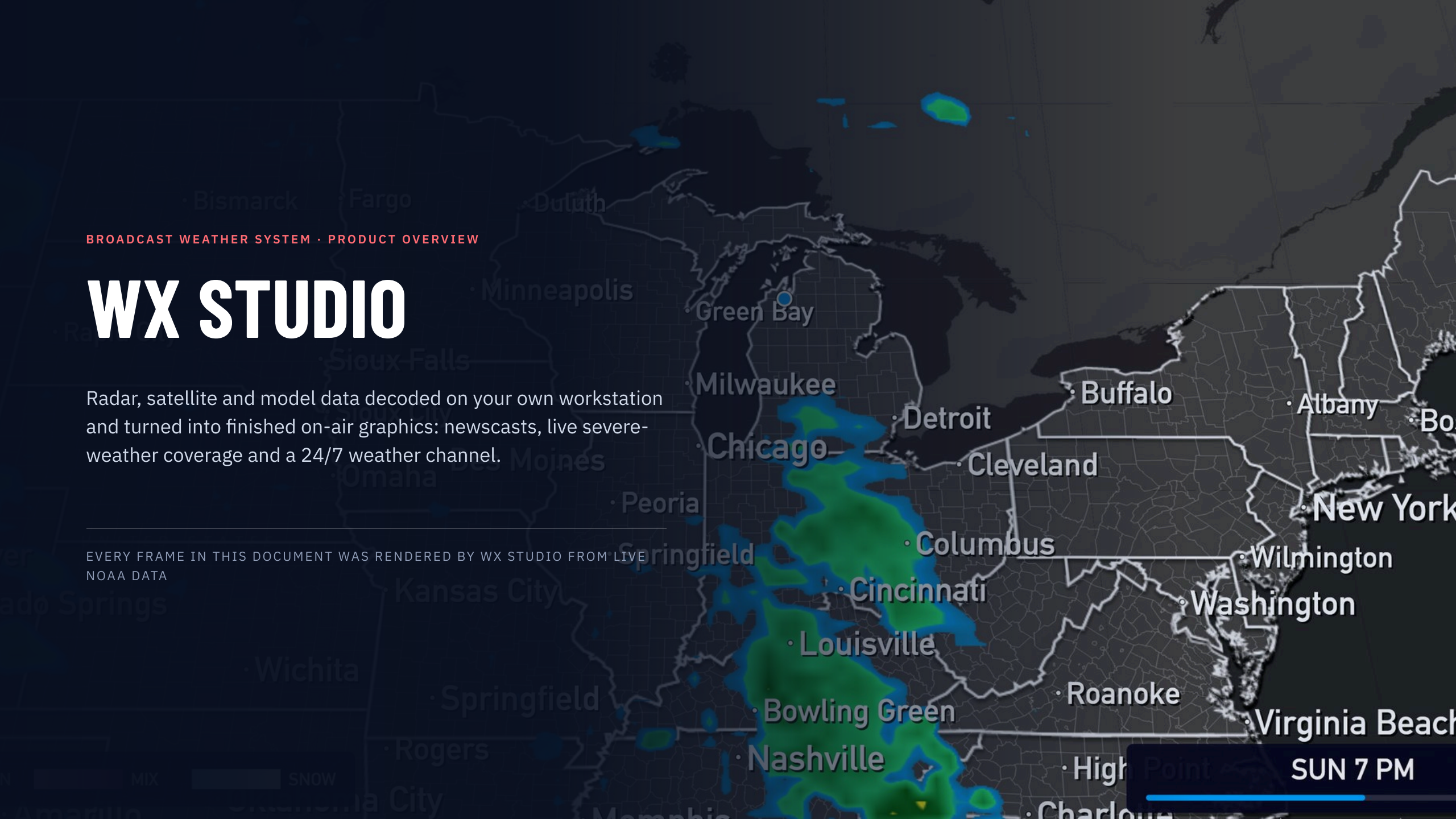
BROADCAST WEATHER SYSTEM · PRODUCT OVERVIEW

WX STUDIO

Radar, satellite and model data decoded on your own workstation and turned into finished on-air graphics: newscasts, live severe-weather coverage and a 24/7 weather channel.

EVERY FRAME IN THIS DOCUMENT WAS RENDERED BY WX STUDIO FROM LIVE NOAA DATA



01 · The system

ONE WORKSTATION. EVERY WEATHER GRAPHIC.

Most systems license data feeds and rent rendering. WX Studio downloads NOAA's own radar volumes, satellite scans and model GRIB2 files and decodes them itself, so the color tables, the detail and the timing are yours.

DECODED IN-HOUSE

Single-site NEXRAD Level III and Level II, GOES-19 and GOES-18 ABI Level 2, GLM lightning, the NOAA MRMS radar mosaic, and HRRR, RRFS, GFS, NBM and RAP from NOMADS, each cached on disk per hour.

FINISHED ON-AIR GRAPHICS

Maps in 2D or true 3D on the GPU, the 7-day, current conditions, hour-by-hour, model comparisons, soundings, tropical and traffic pages, all in one design system with your brand.

RUNS THE CHANNEL

A rundown you take by hand, or a weekly schedule that runs itself, breaks into live coverage for warnings in your area and returns when they end.

170+
model fields, surface to the stratosphere

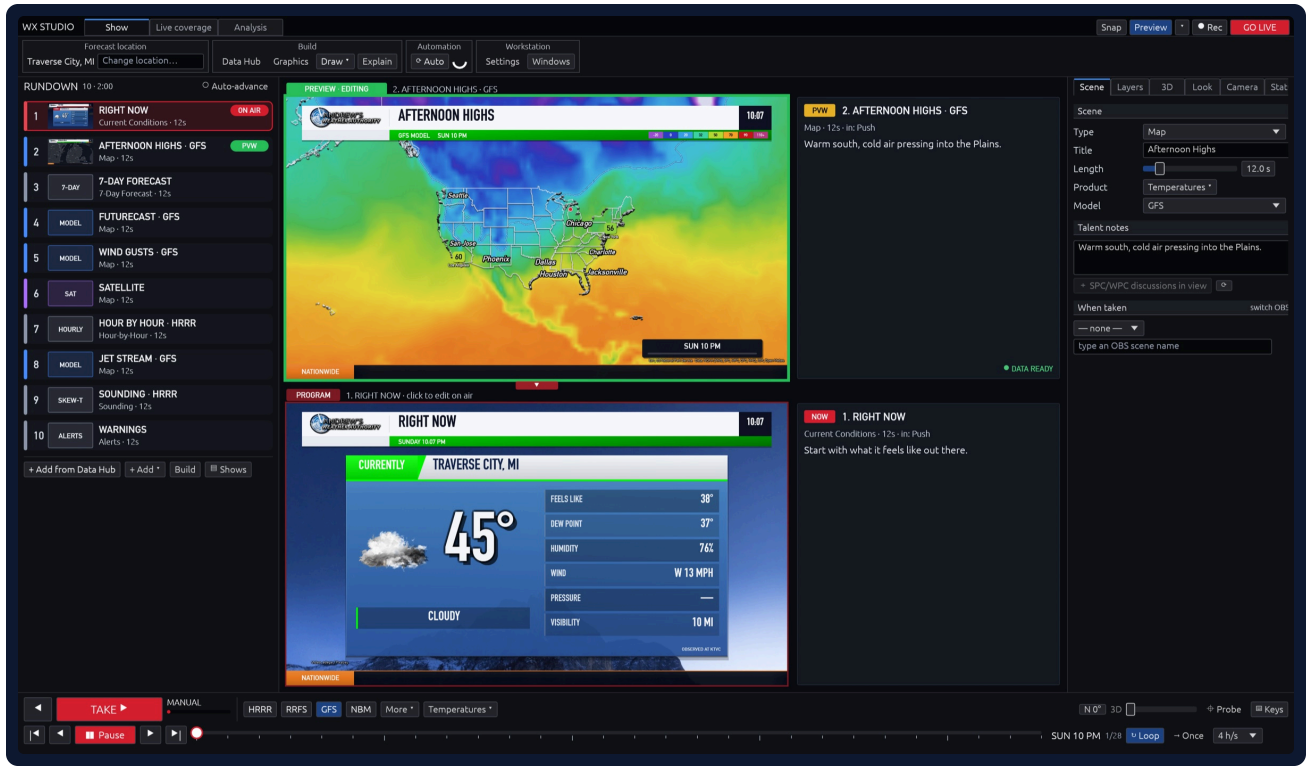
16
GOES ABI bands plus 12 RGBs

7
Level II moments at every tilt

52,000
traffic and weather cameras

48 h
point and area-mean soundings

24/7
scheduled shows with severe takeovers



Operator screen. Rundown, Preview over Program with the NOW / NEXT cards and talent notes, and the inspector.

