode (the newest unused run). Pick a run to fix it.
Hide / Show	Hides the overlay on the Skew-T, hodograph and legend without removing it.
Remove	Removes the overlay.

TIPS

- To overlay your own files instead, use **Upload Comparison Soundings** under **Load Custom Sounding**. Pick several files at once; **Clear All Comparison Soundings** removes them.
- Overlays hide the parcel and wet-bulb lines. Remove or hide them to see the parcel again.



GFS and RAP soundings overlaid on one Skew-T.

Model Comparison needs Professional or Creator. On other plans the button reads **Compare Model (Pro)** and opens the upgrade dialog. It is hidden in archive mode and for NEXRAD VWP.

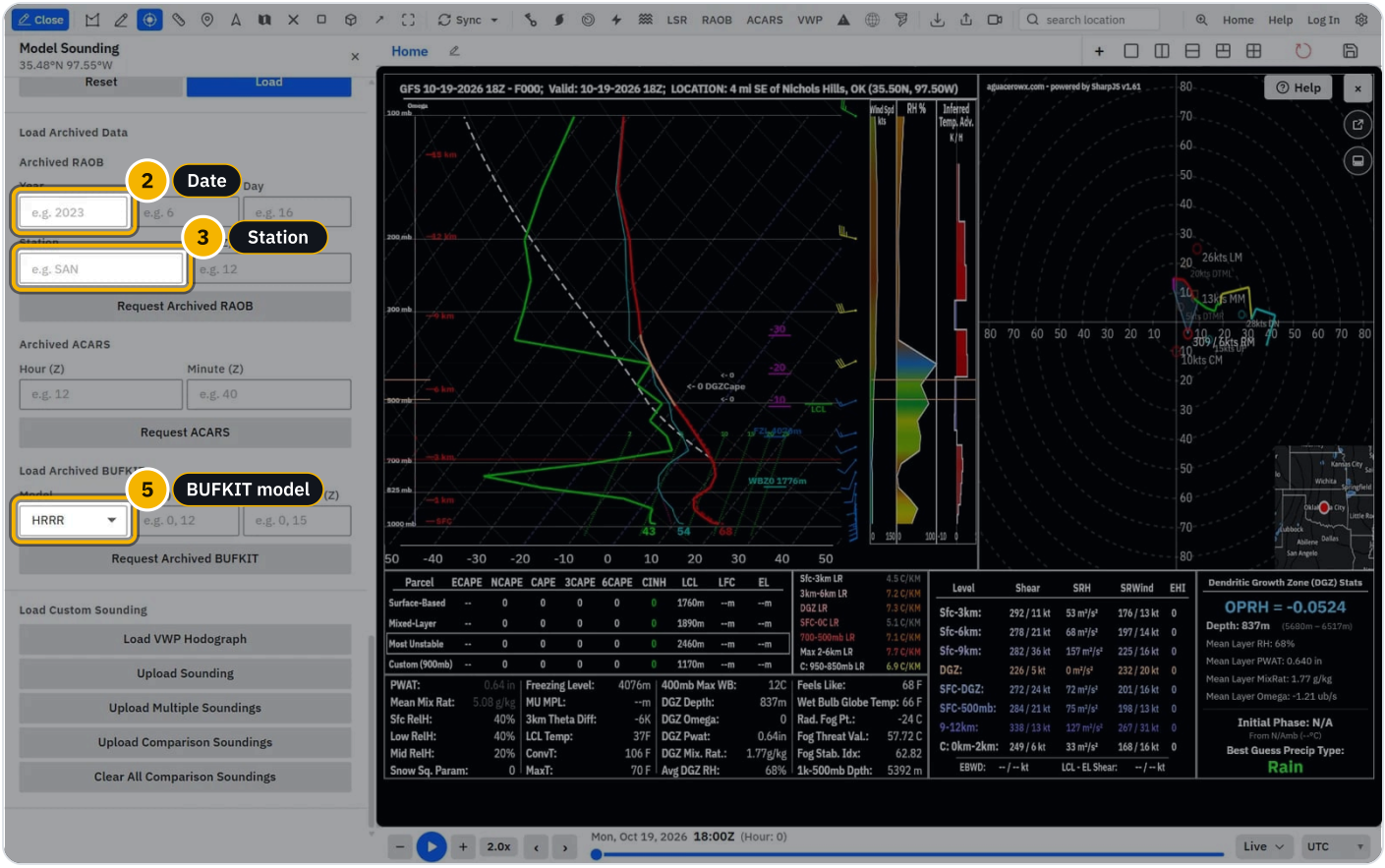
16 Load archived RAOB, ACARS and BUFKIT soundings

