AGUACEROWX USER GUIDE

Soundings, cross sections and charts

Soundings, cross sections, meteograms and time-height plots give you a vertical look at the atmosphere, or follow one point through a model run. Most of them start from a right-click on the map or a toolbar button, and they all open in the same chart window.

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BEFORE YOU START

- Right-click the map for soundings and point charts. The right side of the menu has a **Soundings** group (**Model**, **Meso analysis**, **RAOB**, **ACARS**, **NEXRAD VWP**) and a **Meteograms** group (**Model**, **NDFD** and, on ensembles, **Ensemble**). The left side has a **Time-height** group (**Model**, **NEXRAD VWP**). On a touch screen, press and hold the map.
- The toolbar has **Cross section**, **Box sounding**, **RAOB** and **ACARS** buttons.
- Model soundings, cross sections, meteograms and time-height plots use the model on the active map, so load a model bundle first.
- Each chart has its own controls, which open in the sidebar area next to the chart.

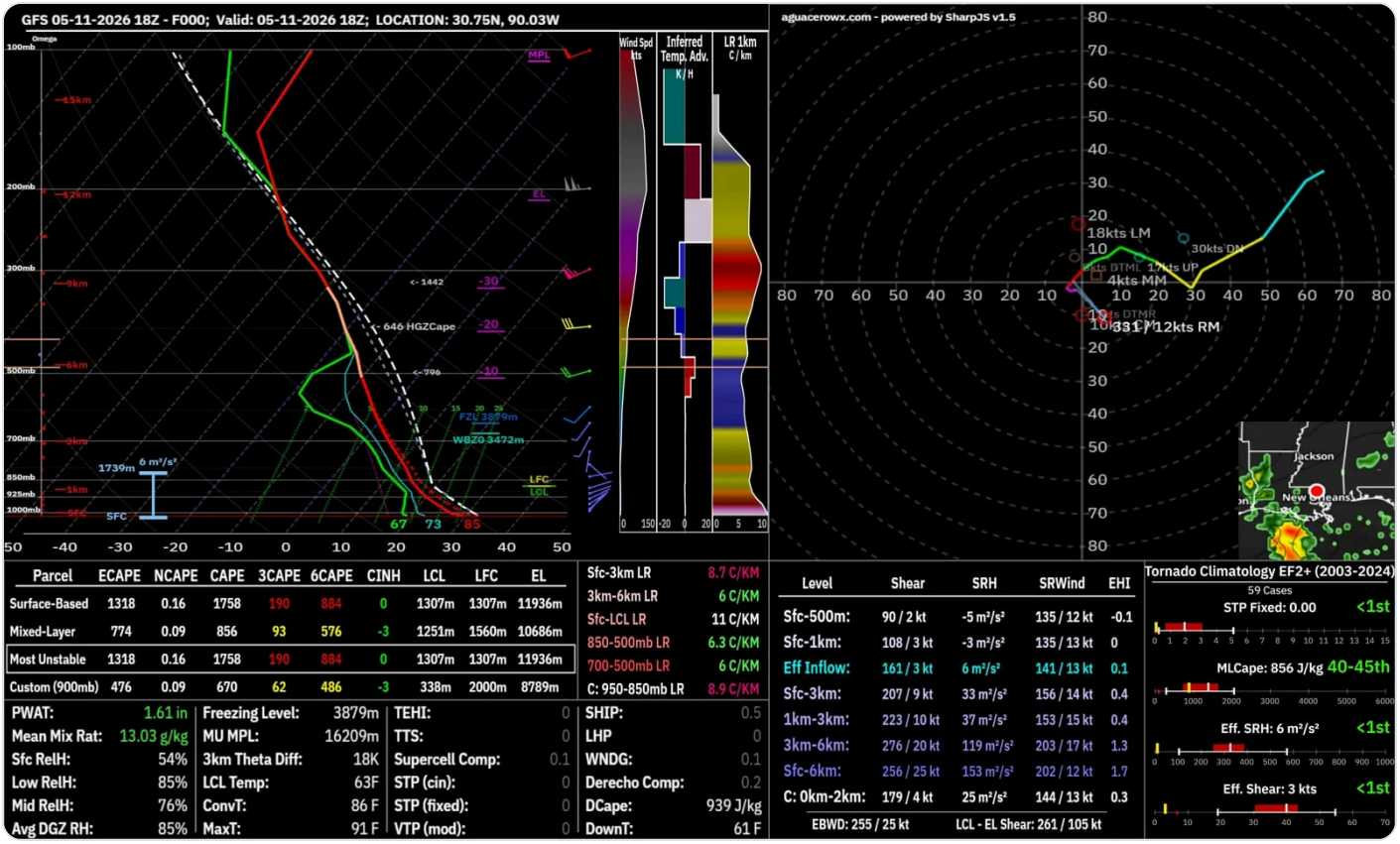
01 Open a model sounding

Right-click anywhere on a model map for a Skew-T with a hodograph, parcels, ECAPE and severe and winter parameters.

1. Load a model bundle on the map.
2. Right-click the map where you want the sounding.
3. Under **Soundings**, click **Model**.
4. In the controls, use **Parcel Selection** to switch between **Surface-Based**, **Mixed-Layer**, **Most-Unstable** and **Custom-Pressure** parcels.
5. Use **Storm Motion** and **Presets** to change the storm motion, the inset parameters and the side panel view.
6. Step through forecast hours with the time slider. The sounding follows it.

TIPS

- Click **Meso analysis** instead of **Model** for a sounding from the SPC Mesoscale Analysis.
- Type a city, zip code, station or coordinates under **Location Search** and click **Request Sounding** to move the sounding without the map.
- Right-click the sounding to copy or download the image, or click **Download Sounding Data** for the data.



A model Skew-T with its hodograph, thermodynamic parameters and severe indices.

You can choose which items the right-click menu shows, and in what order, in Settings under **Context menu**.

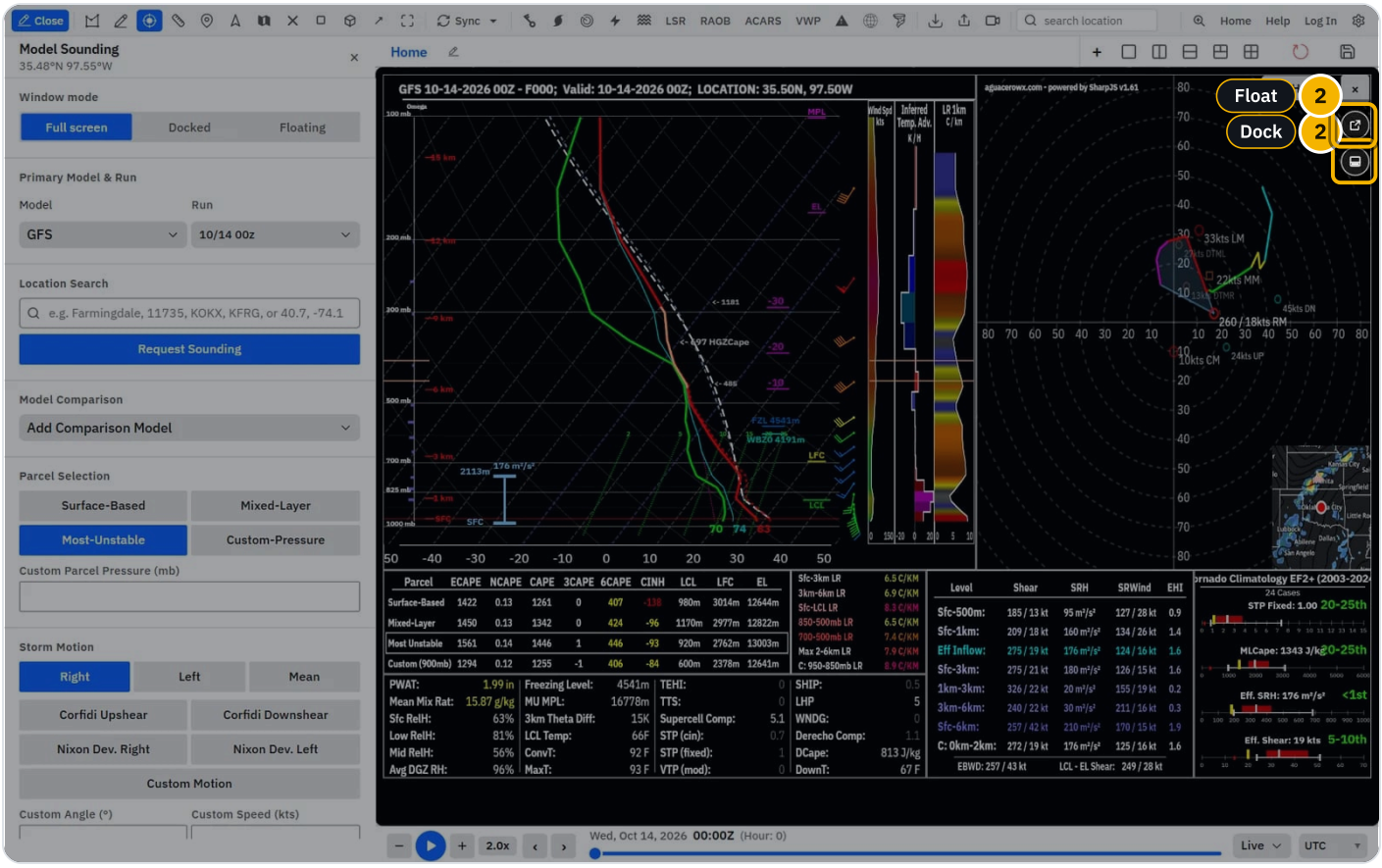
02 Dock, float and resize charts

Soundings, meteograms, cross sections and VWP plots can cover the board, dock under the map or float in a window you move and resize.

1. Open a sounding, meteogram, cross section image or time-height plot.
2. Click the dock button on the chart (**Dock under the map**) to put it below the map, or the pop-out button to float it over the map.
3. Drag a floating window by its title bar, and drag its edges to resize it.
4. Drag the top edge of a docked chart to change its height.
5. Double-click the title bar to go back to full screen.

TIPS

- **Window mode** in the chart controls has the same three choices: **Full screen**, **Docked** and **Floating**.
- The app remembers the last mode you used for each kind of chart.



A full-screen sounding with its dock and pop-out buttons.

Docked and floating windows are on desktop only.

03 Draw a model cross section

Draw a line on the map for a vertical slice through the model. It stands on the map as a curtain you can drag, with presets, overlays and model-minus-model comparison.

1. Load a model bundle on the active map.
2. Click **Cross section** on the toolbar.
3. Drag a line across the map from A to B.

