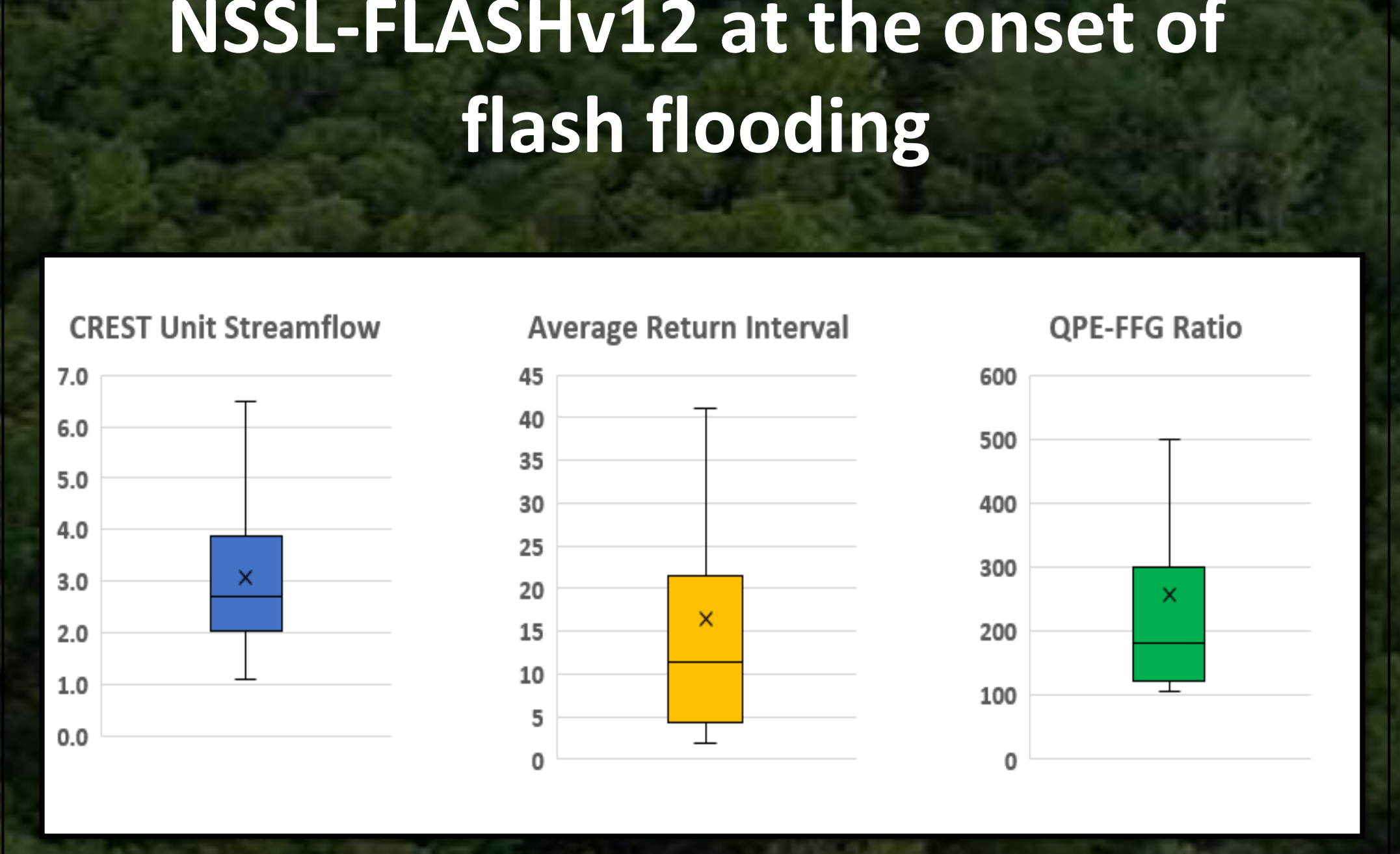