Pull a past balloon launch, aircraft profile or BUFKIT model sounding for any date, for case studies and event reviews.

1. Open any sounding and scroll the controls to **Load Archived Data**.
2. Under **Archived RAOB**, type the **Year**, **Month** and **Day**.
3. Type the launch site in **Station** and the launch time in **Hour (Z)**, then click **Request Archived RAOB**.
4. For an aircraft profile, keep the date and type the airport code in **Station**, set **Hour (Z)** and **Minute (Z)** under **Archived ACARS**, and click **Request ACARS**.

5. To browse many aircraft profiles, set **Hour (Z)** under **Archived ACARS** to the end of the window and click **Load 6-hour ACARS window**. It loads every aircraft profile from the six hours up to that hour. Pick an airport in **Station filter**, then drag the slider to step through the profiles.

6. For a model, keep the date and pick **Model**, **Run (Z)** and **Forecast Hour (Z)** under **Load Archived BUFKIT**, then click **Request Archived BUFKIT**.



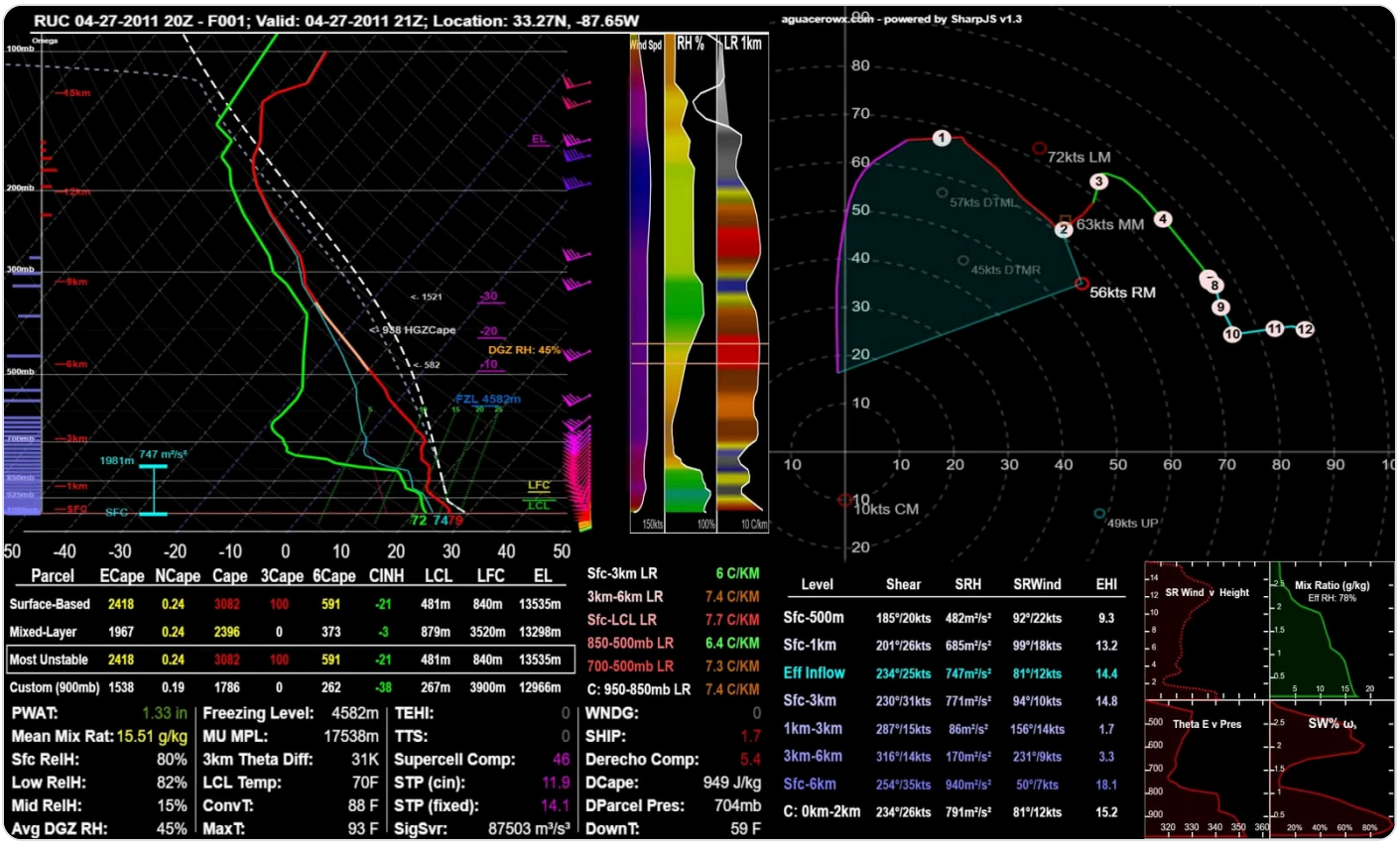
The Load Archived Data fields for RAOB, ACARS and BUFKIT.

