CW3E Event Summary: 1–7 April 2024

Multiple ARs over the Southeastern US Fuel Prolific Flooding in the Mid-South

- A series of multiple atmospheric rivers (ARs) made landfall over the Southeastern US between Tue 1 Apr and Mon 7 Apr providing significant moisture which supported heavy rainfall over the Mid-South, causing widespread flooding over the region.

The ARs:

- Multiple ARs moved onshore over the Southeastern US beginning Tue 1 Apr, each associated with pulses of moisture sourced over the Gulf, with IVT > 250 kg m^{-1} s^{-1} over the Mid-South until the system moved offshore the East Coast on Mon 7 Apr.
- A maximum IVT > 1,400 kg m^{-1} s^{-1} was analyzed at 00Z on 3 Apr along the Arkansas/Tennessee border where heavy rain fell.
- These ARs were associated with a stalled synoptic pattern over the Central US, with a relatively stationary mid-level trough providing favorable forcing for ascent along the region of highest moisture transport, leading to heavy rainfall in the Mid-South.

Impacts:

- The ARs resulted in widespread 5-day precipitation totals between 5–10 inches over the Mid-South, with localized precipitation totals greater than 10–15 inches over Arkansas, southeastern Missouri, northwestern Tennessee, and western Kansas.
- Significant river level rises have been observed within the Ohio and Mississippi River basins, with some rivers forecast to continue rising due to long streamflow response times in the region. NWS Flood Warnings remain in effect for some locations.
- National Weather Service offices issued thousands of watches, warnings, and advisories for flood and flash flood hazards over the Mid-South due to the prolonged rainfall, with hundreds of flood-related Local Storm Reports received.
- These ARs were associated with a multi-day severe weather outbreak over the region, with multiple tornadoes.

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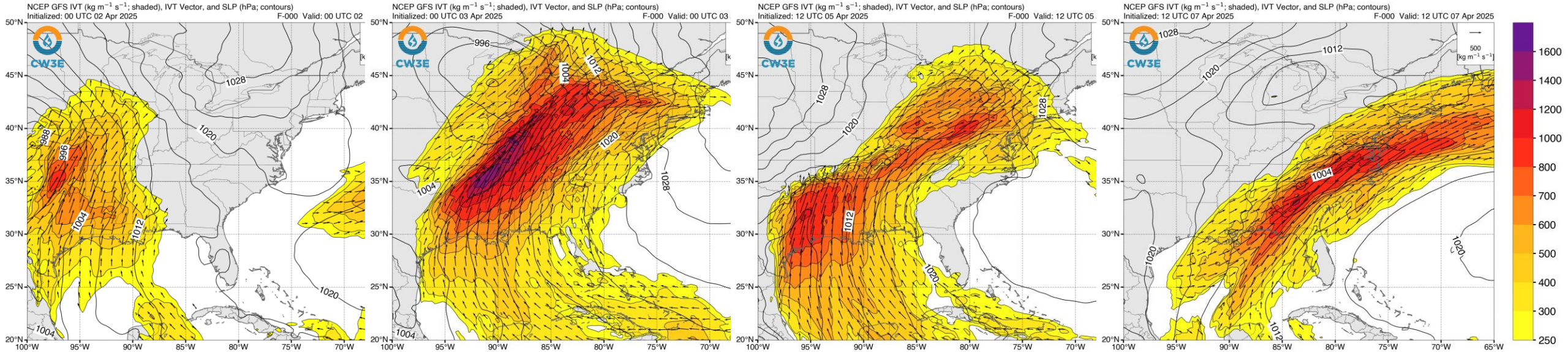
Atmospheric River – GFS IVT and SLP

Valid: 00 UTC 2 Apr 2025 | **Valid: 00 UTC 3 Apr 2025** | **Valid: 12 UTC 5 Apr 2025** | **Valid: 12 UTC 7 Apr 2025**