02 · Workflow

BUILT LIKE A CONTROL ROOM, NOT A MAP VIEWER.

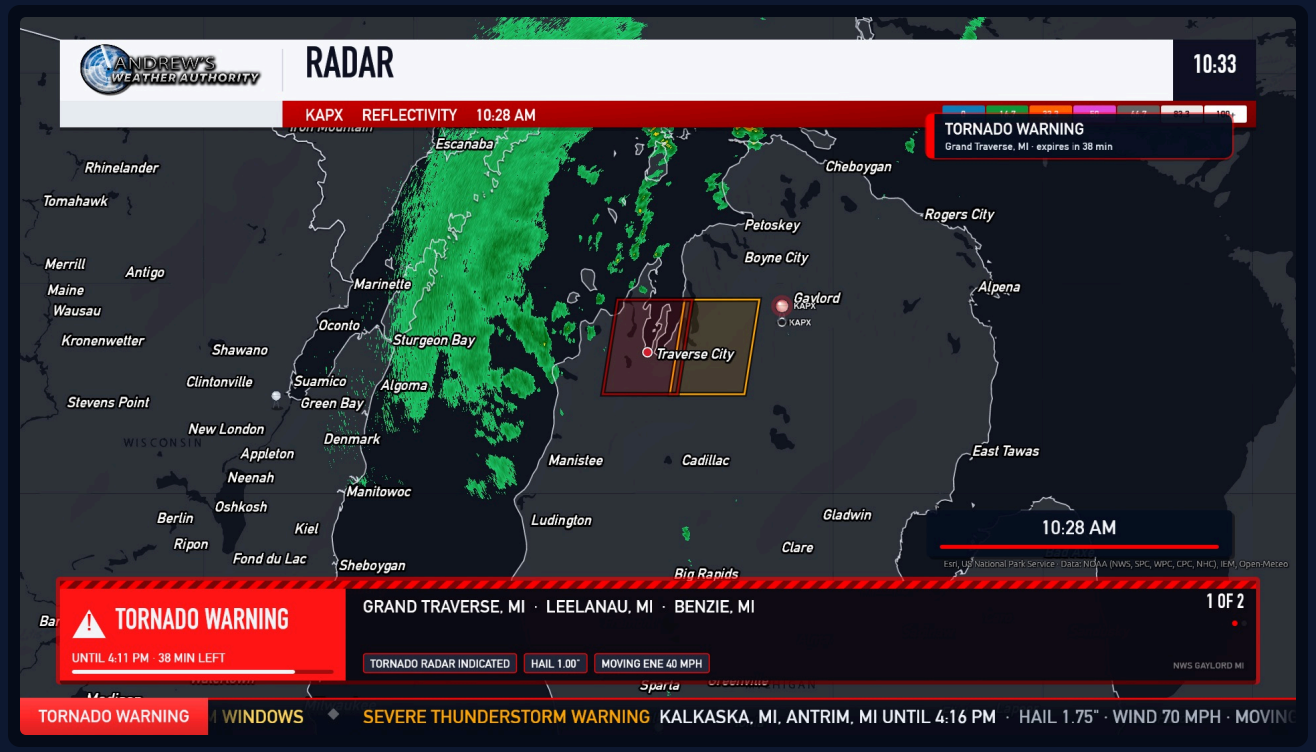
The program monitor shows exactly what goes to air. Everything else is a rundown and a take button.

- **Preview and Program** monitors, like a vision mixer: prepare the next scene while the program stays on air, then TAKE.
- **Rundown with TAKE NEXT**, drag to reorder, undo and redo, scene thumbnails, saved shows with versions to roll back to, and `.wxshow` files.
- **Feed health:** every source's data age and download time, with an alert before air when one goes stale.
- **Three work modes.** Show plays a produced show; Live switches to fast takes, pop-ups and calls to action; Analysis hides the package and reads values under the cursor.
- **Data Hub** of ready-made scenes. Picks land as NEXT and never go straight to air.
- **Coverage Builder** assembles routine, live-severe or analysis rundowns from templates in one step.
- **Talent notes** in the NOW / NEXT strip, the prompter and the producer panel.

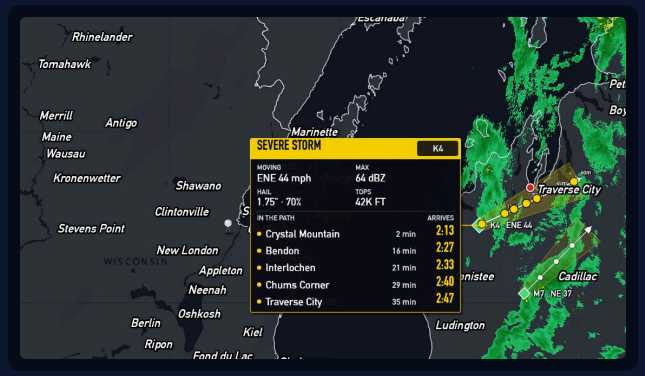
ON AIR WITH THE WARNING, NOT AFTER IT.

NWS warnings arrive with their VTEC codes and impact tags and go on air in the official colors.

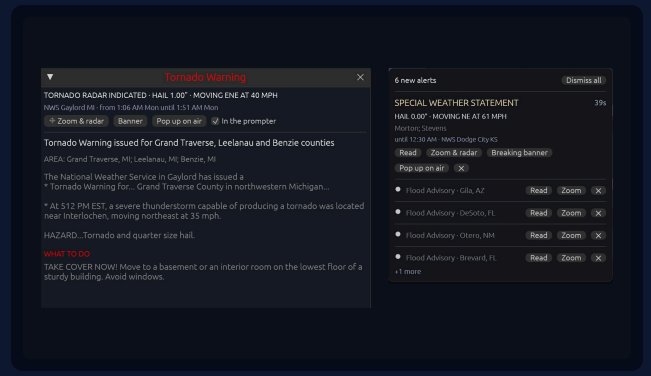
- **Warning banners** on every scene: counties, hazards, storm motion and a countdown to expiry, rotating through several warnings.
- **Threat mode.** Live scenes take on the color of the worst warning in the market; the crawl carries calls to action.
- **Push warnings** from NWWS-OI or a NOAAPORT receiver, seconds after issue.
- **Read the warning:** the full NWS text in its own window, leading the talent prompter while it is open.
- **Zoom & radar.** One click frames the polygon and switches to the single-site radar nearest to it.
- **A compact alert stack** with sounds and Dismiss all. Expired warnings clear everywhere the minute they expire; tornado and severe warnings at home can break into coverage on their own.
- **Storm tracks** from Level III cell data with large markers; click a storm for its timing box: threat, motion, hail size, tops and town-by-town arrival times.