SETTINGS	
Year / Month / Day	The UTC date, shared by all three requests.
Station	The RAOB site, ACARS airport or BUFKIT site. For BUFKIT, leave it blank to use the BUFKIT site nearest your sounding point.
Hour (Z)	The RAOB launch hour, for example 0 or 12.
Minute (Z)	With **Hour (Z)** under **Archived ACARS**, the time of the aircraft profile to the minute.

Model	The BUFKIT model: **HRRR** (default), **RAP**, **RUC**, **NAM**, **GFS** or **NAM3km**.
Run (Z) / Forecast Hour (Z)	The model run and the forecast hour inside it. A blank forecast hour loads hour 0.

TIPS

- A status line under the button shows **Searching archives...** and any error. If no BUFKIT file exists for those times, a **No BUFKIT Available** dialog opens.
- With a NEXRAD archive window loaded, right-click the map and click **Model**: the sounding opens with the window's date and hour and the nearest BUFKIT site filled in, and requests the BUFKIT sounding on its own. In archive mode the controls show **Load Archived BUFKIT** in place of **Load Archived Data**, and hide **Location Search**, **Model Comparison** and **Load Custom Sounding**.
- Archived RAOB and BUFKIT data come from the Iowa Environmental Mesonet archive.



A RUC sounding from April 27, 2011, loaded from the archive.

17 Export images, animations and data, or load your own

Copy or save the sounding as an image, animate it through the run, download the profile for SharpPY or CM1, or open sounding files.

1. Under **Export Sounding Format**, pick the data format.
2. Right-click the sounding (press and hold on a touch screen).
3. Click **Copy Sounding Image**, **Download Sounding Image**, **Download Sounding Data** or **Create MP4/GIF Animation**.

RIGHT-CLICK MENU	
Copy Sounding Image	Copies the whole sounding, tables included, to the clipboard.
Create MP4/GIF Animation	Opens the animation dialog. Pick the time range and frame step; the app steps the slider and captures each frame of the sounding.
Download Sounding Image	Saves a 4000 × 2400 PNG named after the model, run and time.
Download Sounding Data	Saves the profile as text in the **Export Sounding Format**. The desktop app asks where to save it.