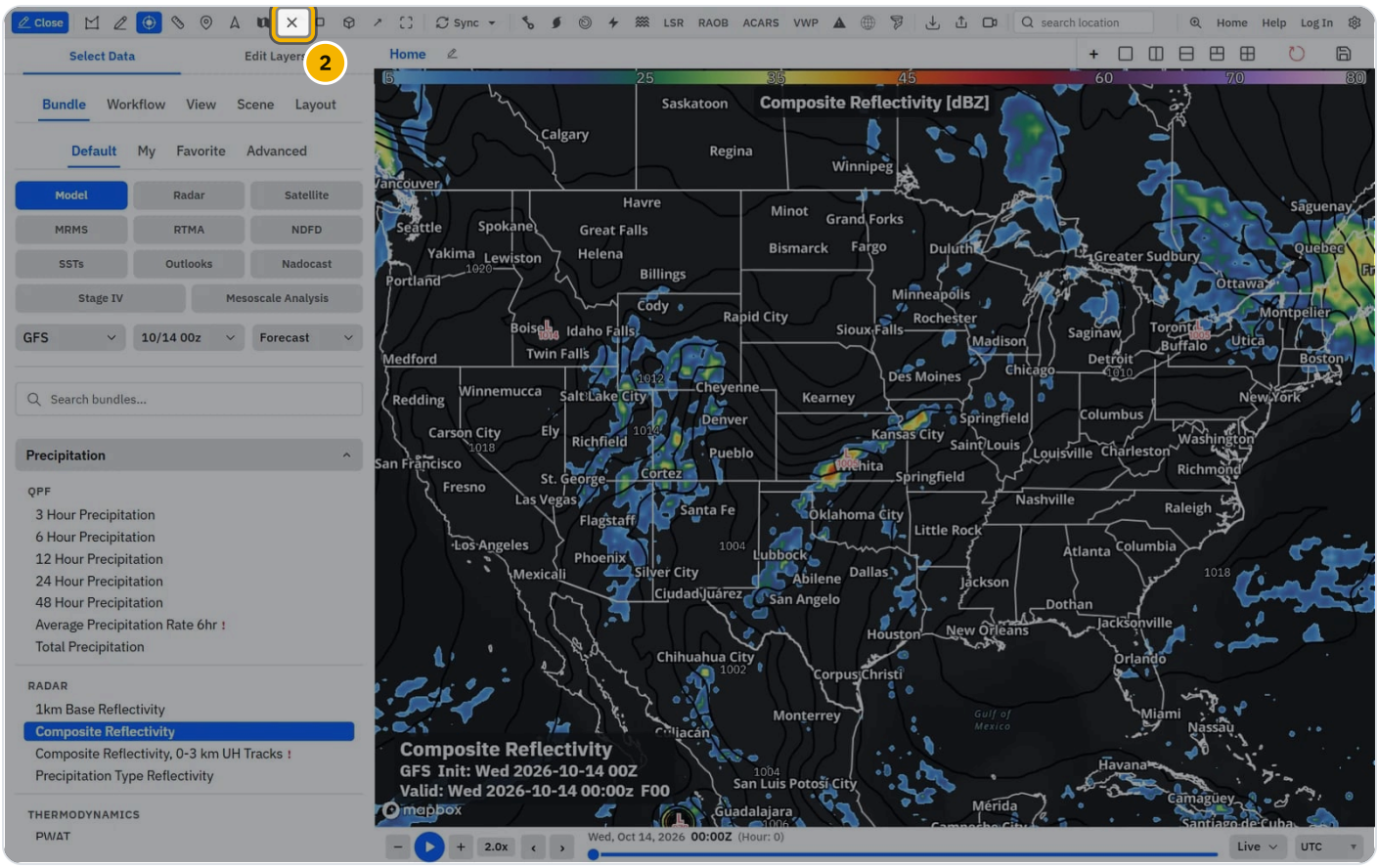
4. Drag the line or its A and B ends to move the cross section.
5. In the controls, pick a **Style** preset, or choose your own **Shading** and **Contours & wind**.
6. Under **Model Comparison (A - B)**, pick a second model to plot the difference.
7. Under **Show as**, click **Image** for a flat chart instead of the curtain.

SHORTCUTS

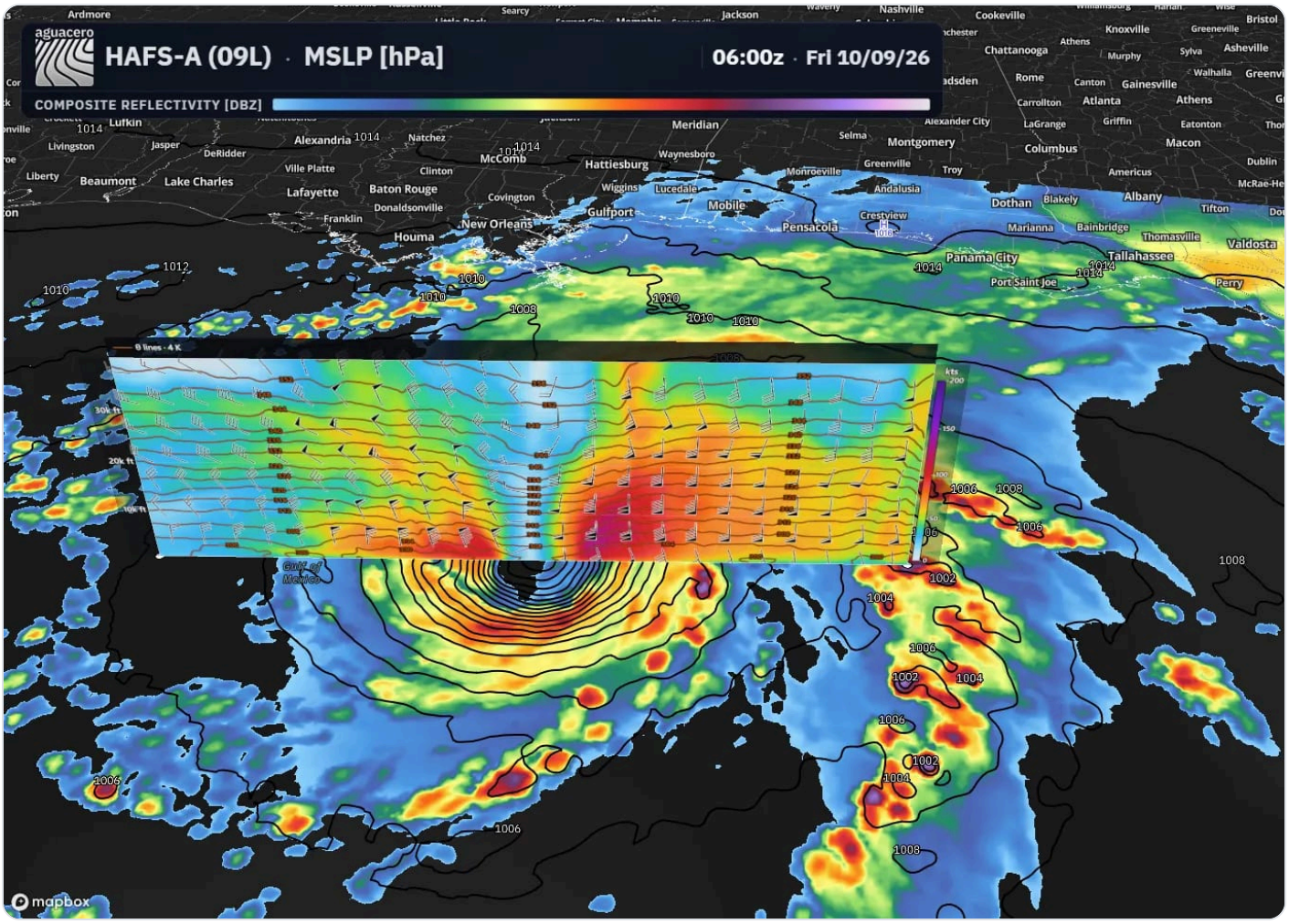
`Ctrl` + drag	Draw a cross section without the toolbar button

TIPS

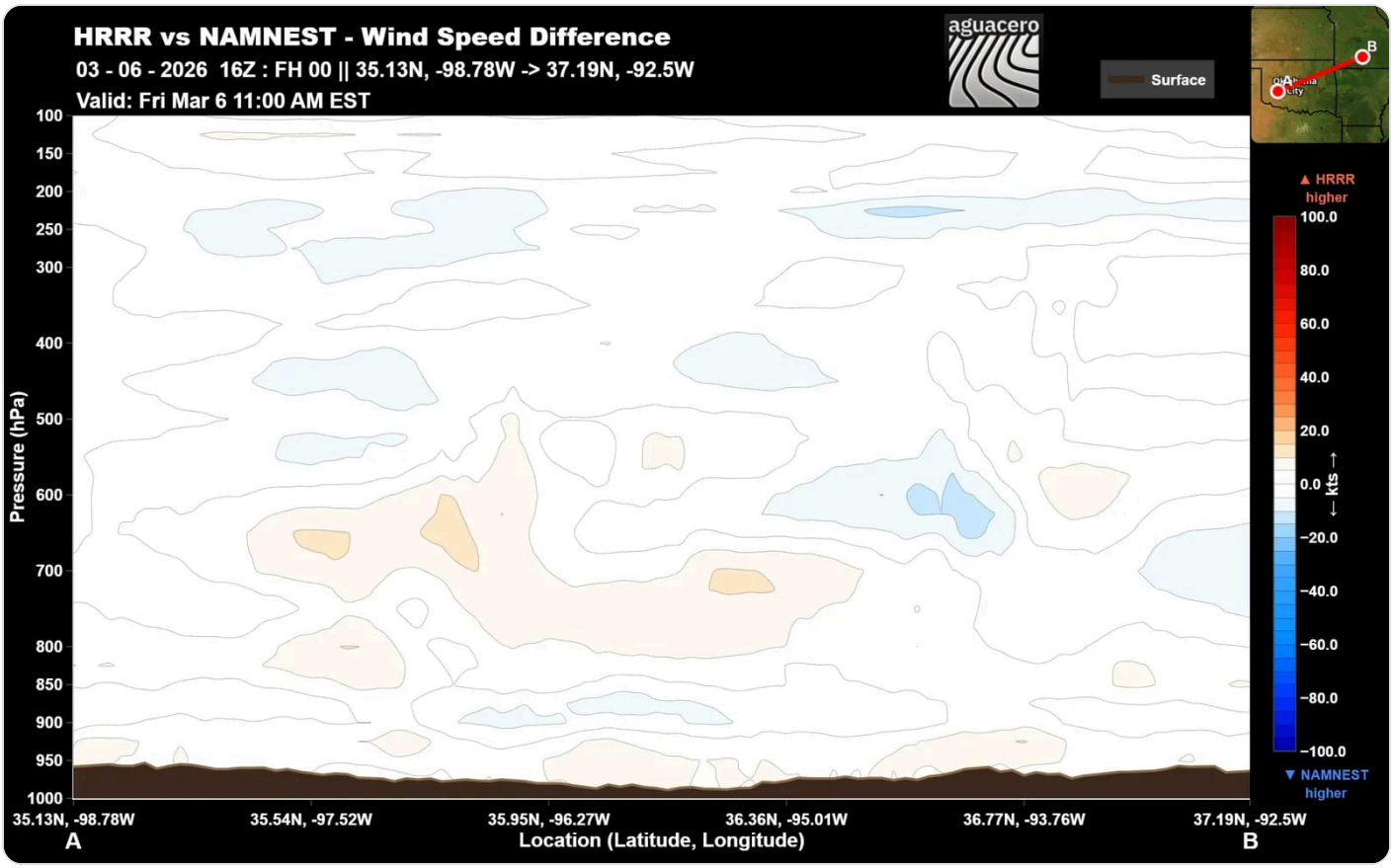
- **Plot Options** switches the vertical axis between height and pressure and sets the vertical exaggeration of the curtain.
- Save your own fills and overlays under **Style** with **Save current**.



The Cross section button on the toolbar.



A HAFS-A cross section standing on the map through a tropical cyclone.



A wind speed difference between two models.

Model cross sections are on every plan. With a NEXRAD layer on the board, the same tool draws a radar cross section, which needs Professional. Compare and Trend views show the cross section as an image.

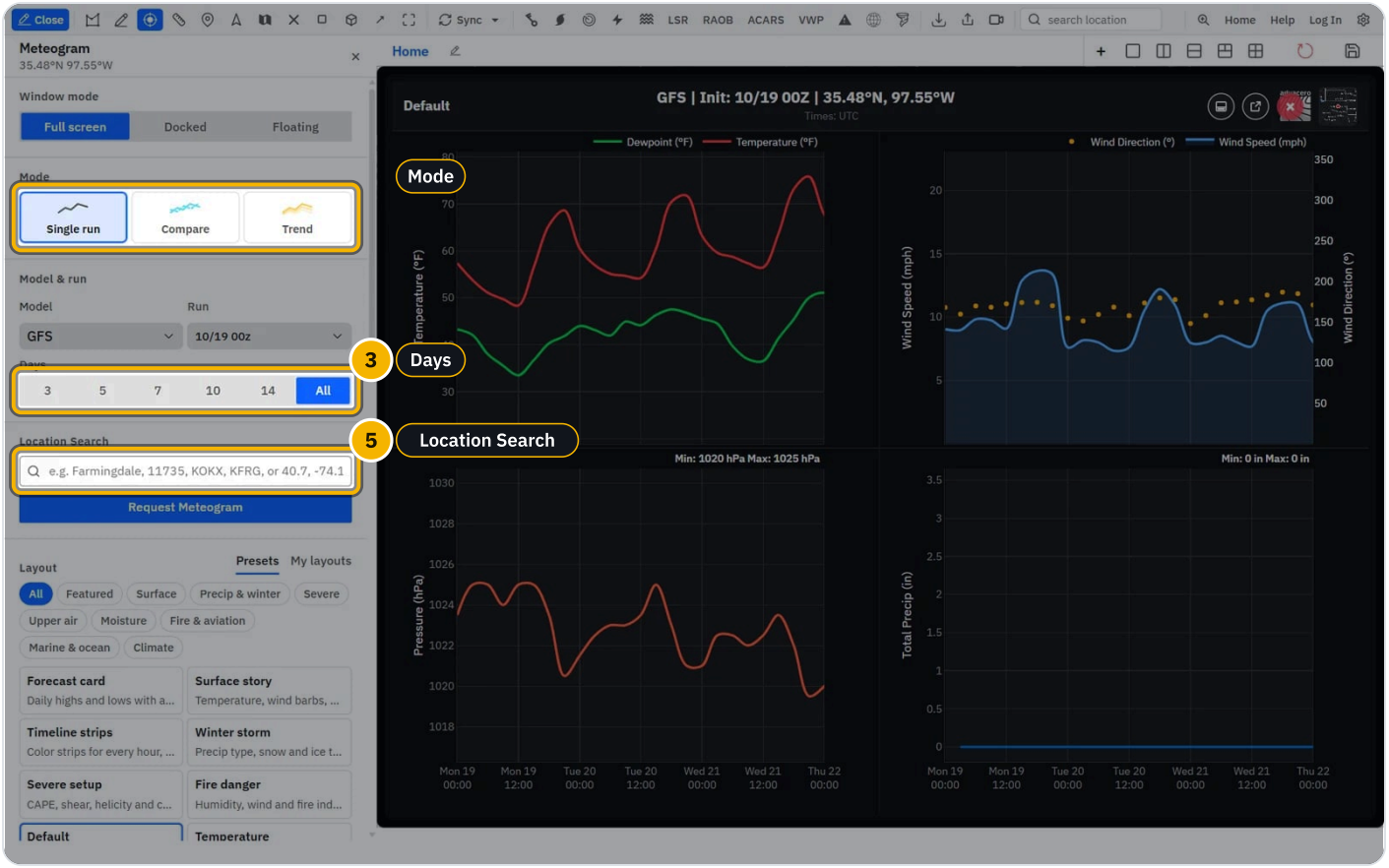
04 Open a meteogram

Right-click the map for a forecast at one point through the model run, drawn in the layout you pick.