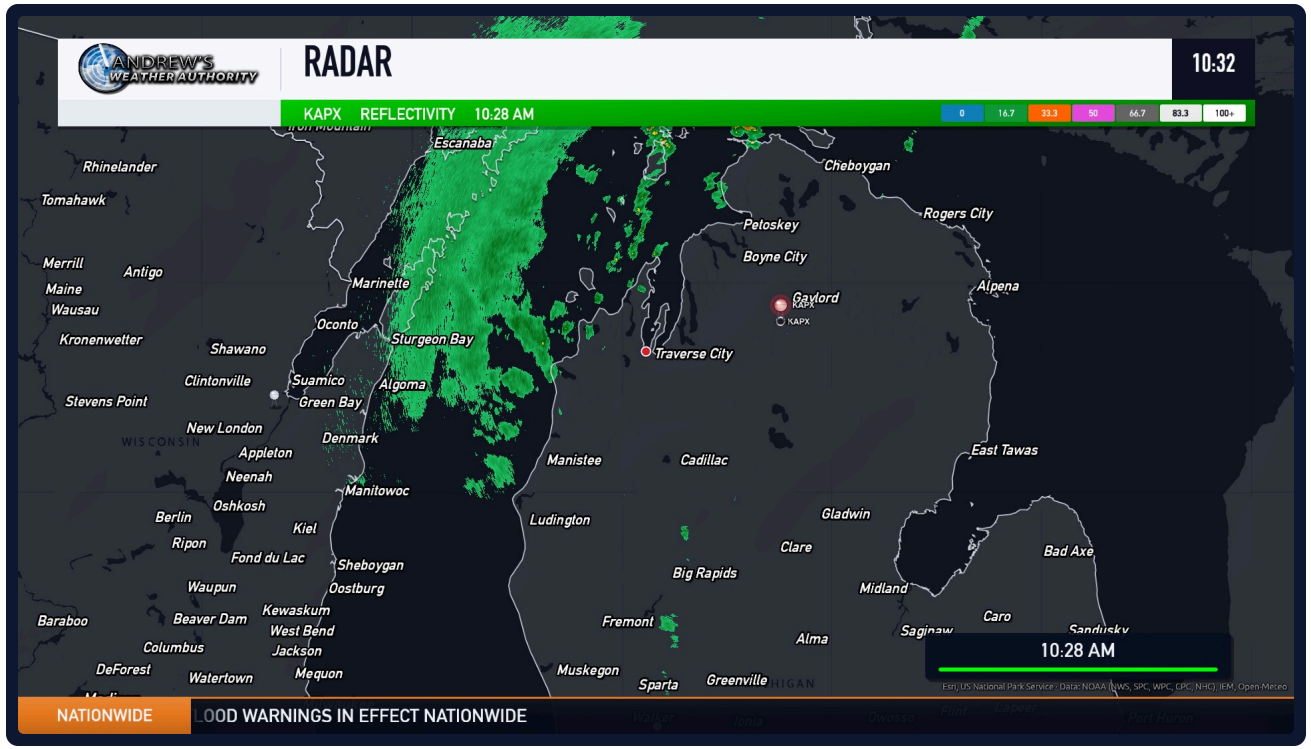
Live coverage. Warning banner, storm tracks and the crawl.



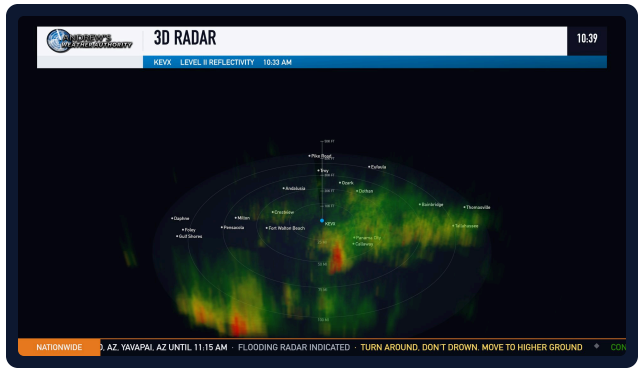
Storm timing boxes with arrival times.



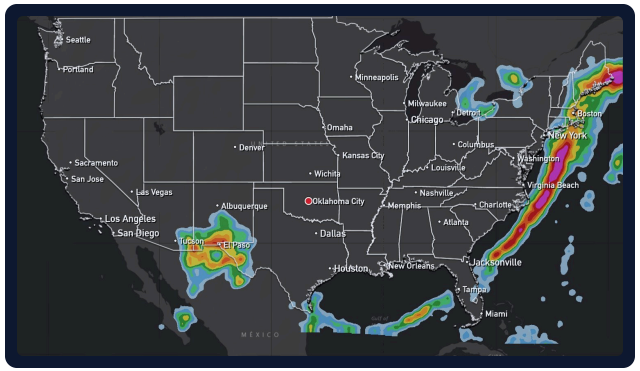
The warning text and the alert stack.



Single-site radar on the tilted 3D map with lightning.



Level II volume as a rotating 3D scene.



REFS ensemble: the chance of storms over 40 dBZ, hour by hour.

04 · Radar

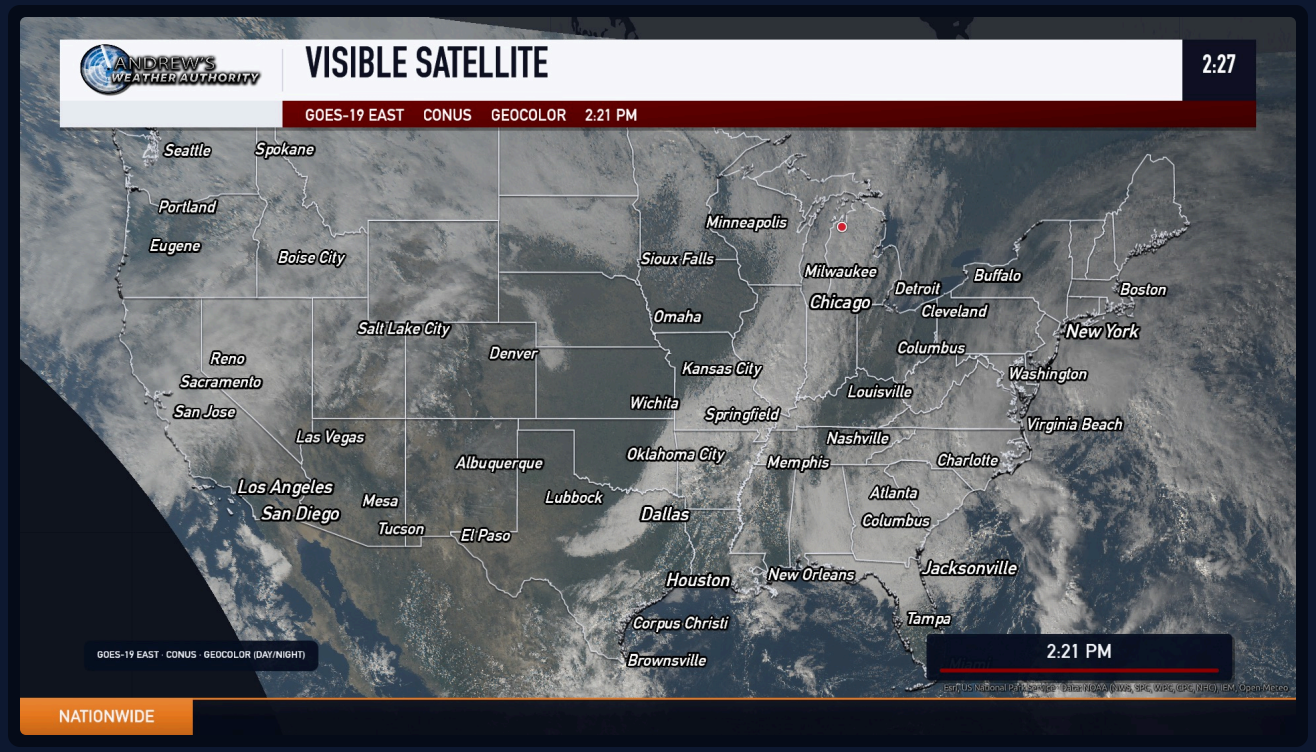
EVERY TILT, EVERY MOMENT, EVERY VOLUME.