EXPORT SOUNDING FORMAT	
SharpPY (Default)	SharpPY text with pressure, height, temperature, dew point, wind direction and speed. Saved as Aguacero_Sounding_<title>.txt. Downloads use this format until you change the menu.
SharpJS (Omega Added)	The same file with an omega column.
CM1	A CM1 model input_sounding.txt: heights above ground, potential temperature, mixing ratio and u/v wind in m/s.

LOAD CUSTOM SOUNDING	
Upload Sounding	Opens one file in the viewer: SharpPY text (including files saved here), a CM1 input_sounding, or JSON with level, hght, temp, dwpt, wdir and wspd arrays.
Upload Multiple Soundings	Pick several files to draw their average as one sounding, titled **AVERAGE OF N SOUNDINGS**.
Upload Comparison Soundings	Overlays one or more files on the current sounding, each in its own color with its title in the legend.
Clear All Comparison Soundings	Removes the uploaded overlays.
Load VWP Hodograph	Replaces the winds with the latest VAD wind profile from the radar typed in **Station** under **Archived RAOB** (OKX when blank), keeping the temperature profile.

18 Recipe: compare HRRR and RAP soundings at a target PROFESSIONAL

Overlay the RAP and an older HRRR run on the latest HRRR at a chase target to see how the models and runs differ on moisture, the cap and shear.

1. Load an HRRR bundle and set the time slider to the hour you care about, for example 21z.
2. Right-click your target and click **Model** under **Soundings**. Or type the town under **Location Search** and click **Request Sounding**.
3. Under **Model Comparison**, click **Add Comparison Model** and pick **RAP**. Its lines appear in sky blue.
4. Click **Add Comparison Model** again and pick **HRRR**. The previous HRRR run appears in gold, so you can see the run-to-run trend.
5. Under **Parcel Selection**, click **Mixed-Layer**, and under **Inset Parameters** pick **Severe/MCS**.
6. Look at the hodograph legend and the lines below 700 mb: a deeper moist layer or a weaker inversion in one model shows at once.
7. Click the eye on one overlay to hide it, or click its name to pick a different run.
8. Step through the afternoon with the time slider. All three soundings follow.
9. Right-click the sounding and click **Create MP4/GIF Animation** to share the loop.

TIPS

- The parcel table and wind table describe the main HRRR sounding. To read the RAP's numbers, make the RAP the primary model under **Primary Model & Run** and add the HRRR as the overlay.
- For a balloon check, open the nearest **RAOB** and add the HRRR and RAP to it: they load at the station for each launch time.

19 Recipe: a tornado environment check

Set up the sounding the way a storm chaser or warning forecaster reads a tornado environment: effective inflow, deviant motion, ECAPE and how the profile ranks against past tornadoes.

1. Open a model or Meso analysis sounding in the warm sector.
2. Under **Presets**, set **Wind/Lapse** to **Tornado**, **Inset Parameters** to **Tornado** and **Side Panel View** to **Tornado Climatology (CONUS only)**.
3. Set **Tornado Filter** to **Significant (EF2+)** to rank the sounding against significant tornado cases near the point.
4. Under **Parcel Selection**, click **Mixed-Layer**, and compare its ECAPE with the CAPE column.
5. Under **Storm Motion**, try **Right** and then **Nixon Dev. Right**. Watch the Sfc-500m and Eff Inflow SRH in the wind table and the ECAPE change.
6. Under **Sounding Design**, set **Hodograph Height Numbers** to **On** and **Hodograph Scale** to **Dynamic**, and set **Hodograph Mode** to **Storm-Relative (Fixed)** to see the storm-relative inflow.
7. Hover the Skew-T near the LCL to read the temperature, dew point and parcel temperature with **Read-out**.
8. Click **Draw front** and click the hodograph along a boundary's orientation to see how storm motion compares with it.