1. Load a model bundle on the map.
2. Right-click the map where you want the forecast. Under **Meteograms**, click **Model** for the model on the map, or **NDFD** for the National Weather Service forecast grids whatever the map shows.
3. Under **Days**, pick how much of the run to show: **3**, **5**, **7**, **10**, **14** or **All**.
4. To change the model or run, use **Model** and **Run** under **Model & run**.
5. To move the meteogram, right-click somewhere else, or type a place, zip code, airport or coordinates under **Location Search** and click **Request Meteogram**.

TIPS

- Hover a plot to read every line at that time. Click to pin the readout, and click again to let it go.
- Scroll over a plot to zoom in time, or over its left axis to zoom its values. Drag to pan, and click ↺ **Reset** to zoom back out.
- Right-click the chart for **Copy Meteogram Image** and **Download Meteogram Image**.
- Times follow the time zone menu on the time bar. The chart header says which one it uses.
- For a set range, pick a **First day shown** and **Last day shown** under **Dates**, and click **Clear dates** to go back to **Days**. Turn on **Hide partial days** under **Display** to leave out a first or last day the run covers only in part.
- The hourly NDFD issuances reach about 3 days ahead. Pick the 00Z issuance under **Run** for 7 days.



A meteogram with its controls: mode, days and location search.

On a phone the meteogram opens full screen, with **Model**, **Run**, **Layout**, **Observations** and **Normals** in the strip at the bottom.

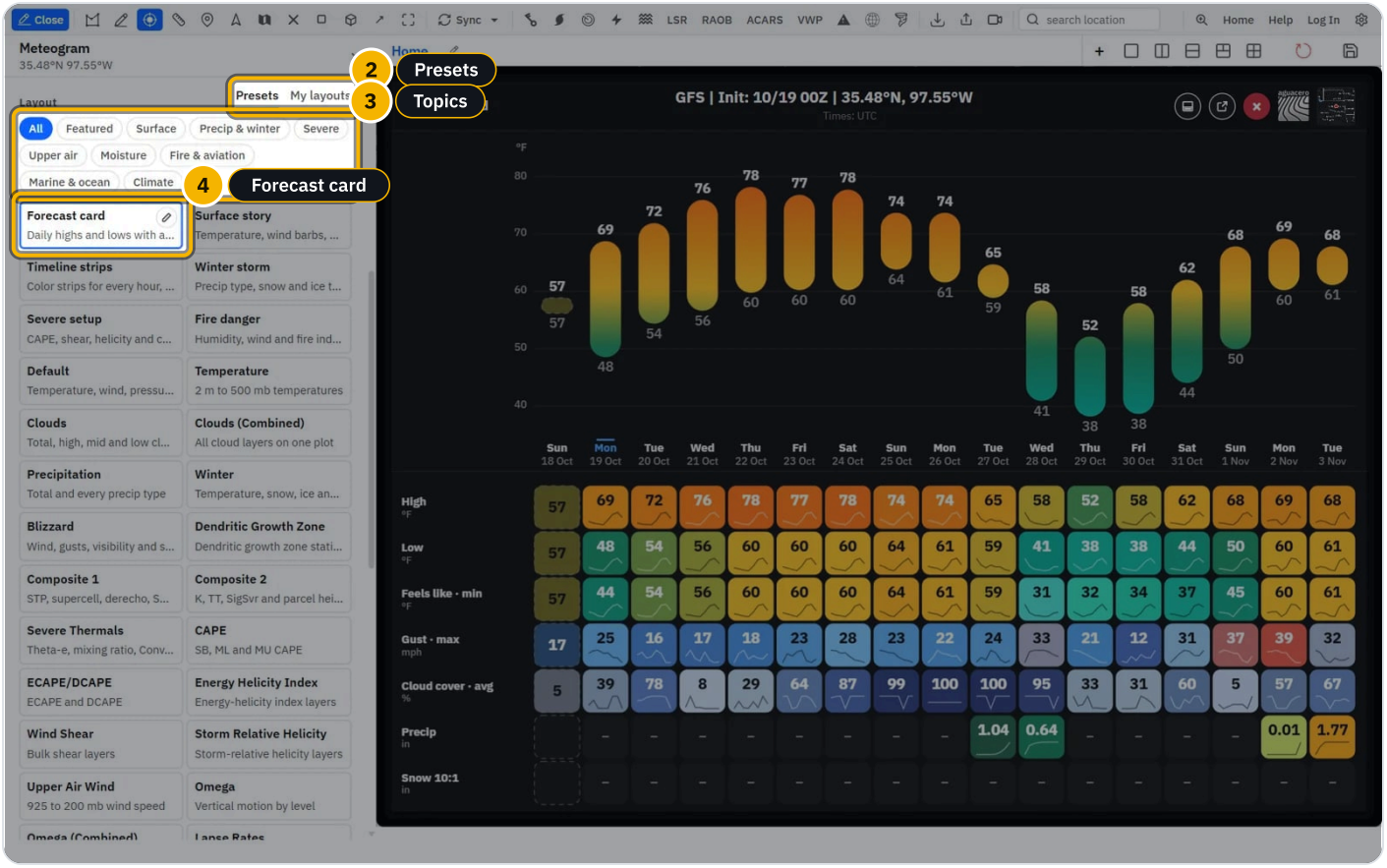
05 Pick a meteogram layout

Layouts set which plots the meteogram draws: a forecast card, color strips, winter and severe setups, and dozens of field sets.

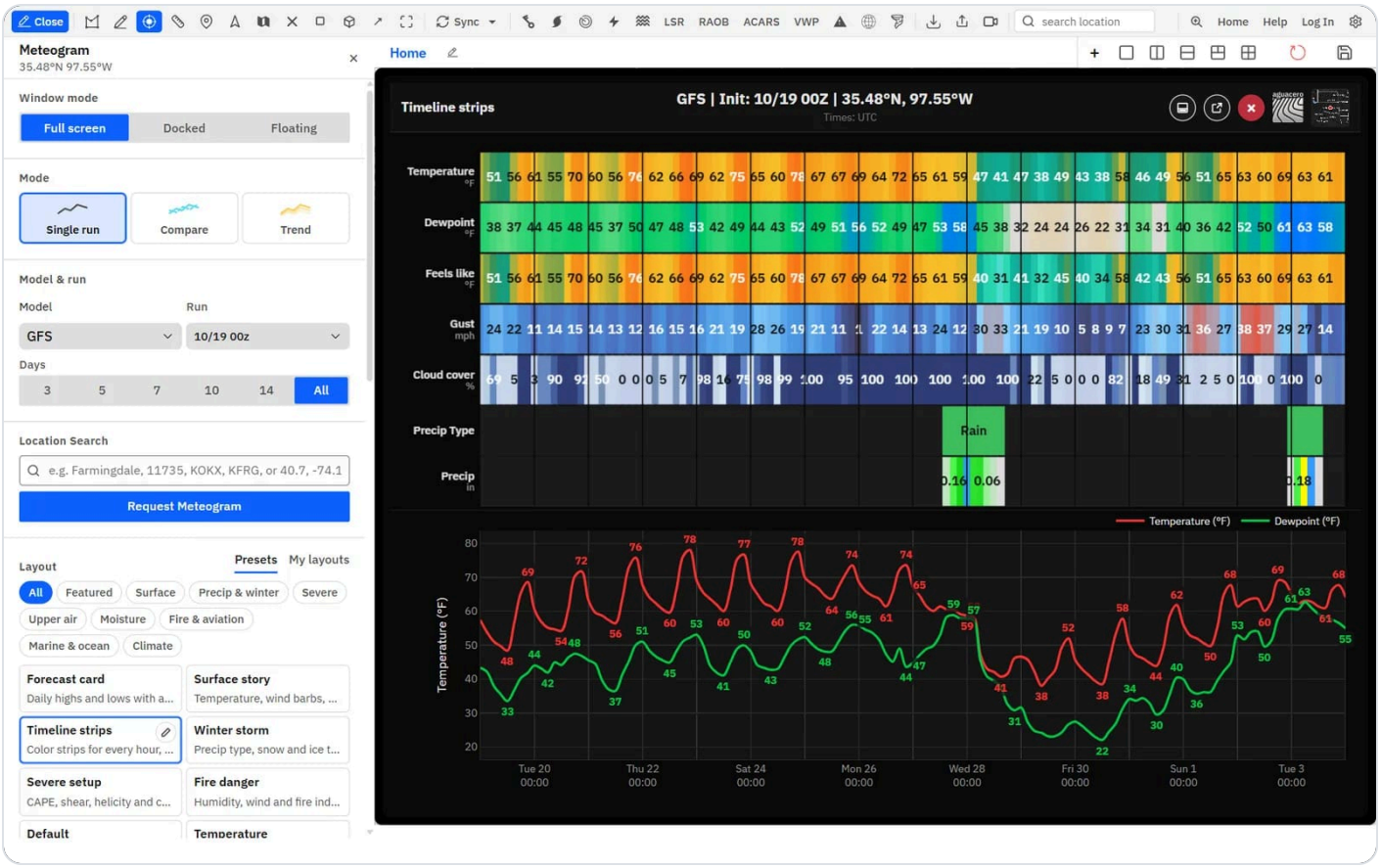
1. Open a meteogram.
2. Under **Layout**, stay on **Presets**.
3. Click a topic, such as **Featured**, **Precip & winter** or **Severe**, or **All** to see every layout.
4. Click a layout. The chart redraws right away.

TIPS

- **Forecast card** shows daily highs and lows over a day-by-day grid. **Timeline strips** draws a color strip for every hour.
- Layouts the model can’t draw are hidden, so air quality, marine and climate models show their own sets.
- Layouts you saved are on the **My layouts** tab.
- The pencil on a layout opens it in the editor, so you can start from it.
- **Aviation forecast** draws ceilings, visibility, flight-rule strips and wind, plus low-level wind shear and IFR chances on the NBM. **Snowfall** under **Precip & winter** draws snow totals and amounts. On the NBM, **Winter storm** and **Snowfall** add its own snowfall, ice, snow ratio and precip type chances.



The layout picker with its topics, showing Forecast card.



Timeline strips for Oklahoma City: an hourly color strip for each field over the temperature and dew point.

06 Compare models and runs on a meteogram PROFESSIONAL

Compare draws other models over the first one. Trend draws earlier runs of the same model, so you can see how the forecast changed.

1. Open a meteogram with a line layout, such as **Default**.
2. Under **Mode**, click **Compare**.
3. Pick a model in **Add model to compare**. Turn on **Same run time as primary** to use the same run hour.
4. Click a model's swatch to change its color, its name to change its run, the eye to hide it, or × to remove it.
5. For runs instead of models, click **Trend** and pick 1 to 6 **Earlier runs**.
6. Under **Display Mode**, pick **Lines**, **Plume** or **Box**.
7. Click **Single run** to go back.

TIPS

- Picking a model that’s already in the list adds its previous run.
- Compared runs draw on line plots only, so layouts without one, such as **Forecast card**, are hidden while you compare.
- A new point, model or run clears the compared models.

