



The Advance Lateral Spread A Massive and Potentially Seismically Induced Feature in Southeast Missouri

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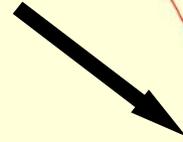
AEG Annual Meeting - September 24, 2009

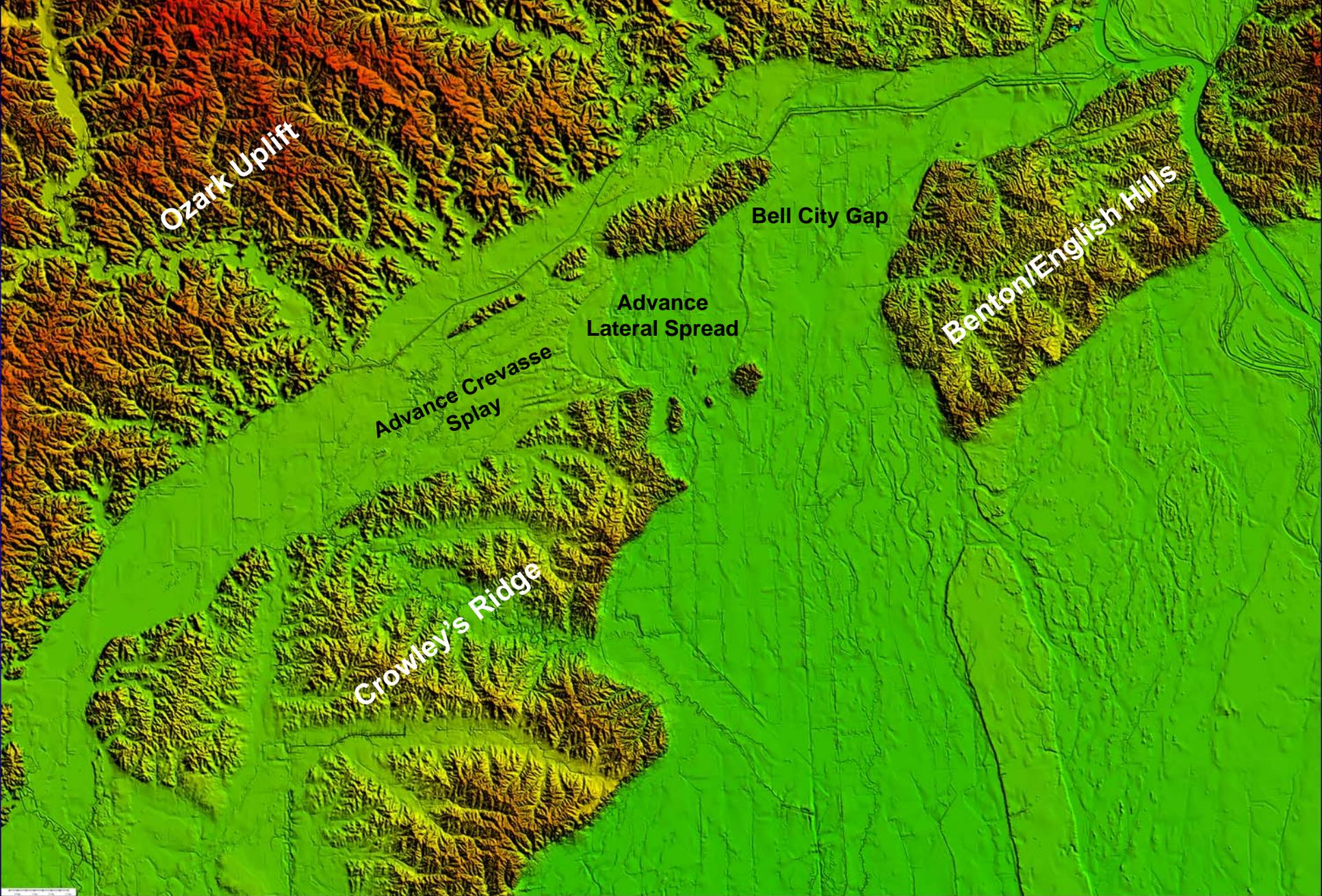
General Overview

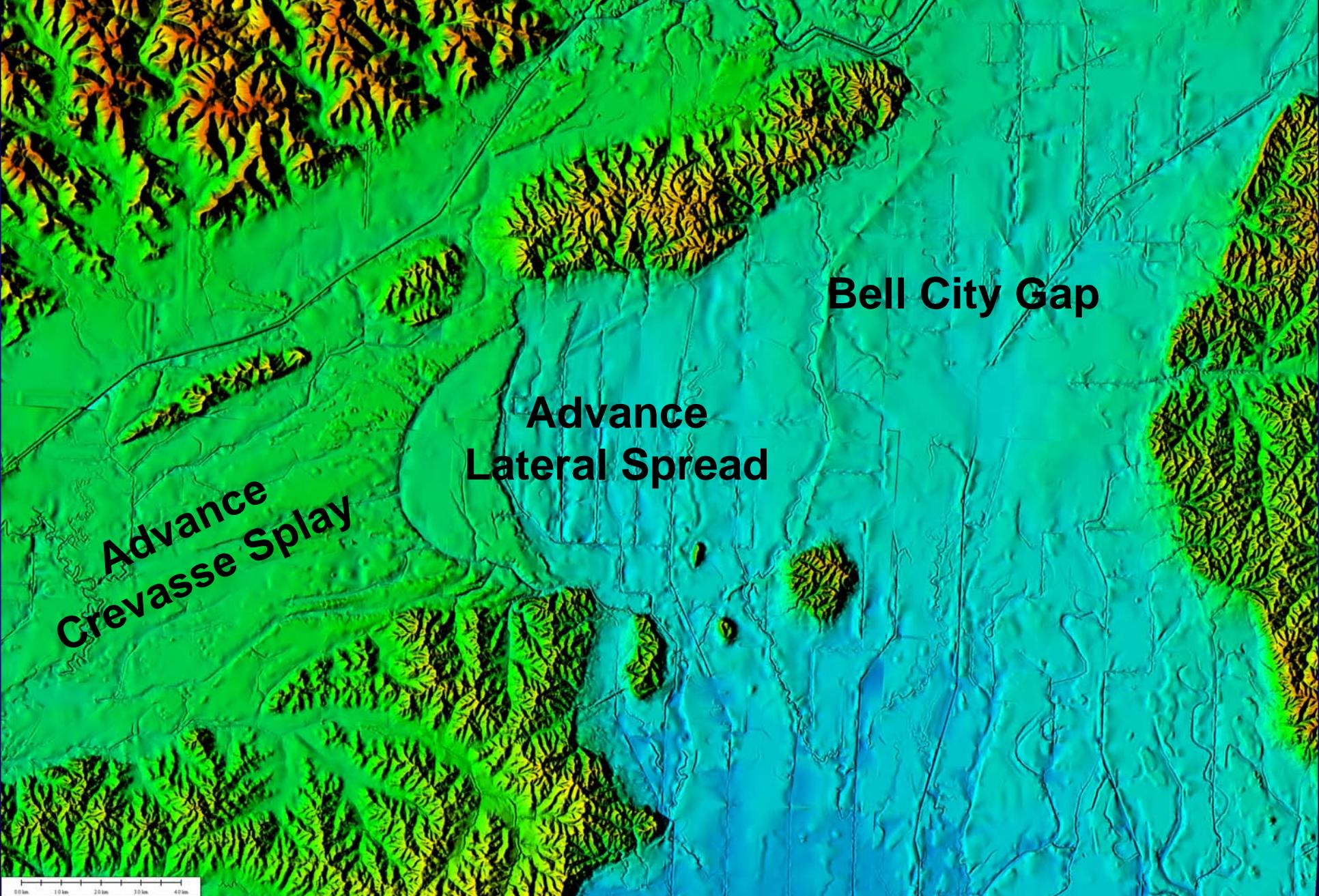
- **Location: Southeast Missouri within “Bootheel” region of state. The feature is located in the upper Mississippi Embayment within the Bell City Gap of Crowley’s Ridge just east of the towns of Advance and Toga, Missouri**
- **Is located at the head of the Advance Crevasse Splay, a late Pleistocene outbreak of the Mississippi River**
- **Aerial extent of approximately 67 square kilometers**
- **Straddles the borders of 4 different southeast Missouri counties: Bollinger, Cape Girardeau, Scott, and Stoddard**
- **Located in seismically active region of the United States**
- **Likely one of the largest identified features of its type in the world**