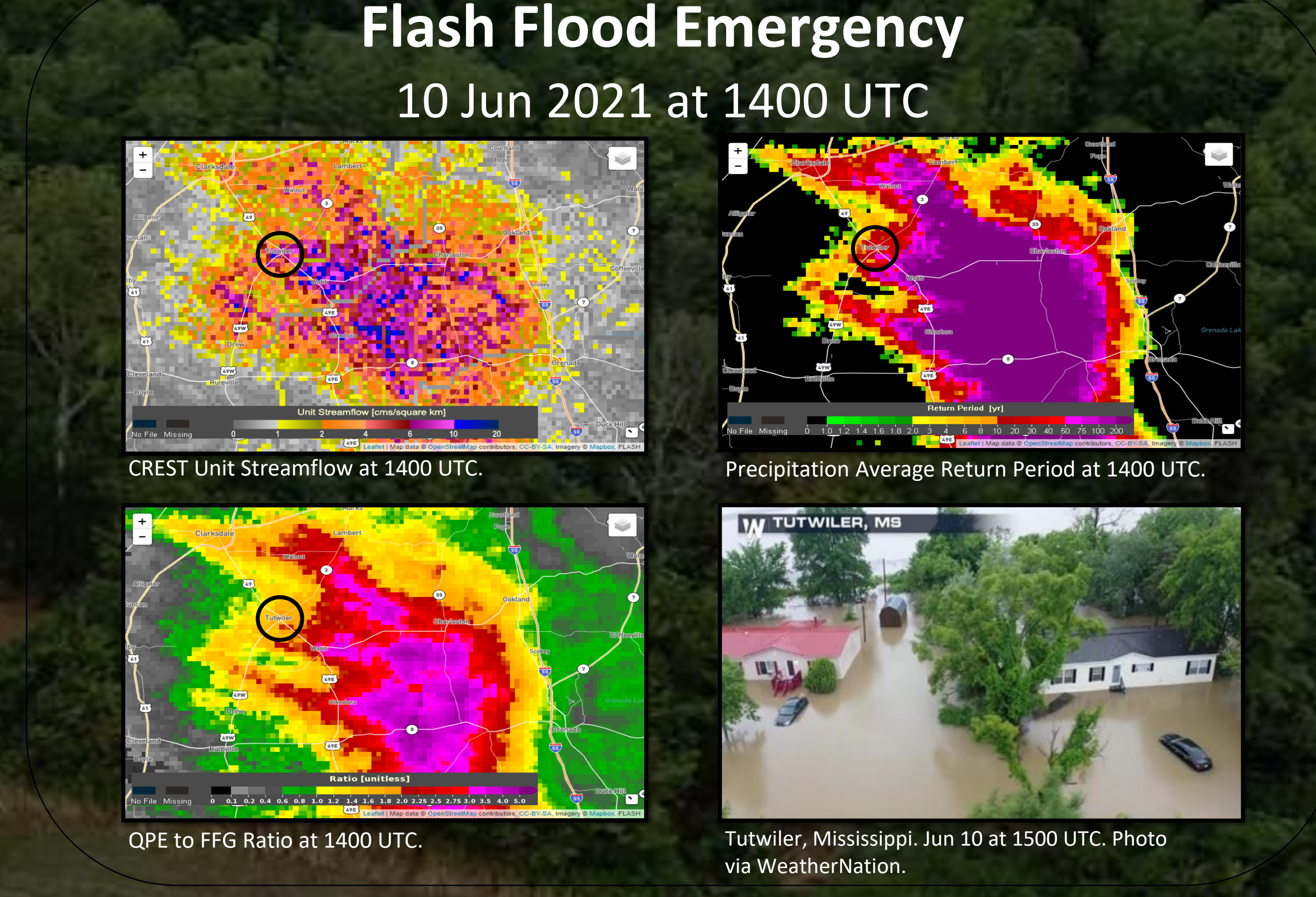