Compare and **Trend** need Professional. On other plans they show a lock.

07 Verify runs against observations PROFESSIONAL

Verify draws earlier runs of the meteogram’s model over the last hours of observations and scores each run, so you can see which runs did best here.

1. Open a meteogram with a line layout, such as **Default**.
2. Under **Mode**, click **Verify**.
3. Under **Observations**, pick **ASOS** (the nearest station) or **RTMA** (the analysis at the point).
4. Under **Last**, pick how many hours to score, and under **Earlier runs** how many runs to draw.
5. Read the scores: each plot lists every run’s mean absolute error (MAE), and the table under **Verify** adds the bias and the hours scored.

TIPS

- Runs are spread across the hours scored, so an hourly model shows runs about 6 hours apart instead of the last few hours.
- Bias is forecast minus observed: a positive temperature bias means the run was too warm.
- A run is scored only on the hours it covers, so a newer run may have fewer hours.
- ASOS reports reach back 24 hours, RTMA 48.

Verify needs Professional. On other plans it shows a lock.

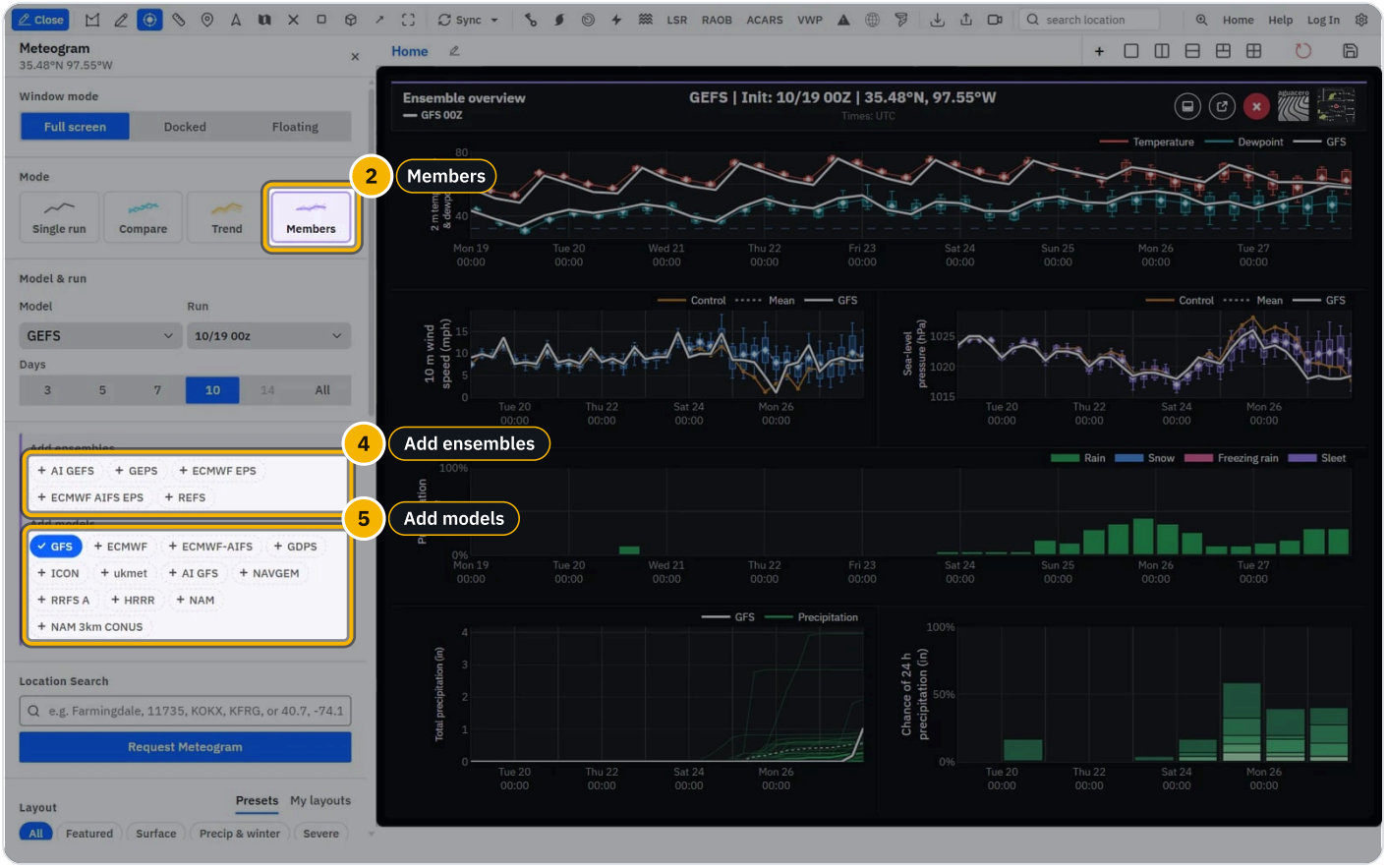
08 Ensemble meteograms

Every member of an ensemble at one point, as box plots, percentile bands, plumes, member heatmaps and chances, with the main run and other models beside it.

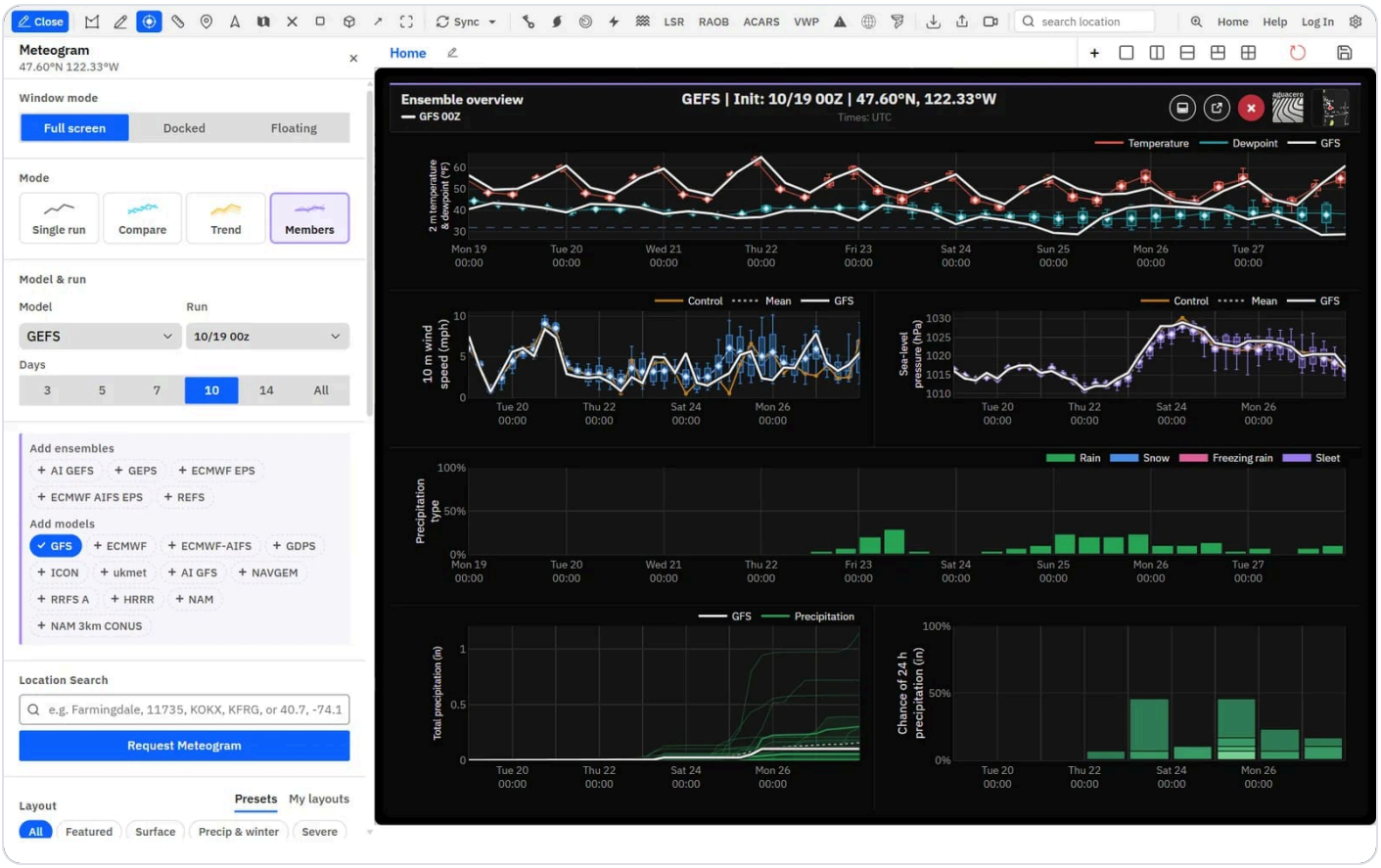
1. Switch the map to GEFS, AI GEFS, GEPS, ECMWF EPS, ECMWF AIFS EPS or REFS.
2. Right-click the map and click **Ensemble** under **Meteograms**. The meteogram opens in **Members** mode.
3. Under **Layout**, pick a layout, such as **Ensemble overview**, **Plumes**, **Member heatmaps** or **Forecast spread**.
4. Under **Add ensembles**, click up to 2 other ensembles to draw beside it.
5. Under **Add models**, click up to 4 models to draw as lines. The ensemble's own run, such as the GFS for the GEFS, is on from the start.
6. Hover a plot for the median, mean, range and member count at that time.

TIPS

- Members mode opens on the first 10 days. Click **All** under **Days** for the whole run.
- **Member heatmaps** draws one row per member in the map's colors, with the main run and the mean on top.
- Box plots span the 25th to 75th percentiles, with whiskers at the 10th and 90th. Where there is one, the control member is a solid line and the mean a dotted one.
- On the NBM, click **Members** under **Mode** for its published percentiles: box & whisker, percentile bands, chances and heatmaps.
- The NBM's Members layouts include **Winter**, **Snowfall** and **Aviation**, with snowfall, ice accretion and snow ratio percentiles.
- A **Model** meteogram on one of these ensembles opens in **Members** mode too. Click **Single run** for the ensemble mean as lines.



A GEFS meteogram in Members mode, with the ensembles and models you can add.



GEFS Ensemble overview for Seattle: member box plots with the GFS, control and mean lines, precipitation type, member totals and 24-hour chances.

GEFS, GEPS, AI GEFS, REFS and the NBM are on the Free plan. ECMWF EPS, ECMWF AIFS EPS and premium models under **Add models** need Enthusiast or higher.

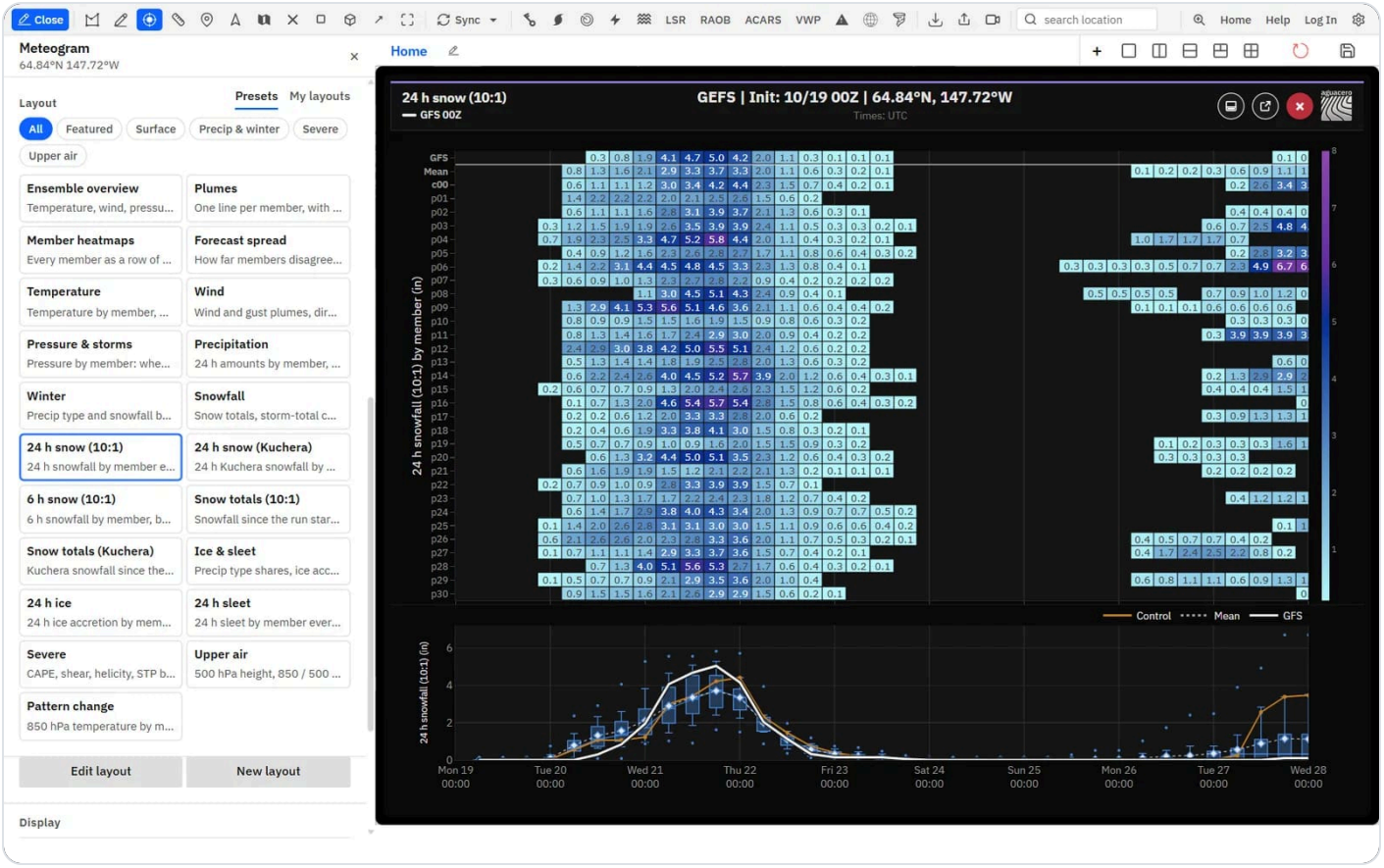
09 Snow and ice by member

A grid of 24-hour or 6-hour snow, ice or sleet for every member, with a box and whisker underneath, to see how many members bring a storm and when.