- **Level III decoded in-app:** reflectivity and velocity at several tilts, computed storm-relative velocity, CC, ZDR, KDP, hydrometeor class, echo tops and rainfall.
- **Level II:** REF, VEL, SRV, SW, ZDR, CC and PHI at every tilt as a radar source.
- **Vertical cross sections** between any two points, and the **3D volume** standing on the tilted map or as its own rotating scene, looping the last half hour and following a storm along its track.
- **Spotlight:** a circle of velocity inside reflectivity that follows the cursor.
- **Opacity curves** per product, despeckle, masking, smoothing, the sweep, site domes and imported GRLevelX / RadarScope `.pal` tables.
- National and regional mosaics decoded in-app from NOAA MRMS on the GPU with your radar colors (composite and base reflectivity, echo tops, hail size, rotation tracks, rain rate), plus IEM and RainViewer tiles.

05 · Satellite

GOES, DECODED THE MOMENT IT LANDS.

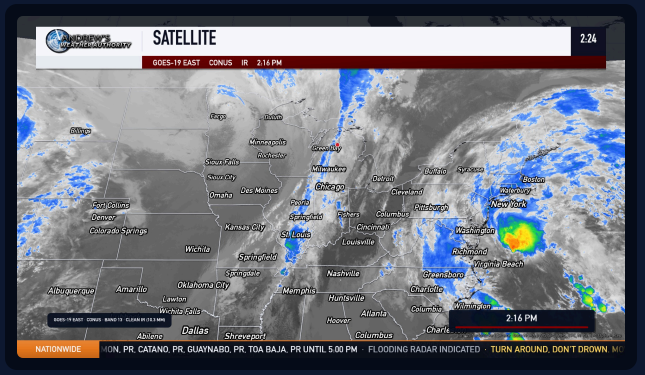
- **GOES-19 East and GOES-18 West** ABI Level 2 from NOAA on AWS: CONUS / PACUS, Full Disk and both Mesoscale sectors.
- **All 16 bands**, True Color, GeoColor (true color by day, glowing night clouds and fog after dark) and Airmass.
- **Nine derived RGBs:** cloud phase, night fog, dust, convection, fire, natural color, snow-fog, sandwich and simple water vapour.
- **Himawari-9, GK2A and Meteosat-12** full disks for global coverage; Meteosat with every FCI channel and true color from your EUMETSAT Data Store account.
- **Background preloading** keeps the products you use decoded and ready.



GeoColor over the CONUS sector.

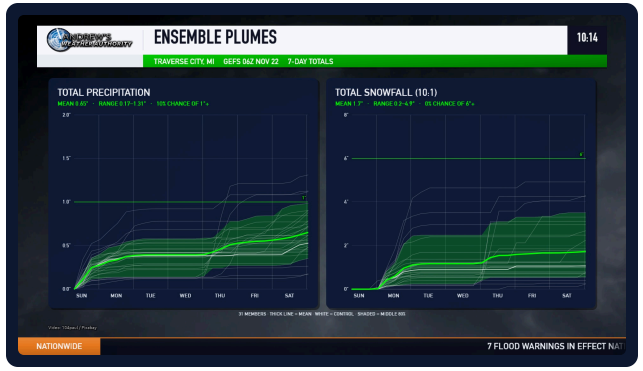


Cloud tops in 3D from infrared.



Enhanced infrared over the region.

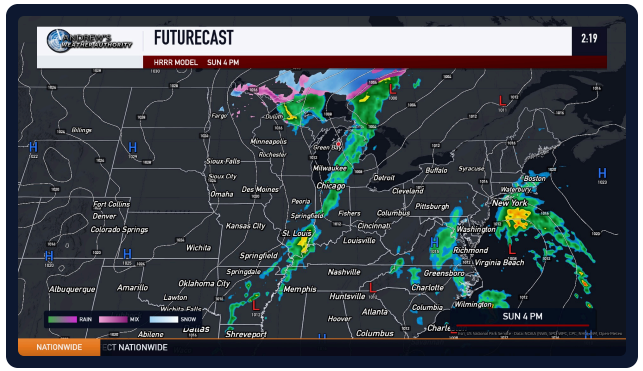
THE FORECASTER'S TOOLKIT, IN BROADCAST COLORS.



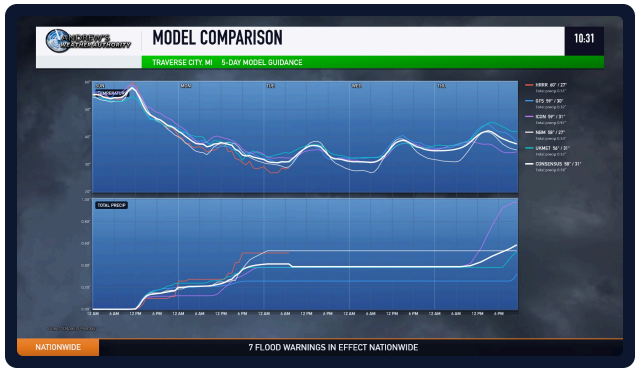
GEFS ensemble plumes at the home point.



Isobars with styled labels and H / L.



HRRR futurecast: rain, mix and snow.



Model comparison at the home point.