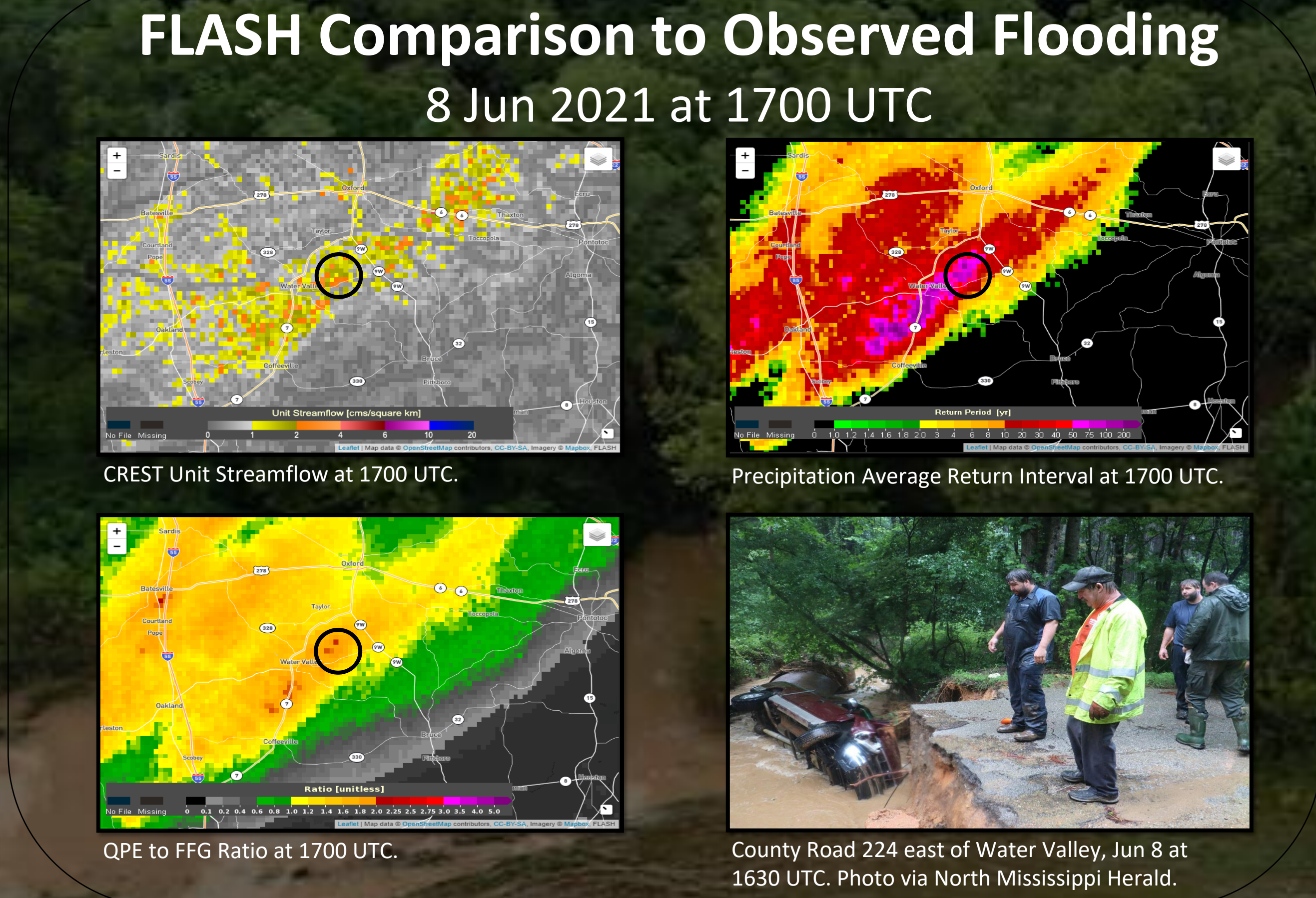