- Multiple atmospheric rivers embedded within a relatively stationary synoptic pattern transported significant moisture onshore over the Mississippi, Ohio, and Tennessee River Valleys beginning 1 Apr, resulting in a multi-day precipitation event that produced widespread flooding.
- Strong moisture transport was supported by persistent southerly-to-southwesterly flow downstream of the mid-level trough, low-level anticyclonic return flow west of the Bermuda High, and moisture convergence along a nearly stationary frontal boundary. Unlike ARs along the West Coast, the highest IWV values were observed over land.
- These ARs were associated with multiple pulses of IVT that moved onshore, with a max IVT > 1,400 kg m^{-1} s^{-1} on Thu 3 Apr
- A relatively stationary 500 mb trough (*not shown*) provided favorable mid-level forcing for ascent along the area of highest moisture transport, supporting a multi-day precipitation event over the Mississippi and Ohio River Basins

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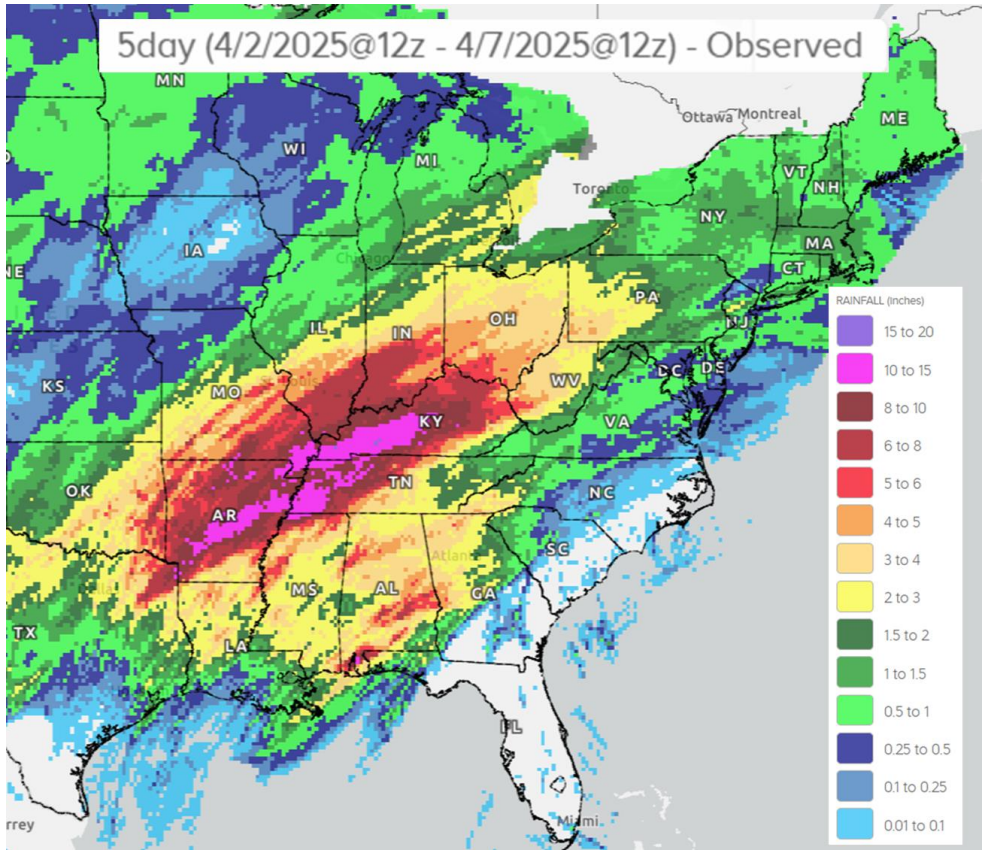
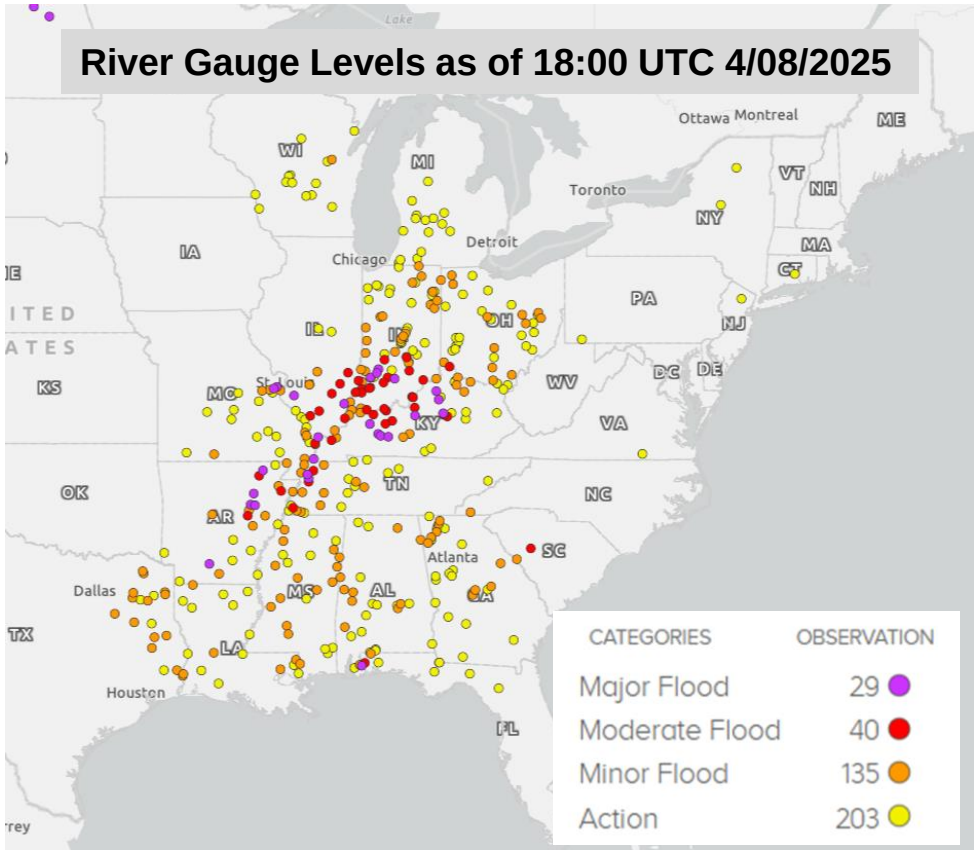
Data Accessed Via: https://water.noaa.gov/