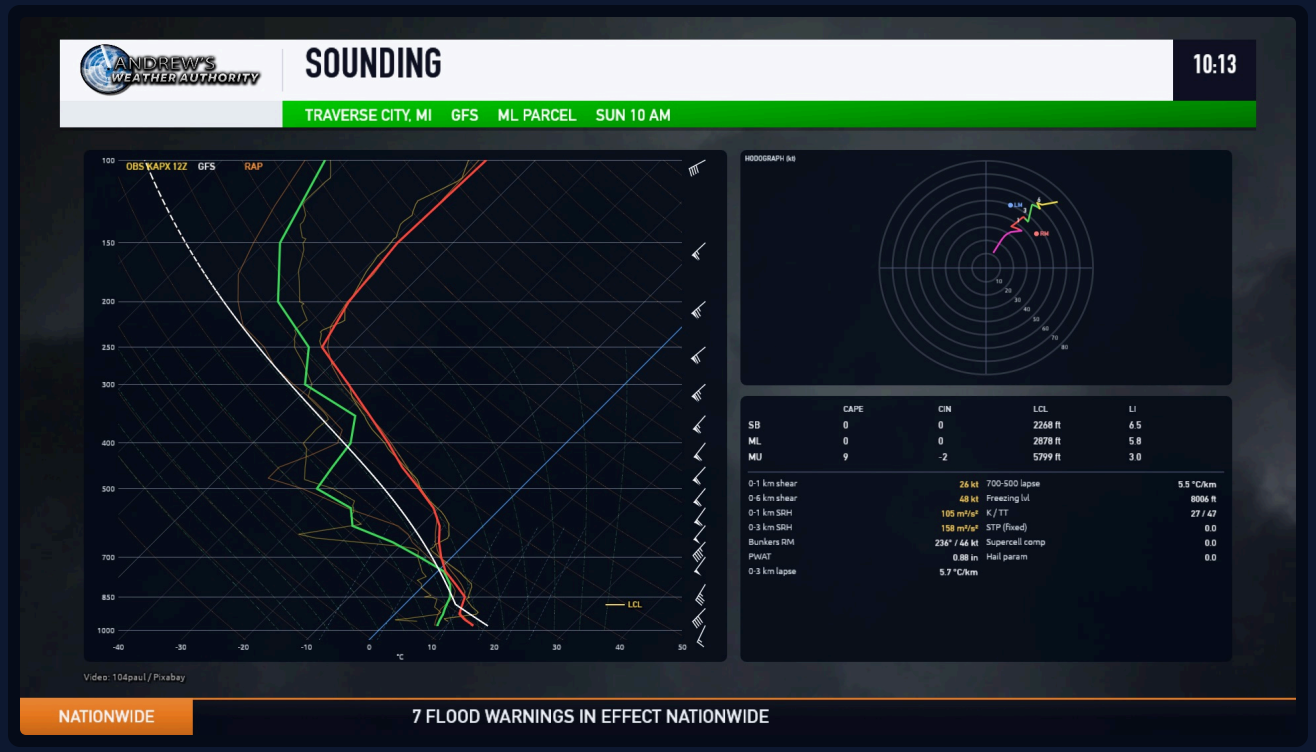
- **From NOAA NOMADS as GRIB2:** HRRR, HRRR 15-minute, RRFS, GFS, NBM and RAP, whole-domain preloading with a per-hour disk cache.
- **AI models:** NOAA's AIGFS and the GraphCast, FourCastNet, Pangu-Weather and Aurora runs NOAA makes from the GFS, read straight from NOAA.
- **ECMWF direct:** the IFS and the AIFS from ECMWF open data, free for commercial use (CC BY 4.0), with model timing alerts when a new run lands.
- **Whole runs:** the GFS to 384 hours, the NBM to 264, ECMWF to 15 days, every frame, paced under NOAA's rate limit.
- **Global models** ECMWF, ICON, GEM and UKMET through Open-Meteo.
- **A catalog of about 70 products:** heights and winds at six levels, vorticity, vertical velocity, advection, frontogenesis, lapse rates, MUCAPE, shear, EHI, SCP, QPF windows, Kuchera snow and freezing rain.
- **Contour styling** per field: interval, smoothing, line and halo, label font, size and background, H / L spacing.
- **Ensembles:** REFS probabilities (rain, snow, updraft helicity, hourly storms; the HREF's replacement), GEFS means, probabilities and member plumes.
- **Mesoanalysis** from the RAP, GLM lightning every 20 seconds, and **hydro**: MRMS rainfall, flash-flood guidance ratios, river forecasts and stream gauges.
- Hours are colored in the background and cross-faded on the GPU, so loops play smoothly.

07 · Soundings

THE WHOLE AIR MASS, NOT ONE GRID POINT.

Soundings come straight from the NWS models on NOAA NOMADS: every pressure level, cropped to the point, cached per run.

- **Point soundings** from the RAP, HRRR, RRFS and GFS at home, a searched place or a right-click on the map, 48 hours out; the first hours arrive in seconds.
- **Area soundings.** The model averaged over a box of 2×2 to 6×6 cells, each the mean of the model points inside it, with the 10th–90th percentile spread shaded.
- **Area statistics:** mean, lowest and highest CAPE, CIN, shear, helicity, PWAT, lapse rate, STP and SCP across the box.
- **Observed soundings** from the nearest radiosonde site or any site you pick, drawn with the model or used for the statistics.
- **Parcels and hodograph:** surface, mixed-layer and most-unstable parcels, Bunkers motion and the indices broadcasters quote.

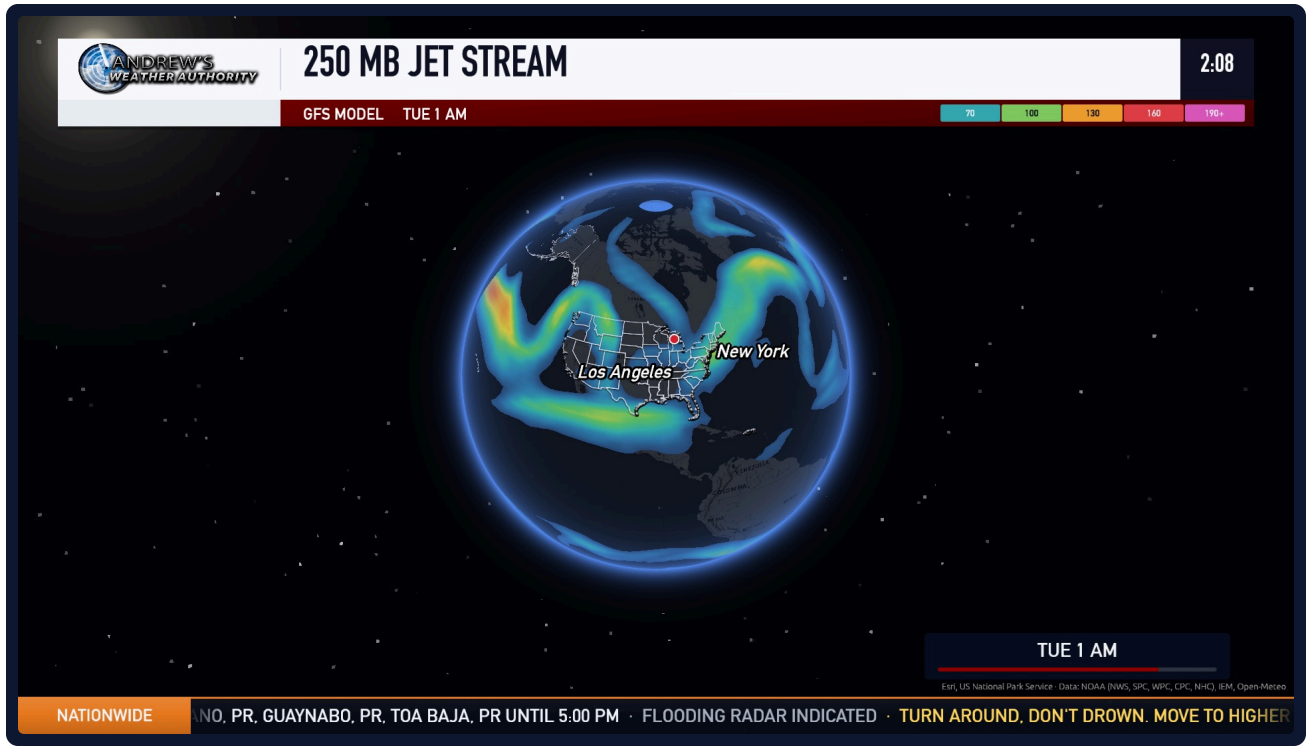


Area mean of 16 points over central Oklahoma from the RAP, with the observed Norman sounding and the spread across the box.

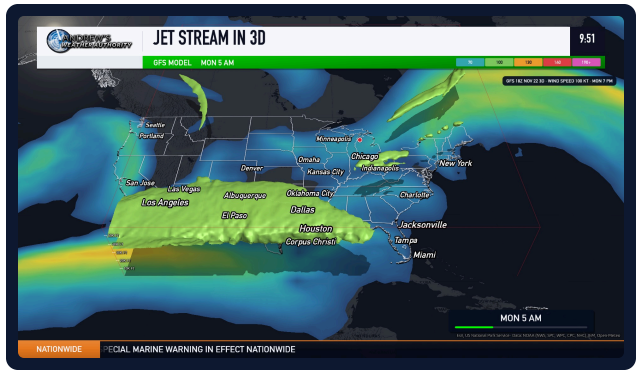
08 · The map

A TRUE 3D MAP, FROM THE GLOBE TO THE STREET.