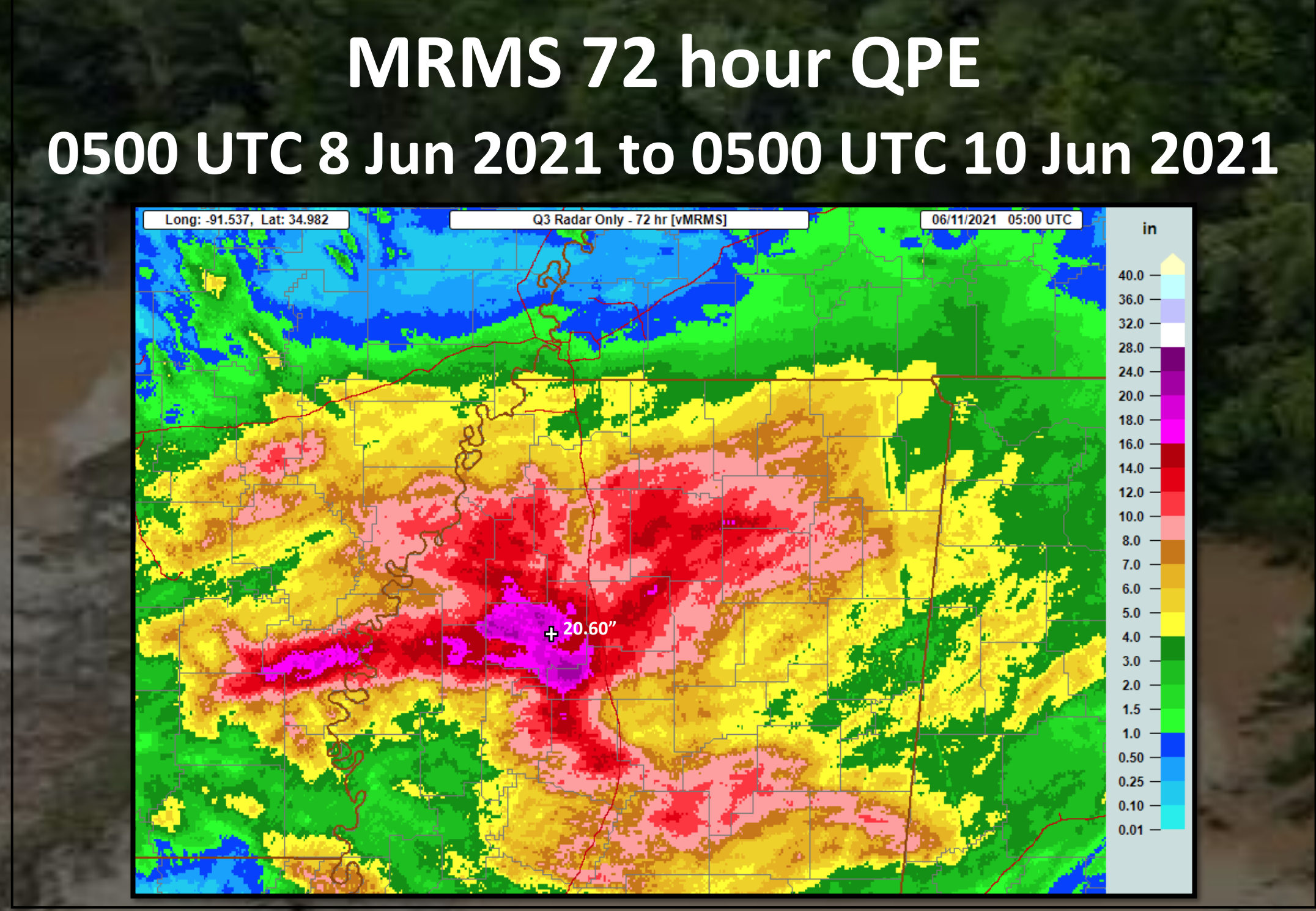