5-Day Precipitation Totals & Streamflow Response





- This series of ARs resulted in a widespread region of 5–10 in. of precipitation over the Mid-South during a 5-day period, with a band of rainfall totals > 10–15 in. over Arkansas, southeastern Missouri, western Tennessee, and western Kentucky.
- Significant streamflow responses have been observed across the Ohio River Basin, Upper Mississippi River Basin, and Lower Mississippi River Basin. Due to relatively flat terrain streamflow responses are expected to be slow over the region, with some rivers forecast to continue rising over the coming days. NWS flood warnings remain in effect for some locations.

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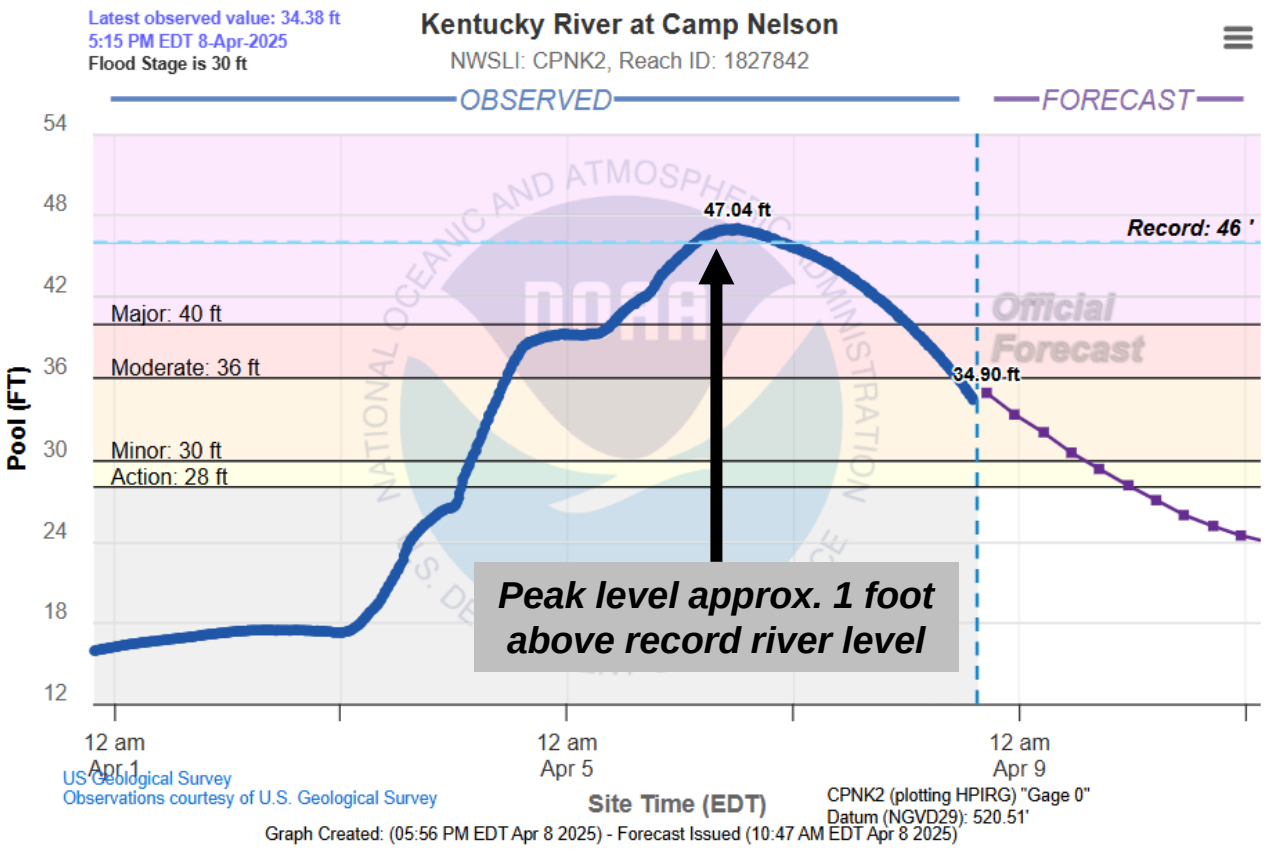