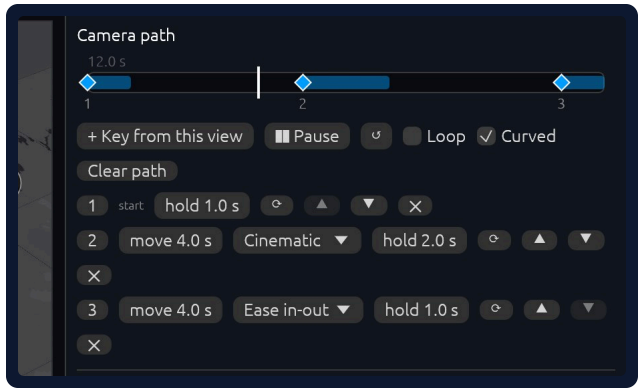
- **GPU map engine** (wgpu): zoomed out it is a globe, zoomed in it flattens into the local map, with free tilt and rotation.
- **GPU colormap.** Model fields and radar are colored in the shader: palette, threshold and smoothing changes show on the next frame, zooming never re-renders, and model hours interpolate in time.
- **Terrain relief** with adjustable exaggeration; every field drapes over it and the 3D radar volume stands on the ground.
- **A camera that holds the ground** under the cursor while zooming and dragging, and snaps the heading back to north.
- **Keyframed camera moves:** paths through any number of framings with easing, holds, a curved route and a scrubbable timeline.
- **Day and night:** the terminator and twilight at the frame's valid time, a sunrise and moon chip, and a Sun & Moon page.



Zoomed out, the map is a globe: GFS 500 mb heights and winds.



The jet stream as a 3D model volume.



Camera path timeline on the Moves tab.

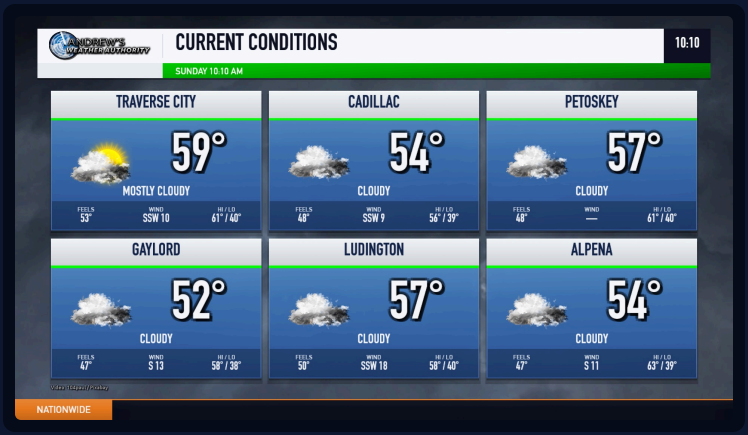
PAGES VIEWERS READ AT A GLANCE.



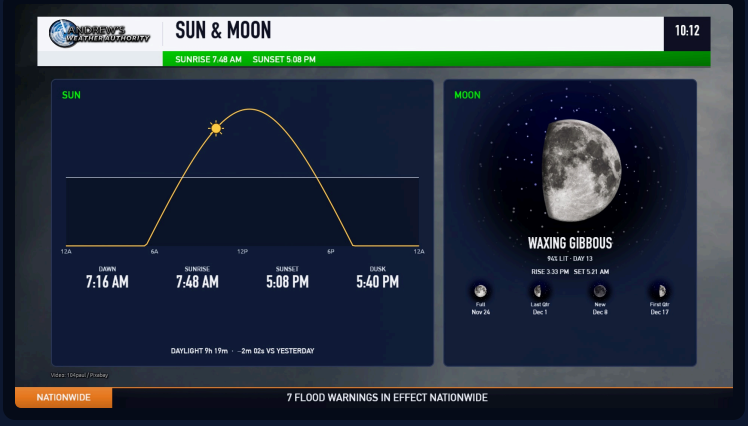
7-Day Forecast from the NWS, with forecaster overrides.



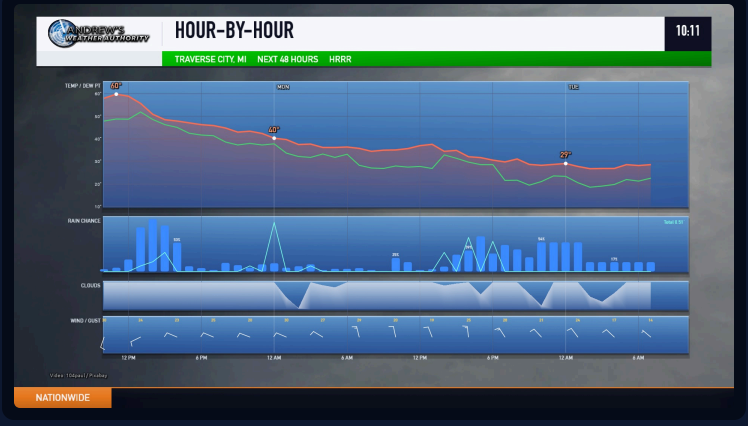
Current Conditions from the nearest observation.



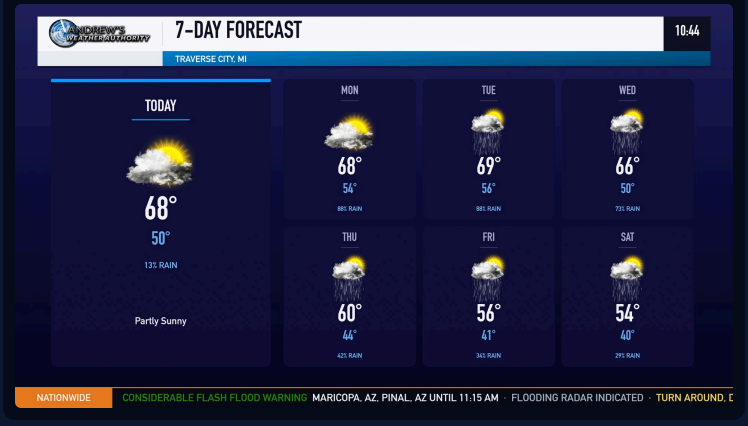
Across the market: up to nine places as cards or a table.



Sun & Moon: the sun's path, rise and set, daylight, moon phase.



Hour-by-Hour meteogram for the next 48 hours.



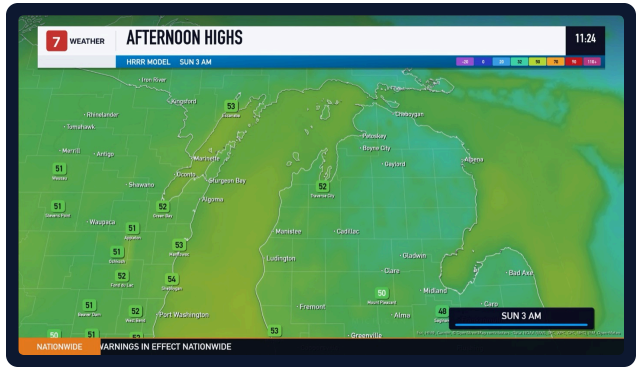
Your own layout: a 7-day built in the Template Designer.

YOUR STATION, ON EVERY GRAPHIC.

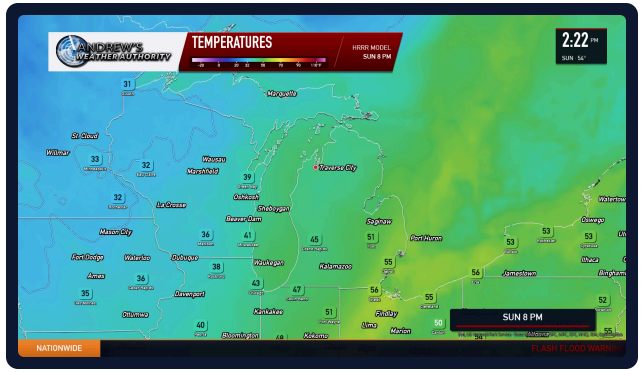
- **Eight title styles:** Card, Blade, Arrow, Slab, Wedge, Banner, Studio and Pinpoint, with the color key inside the title, per-scene colors and talking-point boxes.
- **Logos, still or animated:** PNG and JPEG, or APNG, GIF and transparent WebM that loop in the titles and the corner bug.
- **Station fonts:** your own headline and label faces from any TTF or OTF file.
- **Template Designer:** drag-and-drop layouts for the 7-day, current, hourly, alerts, drive-times and model-comparison pages, and a map frame over every map scene, with single-hour cells and entrance animations; shared between stations as files.
- **Graphics Editor:** color tables for radar, models, warnings and SPC outlooks; two values (accent and surface hue) re-brand the whole package.