The Historic North Mississippi Flash Floods of June 2021: A FLASH Analysis

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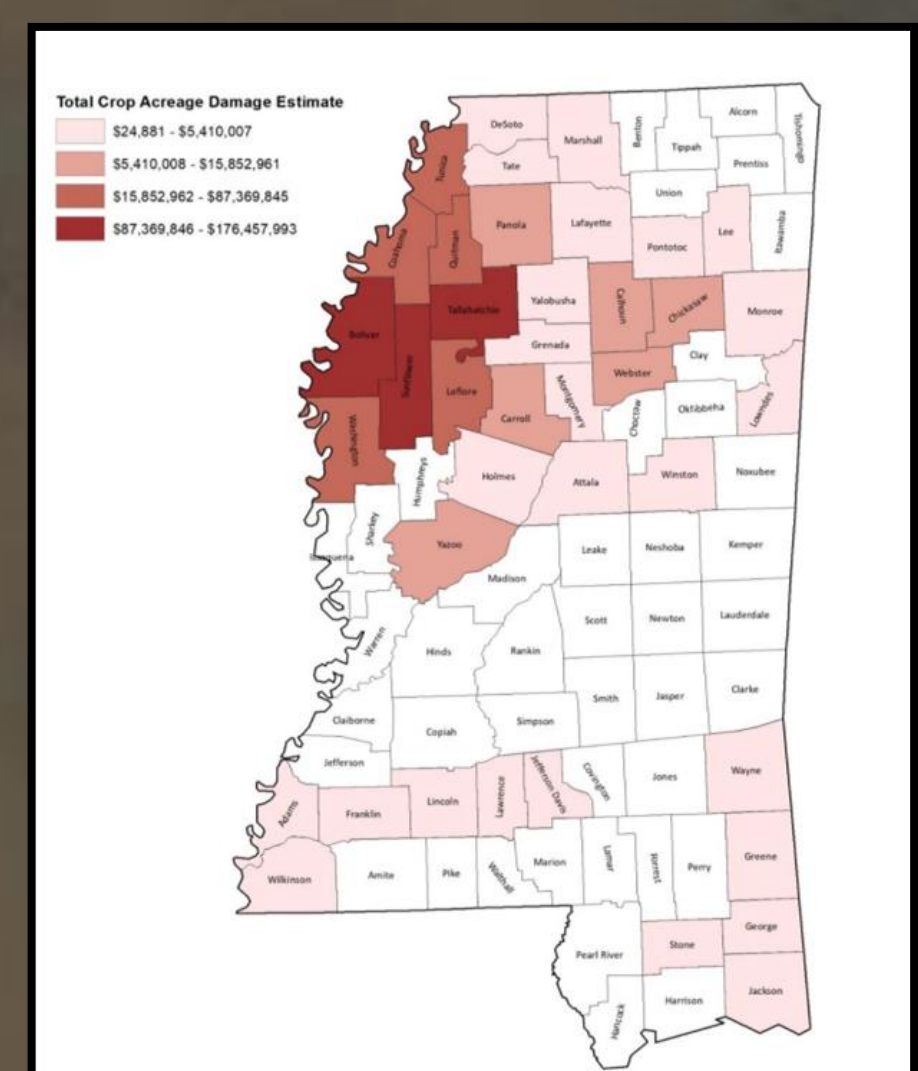
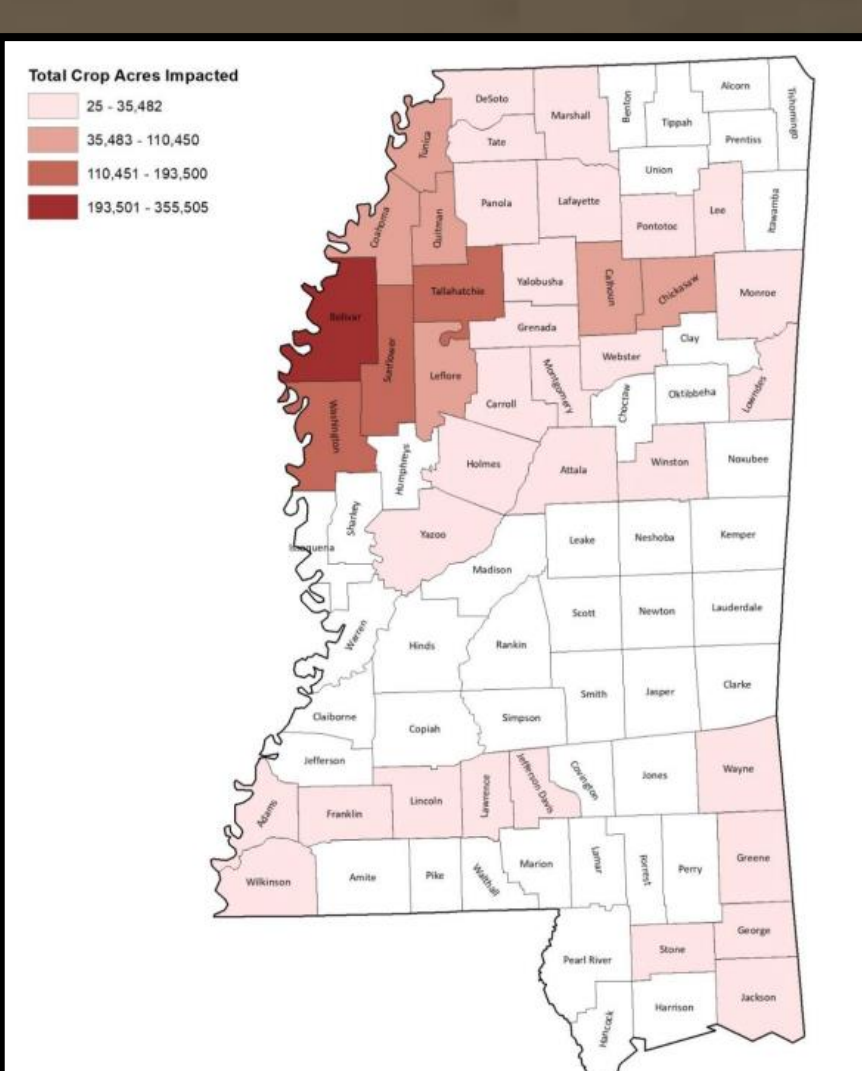