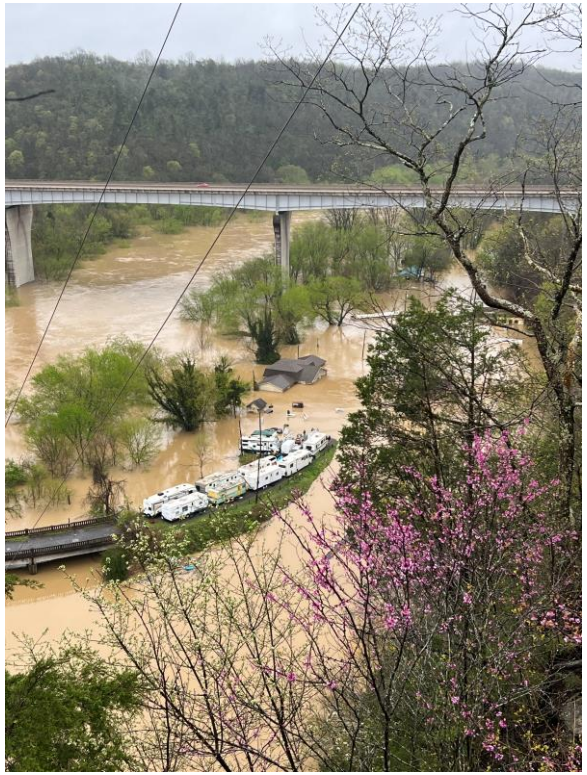
Streamflow Response





Flooding pictured along the Kentucky River near Camp Nelson Island RV Park, 2 miles upstream of the stream gage. *Credit: Cale Canter via WKYT*

https://www.wkyt.com/2025/04/06/multiple-portions-kentucky-river-expected-reach-record-breaking-flood-levels/

- An example of extreme flow response was observed along the Kentucky River at Camp Nelson in Central Kentucky where river levels rose by 30 feet between 3–6 Apr, cresting one foot above the record flood level (~47 feet, records date to 1913).
- The US Army Corps of Engineers had to suspend and limit some operations along the Ohio and Mississippi Rivers as a result of the extremely high river levels and flows along waterways.