Template Designer with a live preview.

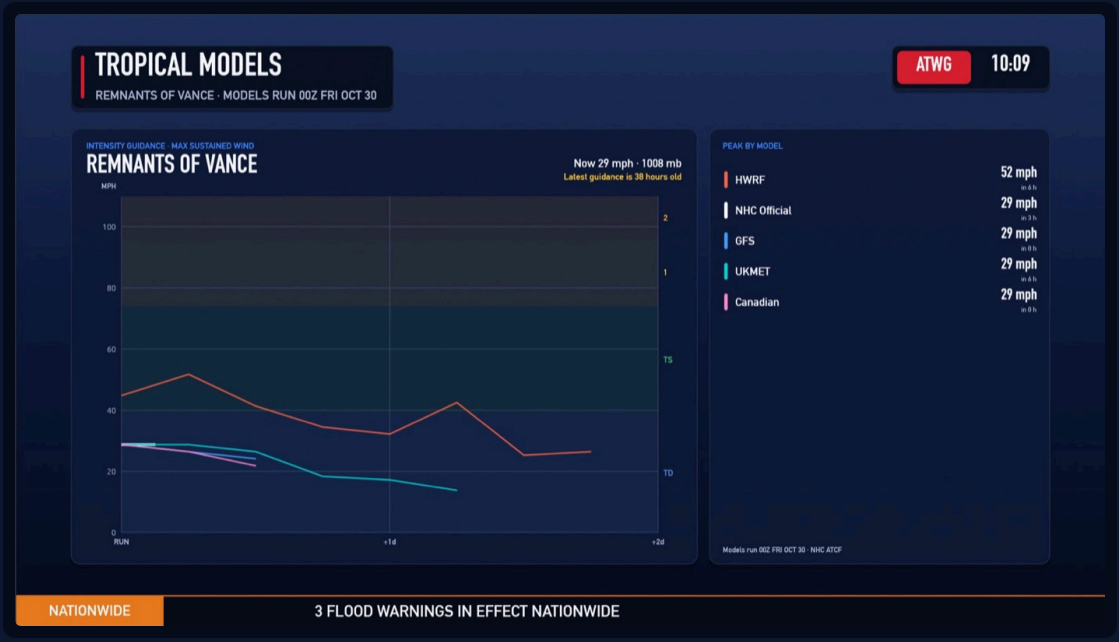


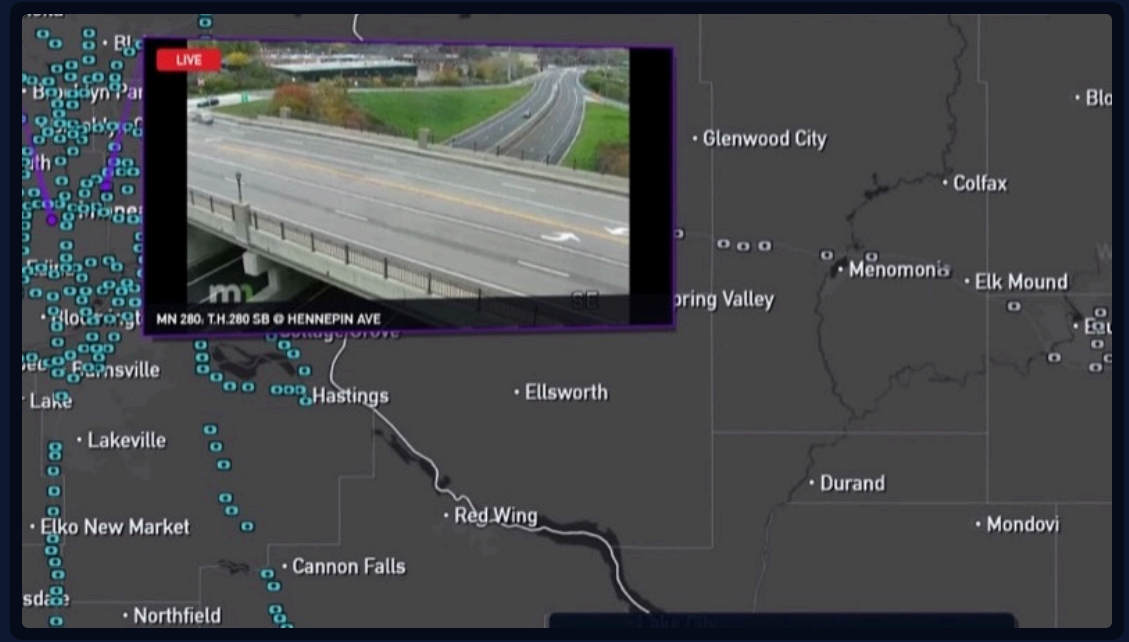
Studio title.



Blade title, legend in the title.

THE STORIES BEYOND THE RADAR.





- **NHC storms and invests** with cones, tracks and the newest run of every ATCF aid.
- **Named model sets** on the spaghetti map and an **intensity-guidance page** per system, switched from the inspector, the producer panel or a button, or given a turn on air each.

- **52,000 DOT and weather cameras** that open from the map as 3D cards during live coverage (ffmpeg playback, snapshot fallback).
- **Drive times** on the routes people near you drive, with live TomTom delays and flow colors when you add a key.

12 · 24/7 automation

A WEATHER CHANNEL THAT RUNS ITSELF.

Schedule a show for each part of the day. WX Studio skips graphics with nothing to show, adds the tropics or snow totals when they matter, and breaks into live coverage when a qualifying warning touches your area.

- **Optional AI host** on your own hardware through Ollama writes what to say over each graphic from the data on screen; a local voice reads it.
- **A fixed set of actions**: stay, move on, jump to a scene, add a headline, or start live coverage only when a real warning qualifies.
- No data leaves the workstation for the AI host, and it is off by default.
- **Scheduled renders** write the 7-day or the futurecast loop to MP4 or PNG on a timer for the web and social, through the same renderer as air.
- **Producer panel users** with roles (producer, talent, engineer), an audit log, and Stream Deck, Companion and MIDI buttons.