1. Open an ensemble meteogram at the place you want.
2. Under **Layout**, click **Precip & winter**.
3. Pick **24 h snow (10:1)**, **24 h snow (Kuchera)**, **6 h snow (10:1)**, **Snow totals (10:1)**, **Snow totals (Kuchera)**, **24 h ice** or **24 h sleet**.
4. Read the grid: one row per member, the main run and the mean on top, and the amount printed in each cell.
5. Read the box and whisker below for the spread at each time.

TIPS

- The 24-hour columns end every 6 hours, so each one overlaps the next. On the first day they start at the run time.
- The color bar zooms to the amounts on the chart and keeps the map's colors.
- **Snowfall** compares 10:1 and Kuchera totals and storm-total chances. **Winter** and **Ice & sleet** add precipitation type.
- **Snow ratio** under **Display** switches the snowfall of any layout to **Kuchera** or **10:1**; **Layout** keeps each layout's own. Layouts named for a ratio, such as **24 h snow (Kuchera)**, stay as they are.



GEFS 24-hour snow (10:1) at Fairbanks, Alaska: every member every 6 hours over a box and whisker.

ECMWF EPS has no control member, so its box plots show the mean only. The ice and sleet layouts aren't offered for AI GEFS.

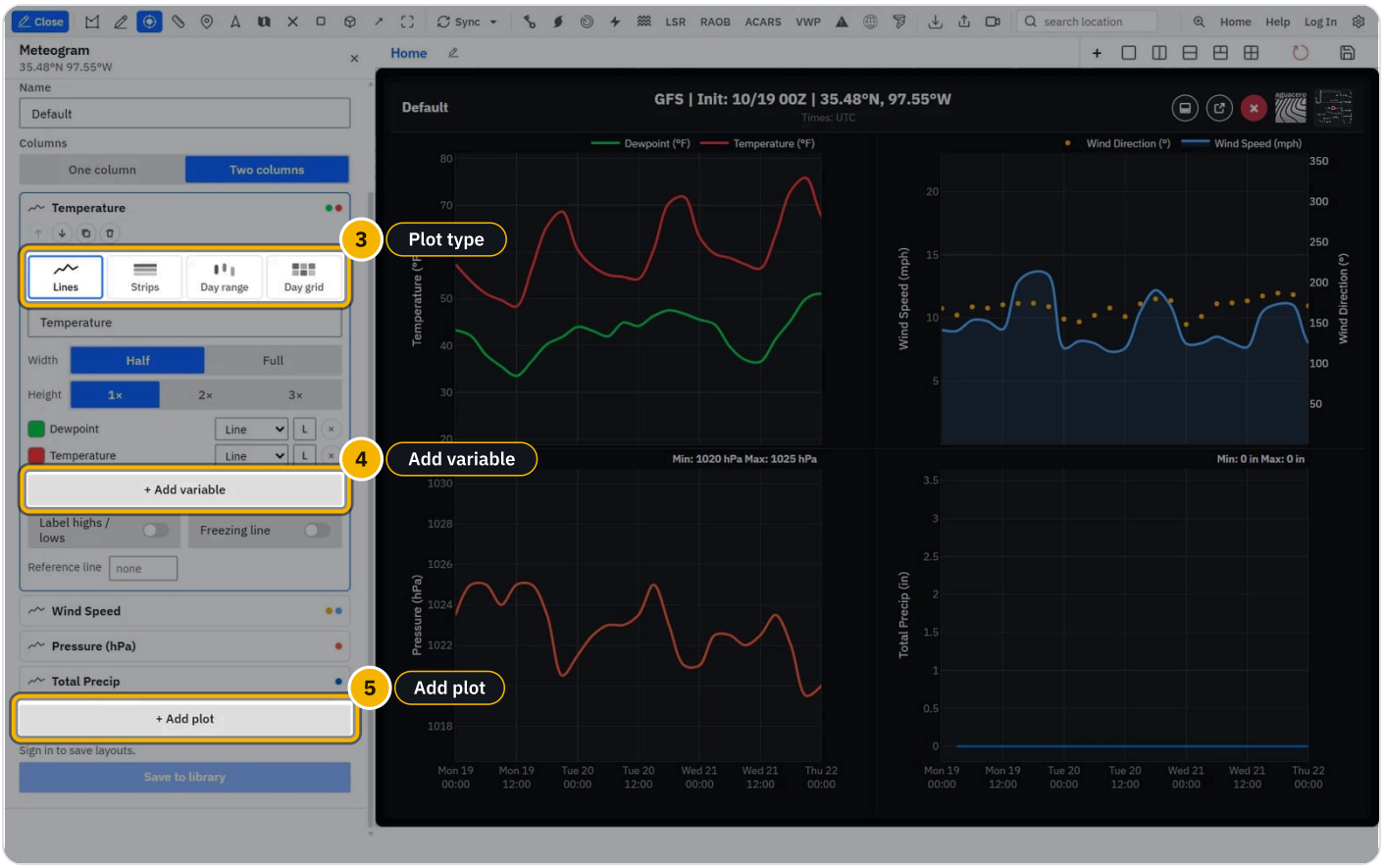
10 Build your own meteogram layout

Pick the plots, variables, colors and axes yourself, and see each change on the chart as you make it.

1. Open a meteogram and click **Edit layout** to start from the current layout, or **New layout** for a new one.
2. Type a **Name**, then click a plot to open it.
3. Pick the plot type: **Lines**, **Strips**, **Day range** or **Day grid**.
4. Click **+ Add variable**, search, and pick a variable. Click its swatch to change the color, and pick a style and the **L** or **R** axis.
5. Click **+ Add plot** for another plot, and set its **Width** and **Height**. With two or more plots, pick **One column** or **Two columns**.
6. Click **‹** when you're done.

TIPS

- **Strips** draw a color band for every hour. **Day range** draws each day's high and low, and **Day grid** prints daily values in a table.
- On a **Day range**, **Bar fill** sets the bar colors. **Gradient** runs the colormap along each bar, **By value** fills each bar with one colormap color for its value, and **Solid** uses the variable's swatch. **Colormap** picks a different colormap for this layout.
- Line plots can label highs and lows, draw a freezing line or a reference line.
- In Members mode, the plot types are **Box & whisker**, **Percentiles**, **Plumes**, **Heatmap** and **Chances**, and **Amounts** sets the window, such as **24 h, every 6 h**.
- Use the arrows to reorder plots, or duplicate and remove them.



The layout editor with the Temperature plot open.

A layout holds up to 12 plots, and a plot up to 8 variables.

11 Save meteogram layouts to your library

Keep a layout you built and open it from the meteogram or the library, like a bundle.

1. In the layout editor, click **Save to library**.
2. Type a **Layout name**, and a **Category** and **Subcategory** if you want to file it.
3. Click **Save layout**. Saved layouts are private: only you can see them.
4. Find it on the **My layouts** tab of the meteogram, or in the sidebar under **Select Data** > **My** > **Meteograms**.
5. Click it in the library to open a meteogram with that layout at your last meteogram point.

TIPS

- To change a saved layout, click its pencil, edit it and click **Save**, or **Save as new** for a copy.
- To delete one, click its **×** on **My layouts**, then click **×** again.
- Appearance isn't saved with a layout. The theme applies to every meteogram.

Saving needs an account. Saved layouts count toward your bundle limit: 10 on Free, 20 on Enthusiast and unlimited on Professional and up.

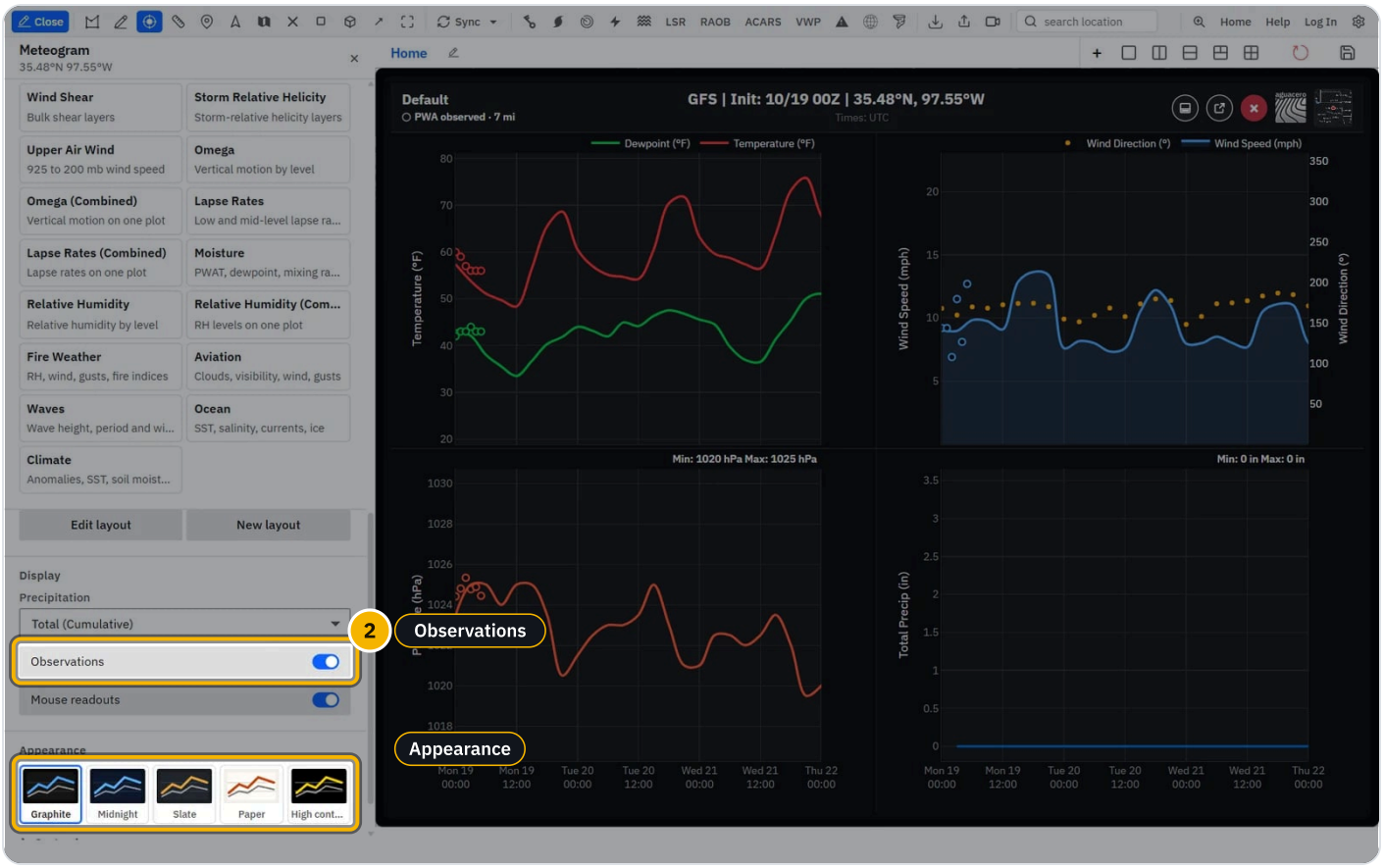
12 Observations on meteograms

Hourly observations drawn as rings over the forecast, so you can see how the run is doing so far: the nearest ASOS station, or the RTMA at the point.