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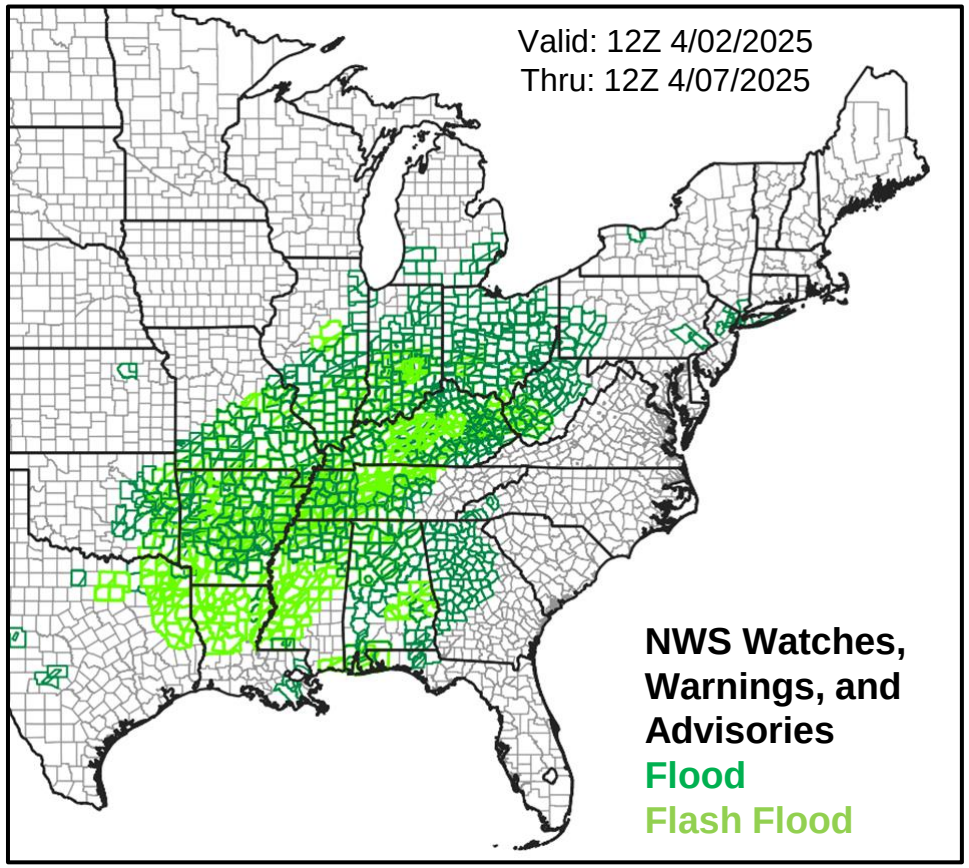
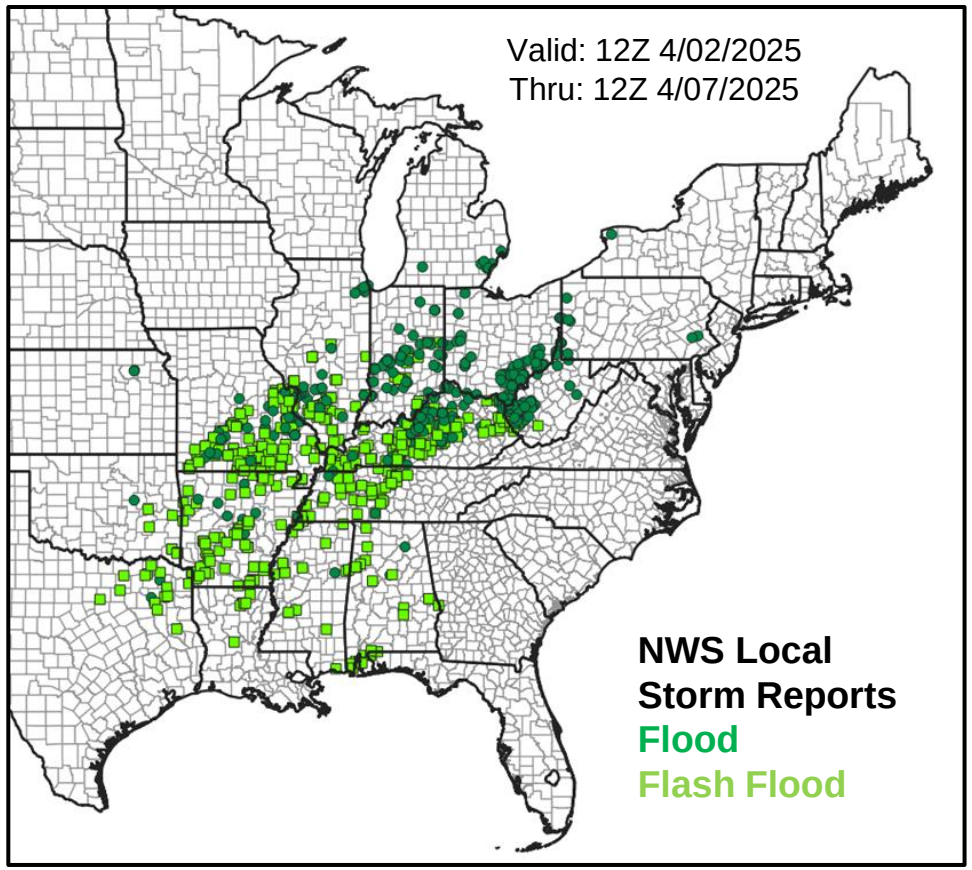
Data Accessed Via: https://mesonet.agron.iastate.edu/nws/