CWA Impacts

- 95 homes received flood damage
- 8 businesses affected
- At least 200 road closures
- 20.60" of rain measured 3.5 miles SW of Charleston (Tallahatchie County)

Catastrophic agricultural losses across north Mississippi (estimated \$869M)

Nearly 1.5 million crop acres were affected by the flood waters



Brian Mills, 2021 Mississippi Agricultural Crop Damage Assessment, Page 2.

Brian Mills, 2021 Mississippi Agricultural Crop Damage Assessment, Page 3.

Recommendations

1. Ensure rainfall rates are included in the analysis. Backbuilding convection with rates greater than 50.8 mm/hr (2 in/hr) can quickly overwhelm drainage systems.
1. A good threshold to anticipate the onset of flash flooding is CREST Maximum Unit Streamflow of 2.0-2.5 m³s⁻¹km⁻² (180-230 cfs*mi⁻²). QPE/FFG Ratio > 120% captured 75% of flash flooding reports. Waiting until these values are reached would significantly limit lead time, so forecasters need to anticipate these magnitudes based on rainfall persistence, rates, and land use.
1. Average Return Interval may not be a good proxy for flash flooding. Use ARI to assess the rarity of the event, not the magnitude.
1. Incorporate Maximum Streamflow into flooding assessment, especially near mapped creeks, streams, and rivers. This seemed to handle riverine flooding impacts relatively well in short-fused warning scenarios.
1. Recognize patterns conducive to significant rainfall and message appropriately.

NSSL-FLASHv12 Products Used

- CREST Maximum Unit Streamflow**
 - Flash flooding likely at > 2.0-2.5 m³s⁻¹km⁻²
 - Significant flash flooding likely at > 6 m³s⁻¹km⁻²
- Precipitation Average Return Periods**
 - Longer return periods imply more unusual precipitation event, not necessarily flooding
- QPE/FFG Ratio**
 - Flash flooding is becoming more likely at > 100 (may need to mentally adjust in urban areas)

Synoptic Pattern Recognition

Pattern matched Maddox mesohigh analog. Rich moisture streaming over old outflow boundary. Ascent aided by quasi-stationary upper low to the northwest and attendant mesoscale convective vortices.

Maddox et al. (1979) Mesohigh Flash Flood Pattern