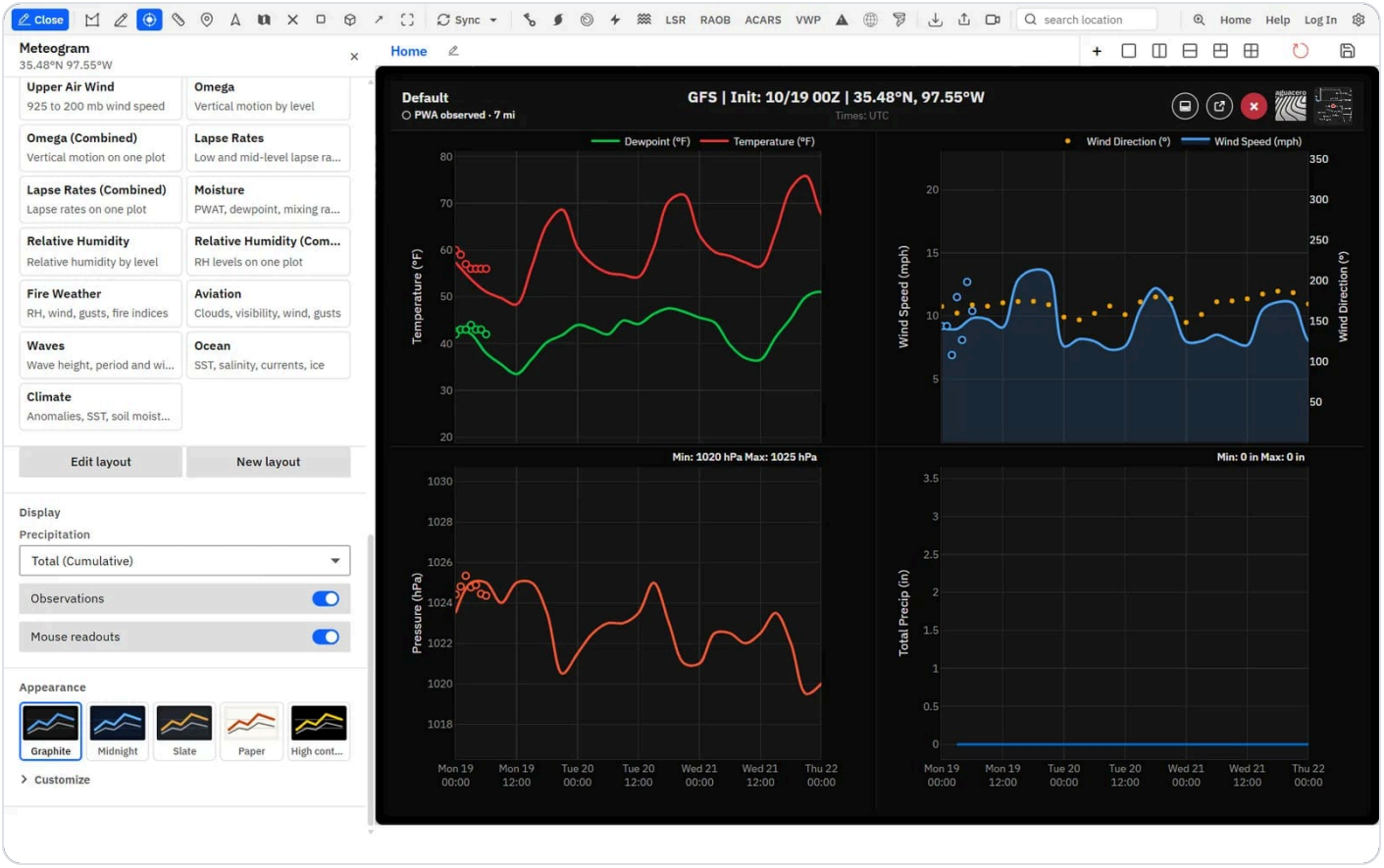
1. Open a meteogram with a line plot, such as **Default**, or an ensemble meteogram.
2. Under **Display**, turn on **Observations**.
3. Under **Observed by**, pick **ASOS** or **RTMA**.
4. Read the rings: one per hour over the last day and since the run started, in the color of the line they match. The chart opens back to the first one.
5. Check the chart header for the station and how far away it is, or the analysis.

TIPS

- A meteogram you searched for by airport uses that airport. Otherwise it uses the nearest ASOS station within 30 km (19 mi).
- ASOS reports go back 24 hours and refresh every 20 minutes. RTMA goes back to the earliest run drawn, up to 48 hours, and refreshes every 15 minutes.
- RTMA is read at the point itself, so it works away from airports (in the US). Its last ring is the newest 15-minute analysis. It has no visibility.
- Temperature, dew point, humidity, wind, gusts, pressure and visibility get rings. Stations above 750 m get no pressure.



The Display and Appearance settings, with Observations on.



A GFS meteogram for Oklahoma City with the reports from Wiley Post Airport (PWA) drawn as rings.

13 Meteogram look and precipitation

Pick a theme for every meteogram, fine-tune its colors and text, and choose how precipitation adds up.

1. Open a meteogram and scroll its controls to **Appearance**.
2. Pick a theme: **Graphite**, **Midnight**, **Slate**, **Paper** or **High contrast**.
3. Click **Customize** to change the colors, gridlines, curves, header size, text size, line width and plot spacing.
4. Under **Display**, pick a **Precipitation** amount, from **Total (Cumulative)** to 72-hour totals.
5. Turn on **Normals** for the 1991–2020 normal high and low at the nearest climate station: a dashed line on temperature line plots, dashed high and low lines on a day range, and a row in a day grid.
6. Turn off **Mouse readouts** to hide the hover values.

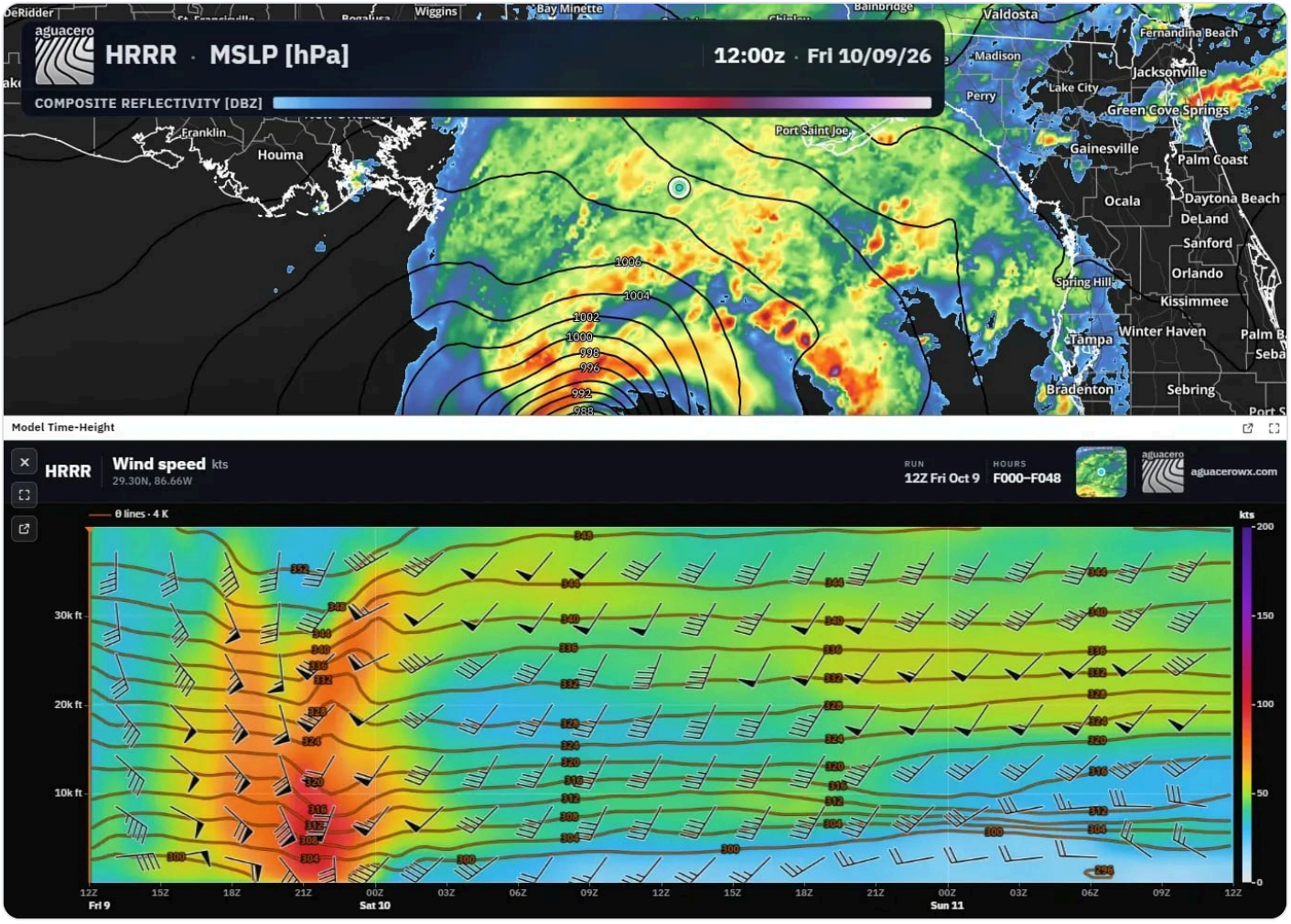
TIPS

- Under **Customize**, turn off **Logo** or **Map inset** to leave them off copied and downloaded images.
- Click **Reset to Graphite** to undo your changes.
- **Corners** under **Customize** sets how round day range bars and day grid cells are, from square to fully round. **Back to Auto** returns to the default.
- **Precipitation** lists only the amounts the run's time step allows.

14 Model time-height plots

One point through the whole model run, with the same fills, barbs and contours as cross sections.

1. Right-click a model map at the point you want.
2. Under **Time-height**, click **Model**.
3. Under **Hours shown**, pick how much of the run to plot.
4. Choose fills and overlays under **Style**, **Shading** and **Contours & wind**.
5. Drag the point on the map to move the plot, and click the chart to set the map time.



An HRRR time-height plot docked under the map.