Flood and Flash Floods Watches, Warnings, and Advisories & Local Storm Reports





- Nearly 5,000 Flood and Flash Flood watches, warnings, and advisories were issued by NWS Weather Forecast Offices over the Ohio and Mississippi River Basins between 12Z 4/02/2025 – 12Z 4/07/2025
- Over 900 Flood and Flash Flood local storm reports were received by the NWS during this period as well, highlighting the widespread hazardous impacts observed during this event.

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Impacts: Arkansas, Tennessee, Kentucky

Credit: Arkansas DOT
https://x.com/myARDOT/status/1909288376307777958

Credit: Tennessee DOT
https://x.com/myTDOT/status/1908663673771471094

Credit: Kentucky State Police
https://x.com/kystatepolice/status/1908621149832896665

1) Flooding in Northern Arkansas, water from the Strawberry River overtopping Highway 115 in Jesup, AR on 4/06/2025
2) Flooding in Western Tennessee, roadways flooded along SR 54 north of Brownsville, TN on 4/05/2025
3) Flooding in Central Kentucky, road surfaces undermined along Cathole Bend Rd in Garrand County, KY on 4/05/2025

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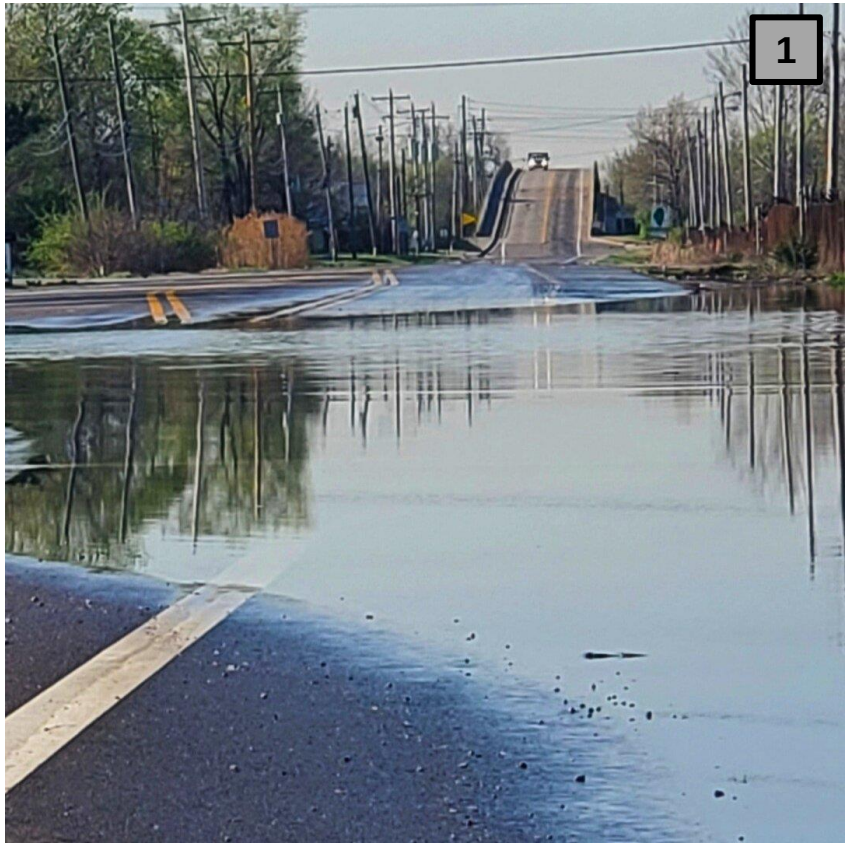
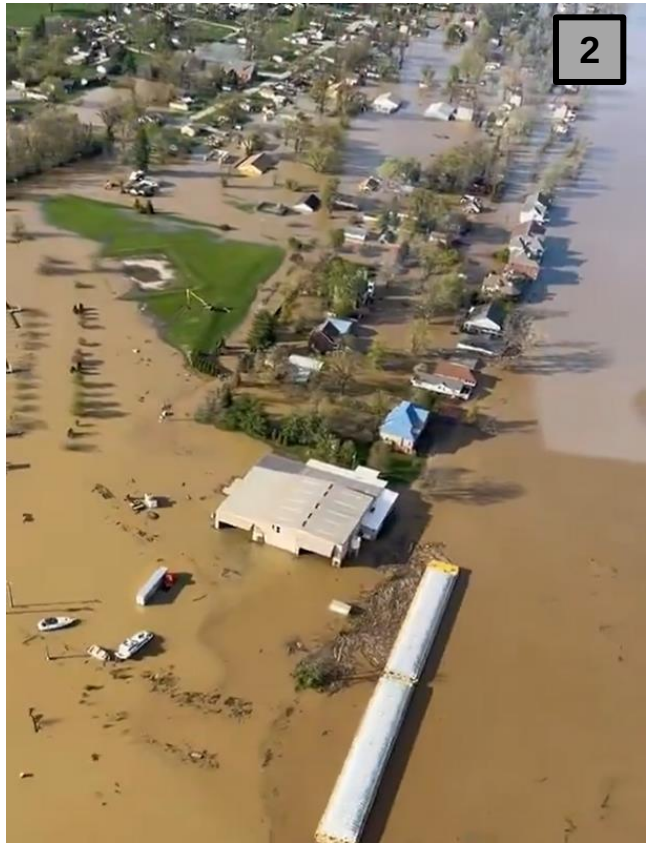
Impacts: Illinois, Indiana, Ohio



Credit: Illinois DOT
https://x.com/IDOT_Illinois/status/1909310835794886804



Credit: Scottie Maples, Clark County Sheriffs Office
https://x.com/ScottieMaples/status/1909388822766321867

Credit: Cincinnati Parks
https://x.com/CincyParks/status/1908474765611839747

1) Flooding in Southern Illinois, flooding caused road closures in Madison, Johnson, and Jackson counties, photo from 4/07/2025
2) Flooding in Southern Indiana, communities along the Ohio River were inundated near Utica, IN on 4/07/2025
3) Flooding in Southern Ohio, river rises along the Ohio River caused waterfront flooding in Cincinnati, OH on 4/05/2025