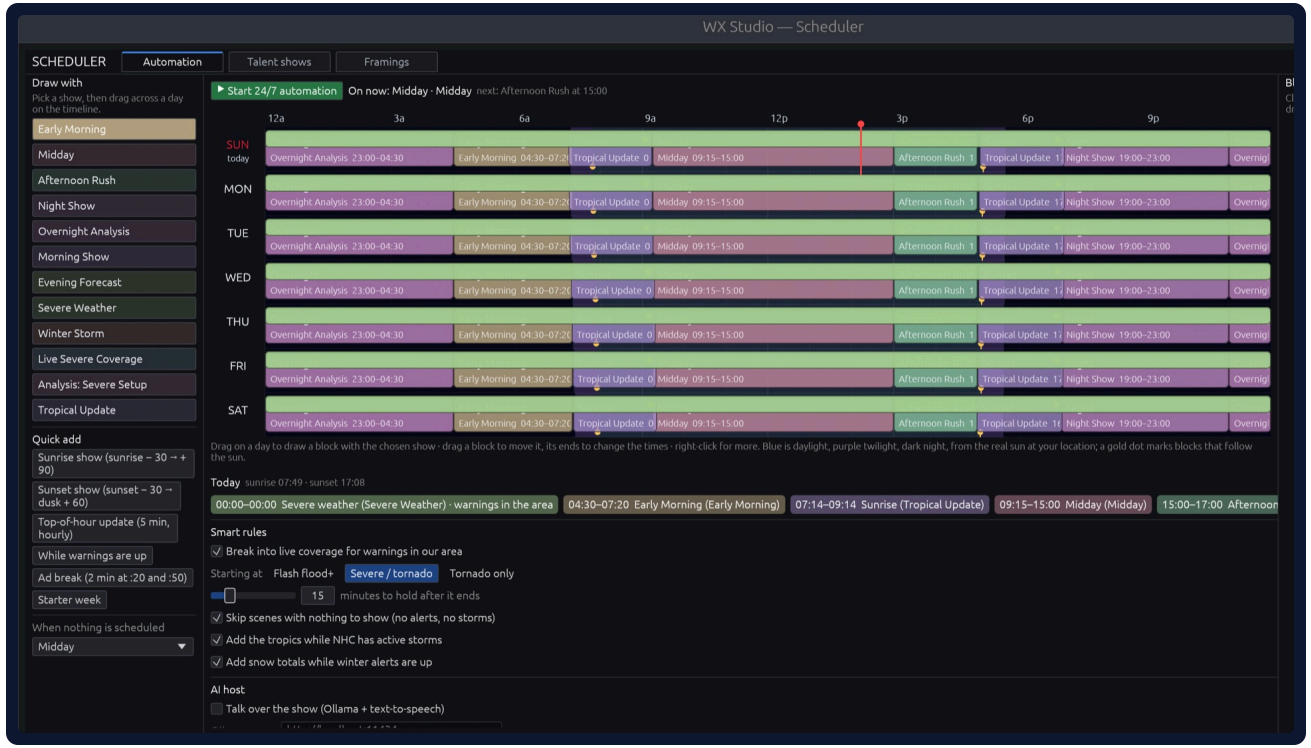
Commute radar, fog, drive times, cameras, futurecast

Satellite, temperatures, the 500 mb pattern, model check

Live Doppler, evening commute, storm fuel and shear

Observations, overnight futurecast, analysis segment

When a qualifying warning touches the area



A week of shows that follow the sun, with inserts and smart rules.

13 · Control and output

FITS THE CONTROL ROOM YOU HAVE.

PROGRAM OUT

Full-screen program and pop-out output windows for capture, chroma-key pages, PNG and image-sequence export.

OBS

Scenes switch OBS scenes as they go to air, and WX Studio follows when the director switches OBS.

PRODUCER PANEL

A web panel on your network with live preview, drag-reorder and text layers, protected by an access token.

TALENT TOOLS

Prompter with talking points, telestrator, lower third and a crawl of custom messages or alerts.

TRANSITIONS

Fly, cut, dissolve, wipe, push, zoom, and 3D swing, cube, flip and fly-away, with house rules for Live mode.

OFFLINE EVENTS

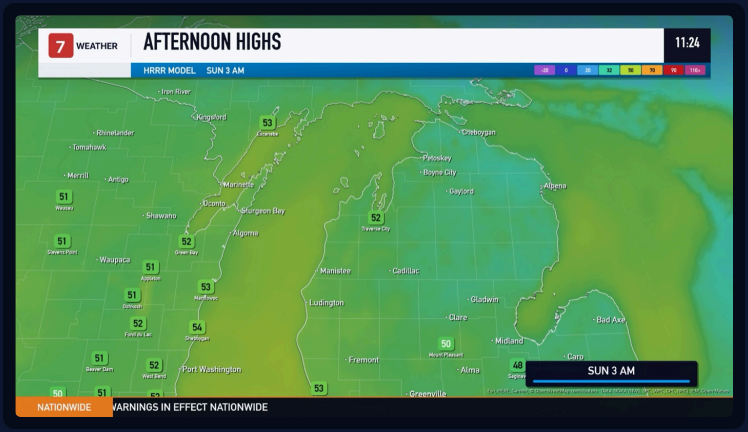
Record every feed of a live show and replay it later with no network, on the event's own clock, for training and demos.

ANALYSIS MODE

The package hides, takes are instant and the cursor reads the value and lat/lon under it.

PERFORMANCE

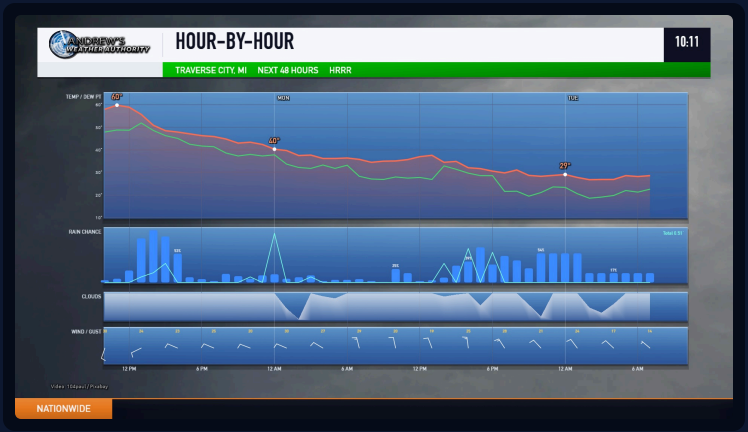
Model loops at 120 fps on Apple silicon; an F12 overlay shows the frame-time budget.



Program output with the Studio title.



Current Conditions, full frame.



Hour-by-Hour from the NWS / NBM.

14 · Specifications

FOR ENGINEERING.

Platform	Native Rust application on one workstation; GPU map on wgpu with an OpenGL fallback. Tested on macOS with Apple silicon.
Output	Preview / Program monitors; program and pop-out windows; NDI with a separate key source; Blackmagic SDI (fill + key); RTMP / SRT streaming; headless playout; scheduled MP4 / PNG renders; chroma key; OBS websocket.
Control	Rundown with hotkeys; producer web panel with roles and an audit log; Stream Deck, Bitfocus Companion, tally and MIDI; prompter; telestrator.
Storage	About 2 GB for model and tile caches; tiles kept 30 days.
License	Signed license key per workstation, checked offline. Subscriptions run to an end date; perpetual keys cover the builds released during their update period.
Optional	ffmpeg for camera video and video logos; Ollama and Piper for the AI host; TomTom key for live traffic.

Data sources

WHERE THE DATA COMES FROM.

Radar	NEXRAD Level III and Level II and the MRMS mosaic (NOAA); IEM and RainViewer mosaics.
Satellite	GOES-19 / GOES-18 ABI and GLM (NOAA on AWS); Himawari-9, GK2A, Meteosat-12.
Models	NOAA NOMADS GRIB2, soundings included; IEM radiosonde archive; ECMWF IFS and AIFS from ECMWF open data; GEM, RDPS and HRDPS from Environment Canada; ICON and UKMET via Open-Meteo.
Hazards	NWS alerts (VTEC); SPC, WPC, CPC, NHC; ATCF guidance.
Data terms	Open-Meteo is free for non-commercial use; a commercial key is supported. Some agencies require their own sign-in for camera video.

Next step

SEE WX STUDIO ON YOUR MARKET, WITH YOUR CALL LETTERS.

Demo builds are set up for your location, radar site and logo, with a starter schedule.

01
SET THE MARKET
Your city, nearest radar, towns and the routes viewers drive.

02
ADD YOUR BRAND
Call letters, logo, fonts, accent color and a title style.

03
PICK THE SCHEDULE
A show for each part of the day, or the starter week.

04
GO ON AIR
Run it live, or start automation and let it run.