TIPS

- Dock the sounding and turn on **Follow mouse** to sweep across the warm front and watch the low-level hodograph grow.
- For hail, switch **Inset Parameters** to **Hail Heights (kft)** and read the −10 to −30 °C heights and the HGZCape label.

20 Common questions

Answers to the sounding questions we hear most.

Why does it say Skew-T not available, or that the location is outside the bounds of the model?

Some models have no sounding data; switch the panel to a model that does. The point must also be inside the model's area: a regional model like the HRRR has no soundings over Europe. Under **Primary Model & Run**, the model list only shows models with soundings.

Why is Model missing from the right-click menu?

It is hidden while the Archive Builder has a model archive loaded, and it may be turned off in Settings under **Context menu**. **ACARS** and **NEXRAD VWP** also drop out of the menu for archive windows they don't cover.

Why does the comparison button say Compare Model (Pro)?

Model Comparison needs Professional or Creator. Clicking the button opens the upgrade dialog. **Upload Comparison Soundings** under **Load Custom Sounding** overlays your own files.

Why did the parcel line disappear when I added a comparison?

With overlays on, the Skew-T hides the parcel, ECAPE parcel, wet-bulb and virtual temperature lines so the model lines stay readable. Hide or remove the overlays to bring them back. The tables still describe the main sounding.

Why did the cursor read-out stop working?

Turning on **Modify sounding** turns **Read-out** off, and that choice is saved. Turn **Read-out** back on under **Cursor Options**. A click on the Skew-T also freezes the read-out; click again to let it follow the cursor.

Why did my parcel, storm motion and presets change?

A sounding at a new point, or from another model or run, starts fresh: **Most-Unstable**, **Right**, standard custom layers and presets picked to fit the profile. Stepping through time keeps all your choices.

Why is Tornado Climatology greyed out, or why does it say Insufficient Cases?

The climatology covers the contiguous US only, so the choice is greyed out elsewhere. Near the edge of the data or in quiet areas there may be fewer than 5 past cases, which is too few to rank. Try **All Tornadoes (EF0+)** under **Tornado Filter** for more cases.

Why does ECAPE show --?

ECAPE needs a parcel with an equilibrium level below the top of the profile. A parcel with no CAPE, or one that rises to the top of a shallow profile, has no ECAPE.

Why are Docked, Floating and Follow mouse missing?

Window mode is on desktop only. **Static** and **Follow Mouse** show only while the map is in view (docked or floating), and only for single-point model and Meso analysis soundings.

Why does a RAOB station say Sounding unavailable?

Some stations list no recent launches, or the launch isn't posted yet. The sounding shows the launch nearest the time slider, within 12 hours; move the slider to a launch time or pick another station.

Why does Meso analysis say no hours are downloaded yet, or not work in archive mode?

Meso analysis soundings use the latest SPC Mesoscale Analysis hours, and the message shows when none are available yet. They aren't available in archive mode; use **Load Archived BUFKIT** for past events.

Why are some parameters in °F or inches with Metric units?

Units changes the chart, read-outs, heights, wind and lapse rates. A few inset parameters, such as **LCL Temp**, **ConvT**, **MaxT**, **DownT** and PWAT, always use °F and inches.

Which format does Download Sounding Data save?

The one set under **Export Sounding Format**, which starts on **SharpPY (Default)**. Pick **SharpJS (Omega Added)** for an omega column or **CM1** for a CM1 input_sounding file.

Why don’t my hodograph and unit settings stick after a reload?

Hodograph, skew, read-out and unit choices save to your account, so sign in. **Vertical Bars**, **Storm Motions**, **Hodograph Mode** and the export format last until you reload.

Why are the sounding controls missing?

On a narrow phone screen the sounding opens full screen without its controls. On desktop, a docked or floating sounding puts its controls in a panel beside the sidebar; click **Hide these controls** to fold it. Recon dropsondes open in a simplified viewer with no sounding controls.