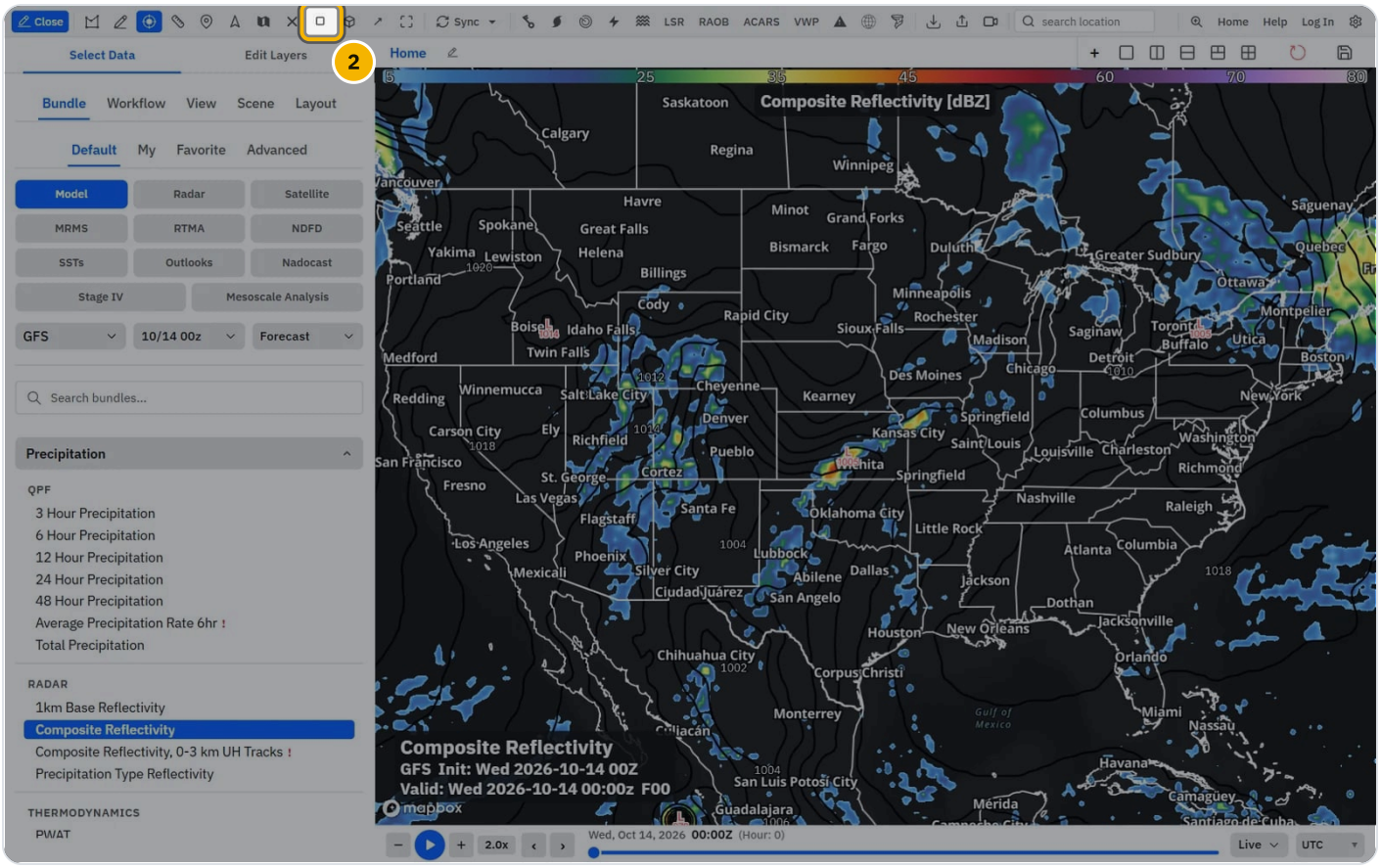
15 Area-averaged soundings

Draw a box for a sounding averaged over the whole area, from the model or the SPC Mesoscale Analysis.

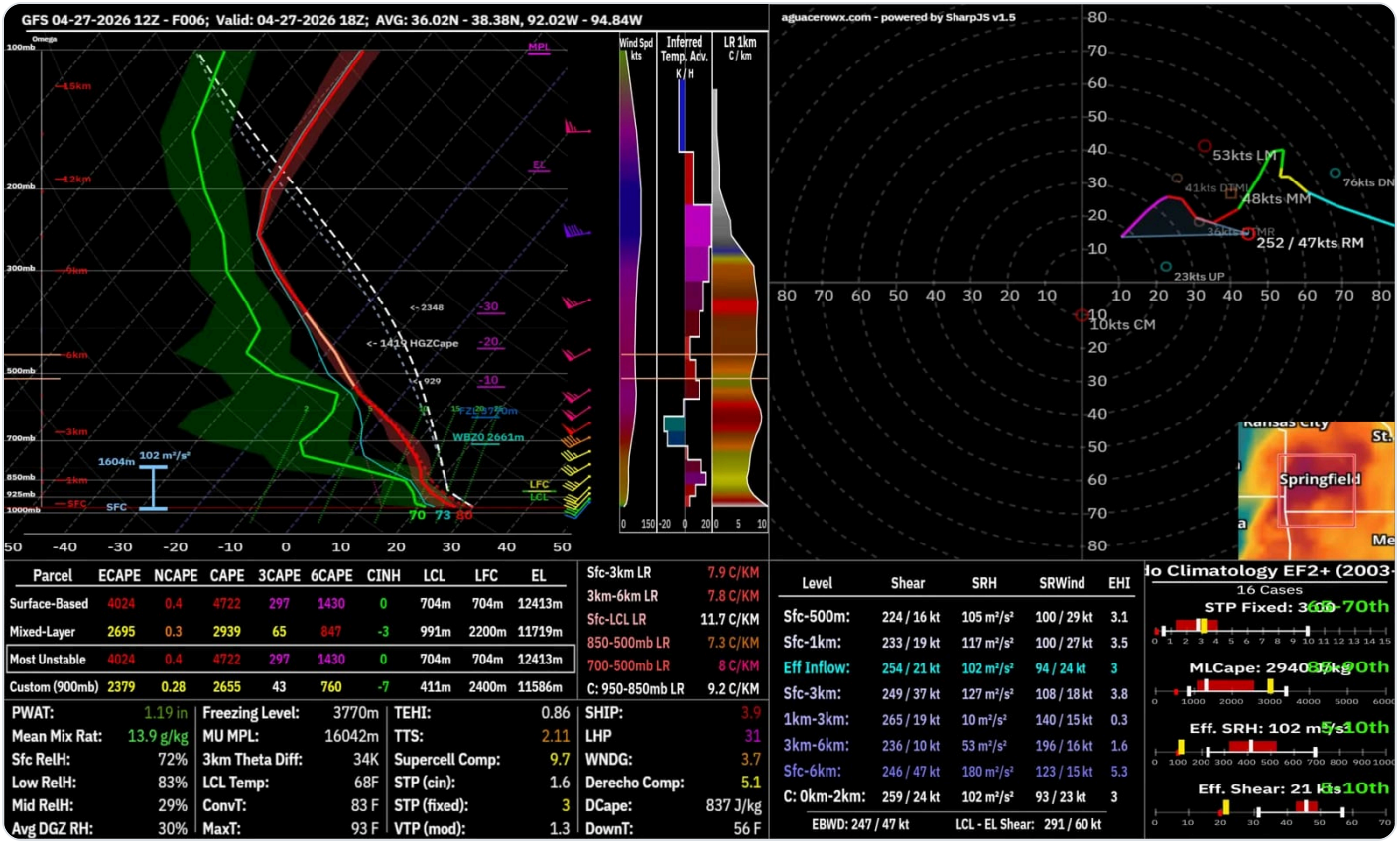
1. Load a model bundle on the active map.
2. Click **Box sounding** on the toolbar.
3. Drag a rectangle over the area.
4. In the small menu, click **Model** or **Meso analysis**.
5. Read the averaged sounding. The tool turns itself off.

SHORTCUTS

Hold B + drag	Draw a box sounding without the toolbar button



The Box sounding button on the toolbar.



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

16 Hover soundings

A model sounding that follows your cursor, or that you drag across the map. The profile updates as it moves.

1. Right-click a model map and click **Model** under **Soundings**.
2. Switch the sounding to **Docked** or **Floating** so the map stays in view.
3. In the sounding title bar, click **Follow mouse**.
4. Move the cursor over the map. The sounding updates as you go.
5. Click the map to pin the sounding, and click again to follow the cursor.
6. Or click **Static** and drag the sounding marker on the map.

Hover soundings work for model point soundings on desktop, not for RAOB, ACARS or box soundings.

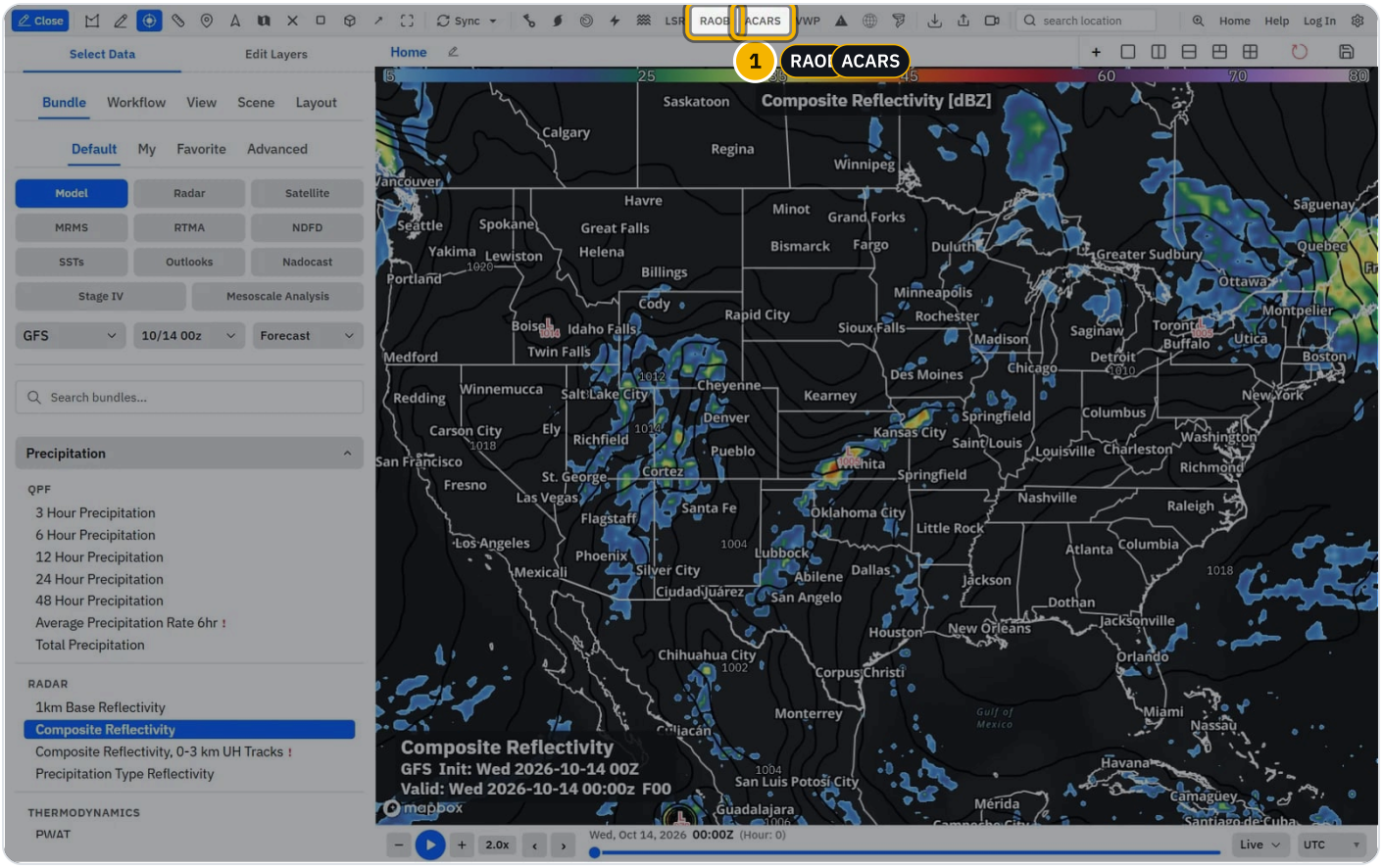
17 RAOB soundings

Radiosonde launch sites on the map. Click one for its observed sounding.

1. Click **RAOB** on the toolbar to show the launch sites.
2. Click a station on the map.
3. Step through the station's launch times with the time slider.

TIPS

- Right-click the map and click **RAOB** under **Soundings** for the nearest station without turning on the sites.



The RAOB and ACARS buttons on the toolbar.

18 ACARS aircraft soundings

Observed profiles from aircraft as they take off and land at airports.

1. Click **ACARS** on the toolbar to show the airports.
2. Click an airport on the map.
3. Step through the airport's soundings with the time slider.

TIPS

- Right-click the map and click **ACARS** under **Soundings** for the nearest airport.

In archive mode, ACARS data goes back to January 1, 2019.

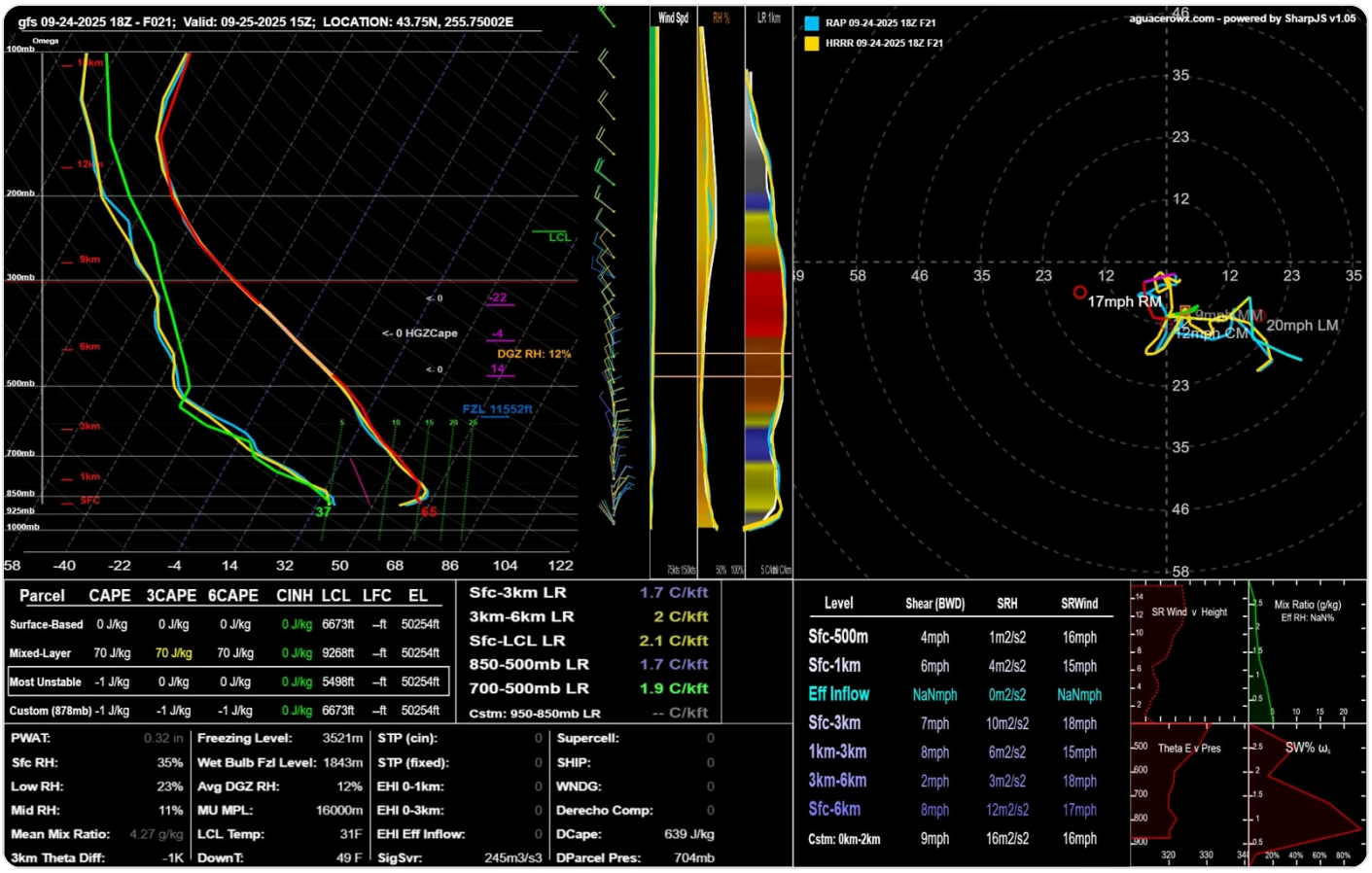
19 Compare soundings PROFESSIONAL

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

1. Open a model, RAOB or ACARS sounding.
2. In the controls, under **Model Comparison**, click **Add Comparison Model** and pick a model.
3. To compare runs, add the same model again, then click its row to change the run.
4. Click a model's color swatch to change its color, the eye to hide it, or × to remove it.

TIPS

- To overlay your own files, use **Upload Comparison Soundings** under **Load Custom Sounding**.



GFS and RAP soundings overlaid on one Skew-T.

Needs Professional. On other plans the button reads **Compare Model (Pro)**.

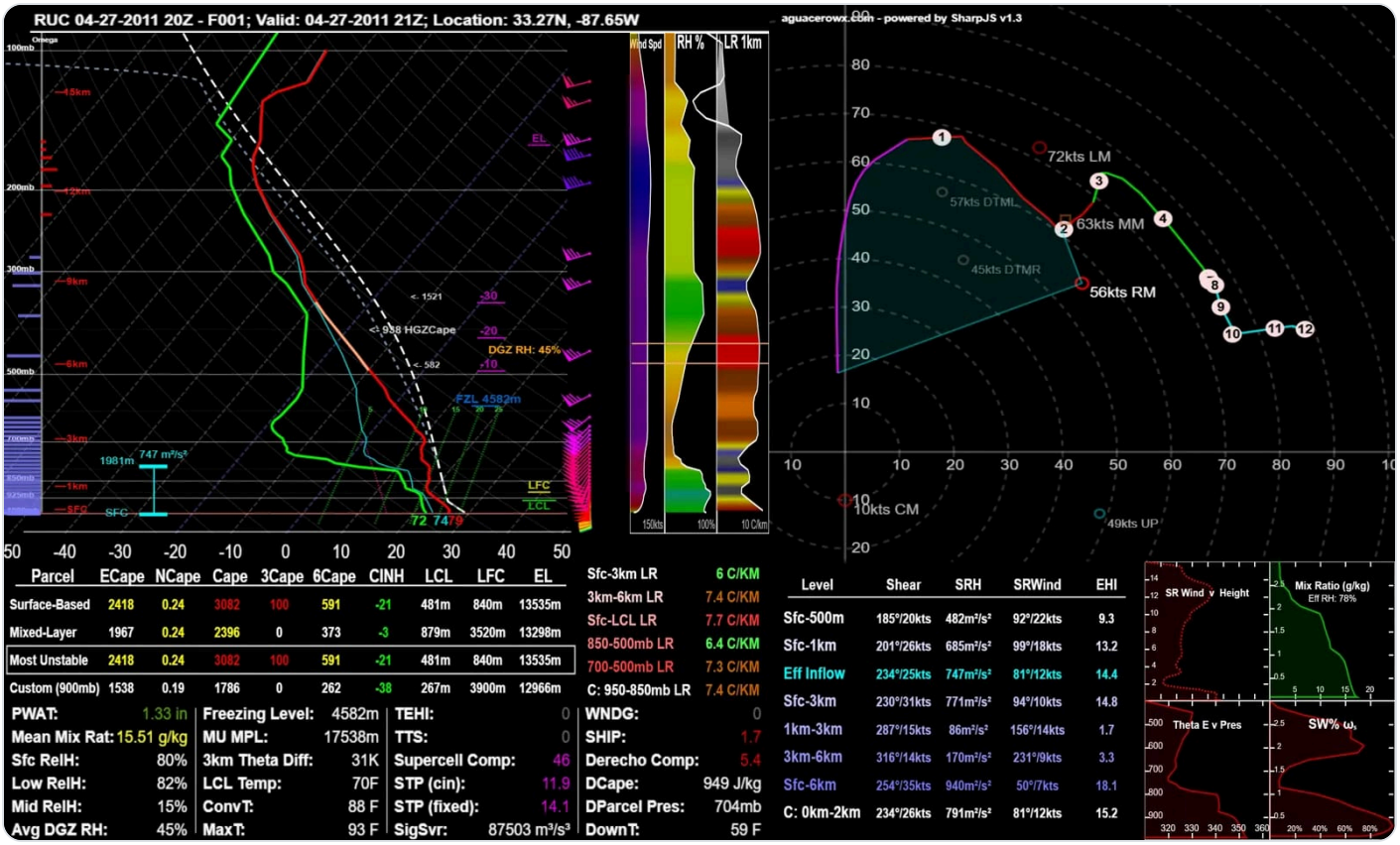
20 Archived soundings

Load past RAOB, ACARS and, for select models, BUFKIT soundings for an event.

1. Open any sounding.
2. In the controls, scroll to **Load Archived Data**.
3. Enter the **Year**, **Month** and **Day**, the **Station** and the **Hour (Z)**.
4. Click **Request Archived RAOB**.
5. For a model, set **Model**, **Run (Z)** and **Forecast Hour (Z)** under **Load Archived BUFKIT**, then click **Request Archived BUFKIT**.

TIPS

- **Archived ACARS** uses the same date with an hour and minute. Click **Request ACARS**.
- With a NEXRAD archive event loaded, right-click and click **Model** to load the archived BUFKIT sounding for that point.



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

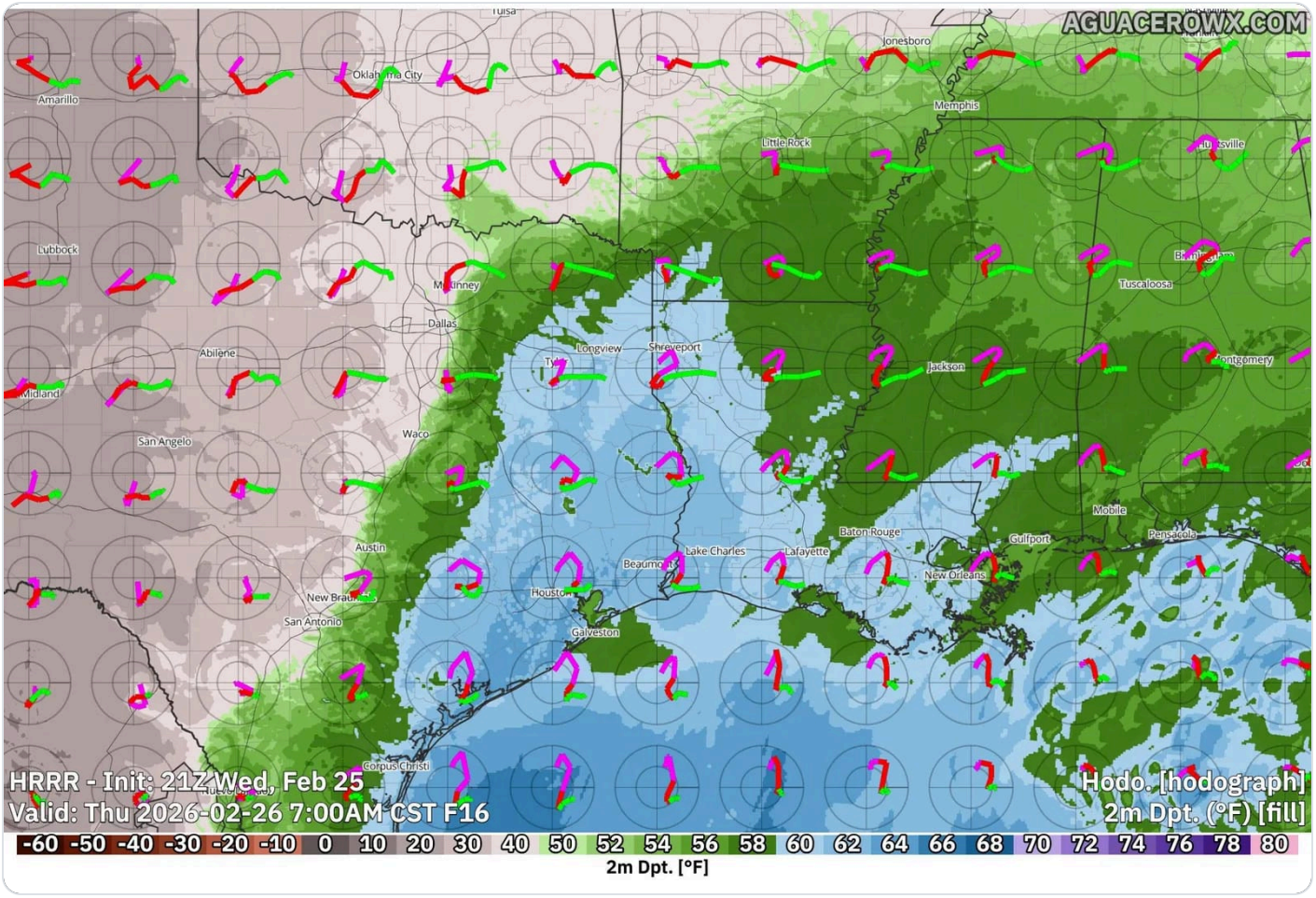
21 Hodographs on the map

Plot hodographs across the map for select models, such as the HRRR, RRFS and RAP.

1. Load a model that has hodographs, such as the HRRR.
2. Open **Edit Layers** in the sidebar.
3. Click **Add Layer**.
4. Open **Upper Air** and pick **Hodograph**.
5. Open the layer's settings to change the **Hodograph Size** and **Hodograph Distance**.

SHORTCUTS

F1	Open or close the sidebar



HRRR hodographs across the map over 2 m dew point.

22 Ocean cross sections

Slice the ocean along any line: temperature to 500 m, its anomaly and its 7-, 15- and 30-day change, with the 20 °C isotherm.

1. Load a sea surface temperature layer, for example from the **SSTs** data type in the sidebar.
2. Click **Cross section** on the toolbar.
3. Drag a line across the ocean.
4. In **Cross section type**, click **Ocean subsurface (ARMOR3D)**.

5. Under **Type**, pick **Temperature**, **Anomaly**, **7-Day Change**, **15-Day Change** or **30-Day Change**.
6. Set the **Width** and **Depth**, and drag the A–B line to move the section.

TIPS

- Click **Download PNG** to save the chart.