Advance Lateral Spread







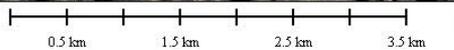
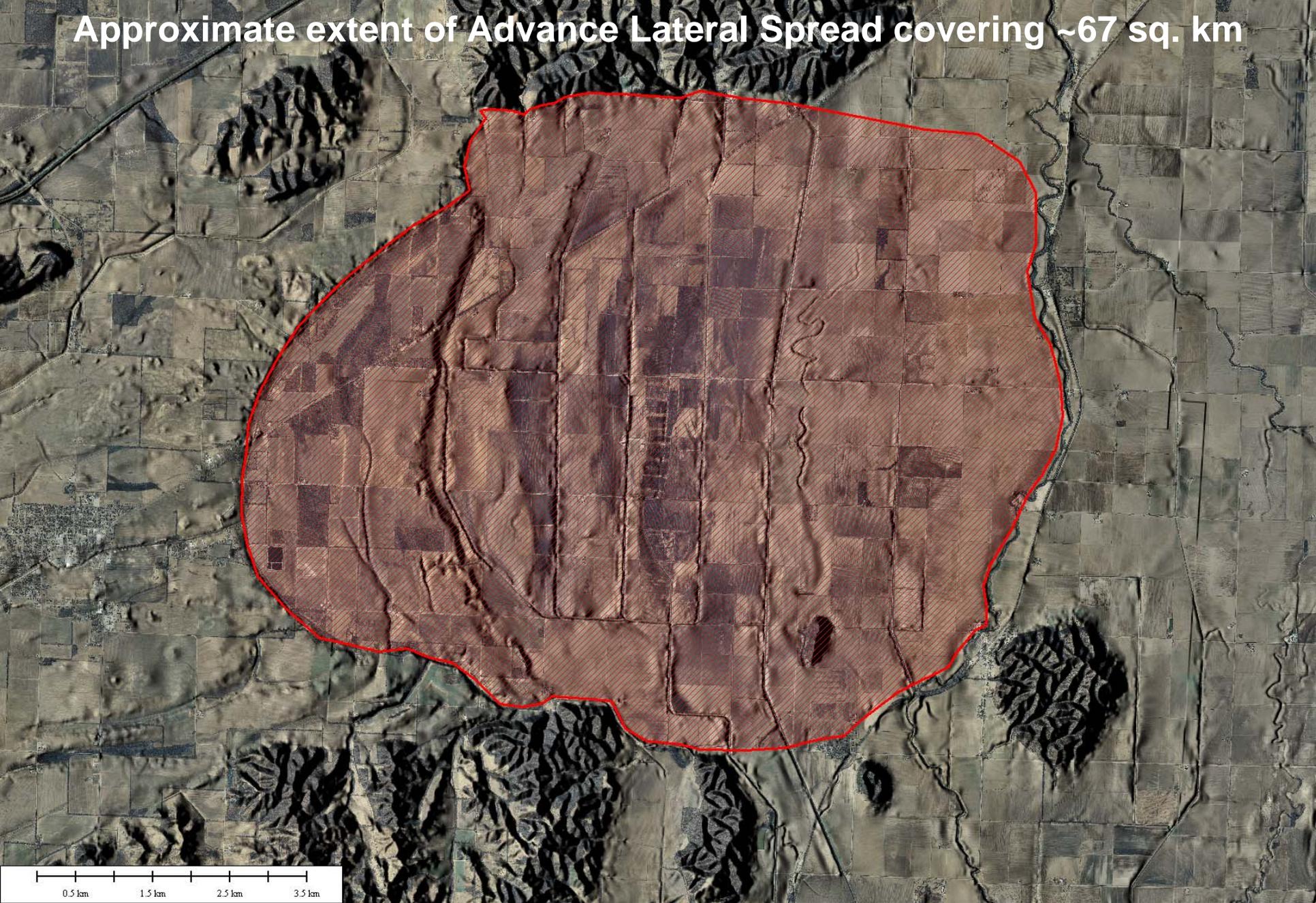
**Advance
Crevasse Splay**

**Advance
Lateral Spread**

Bell City Gap



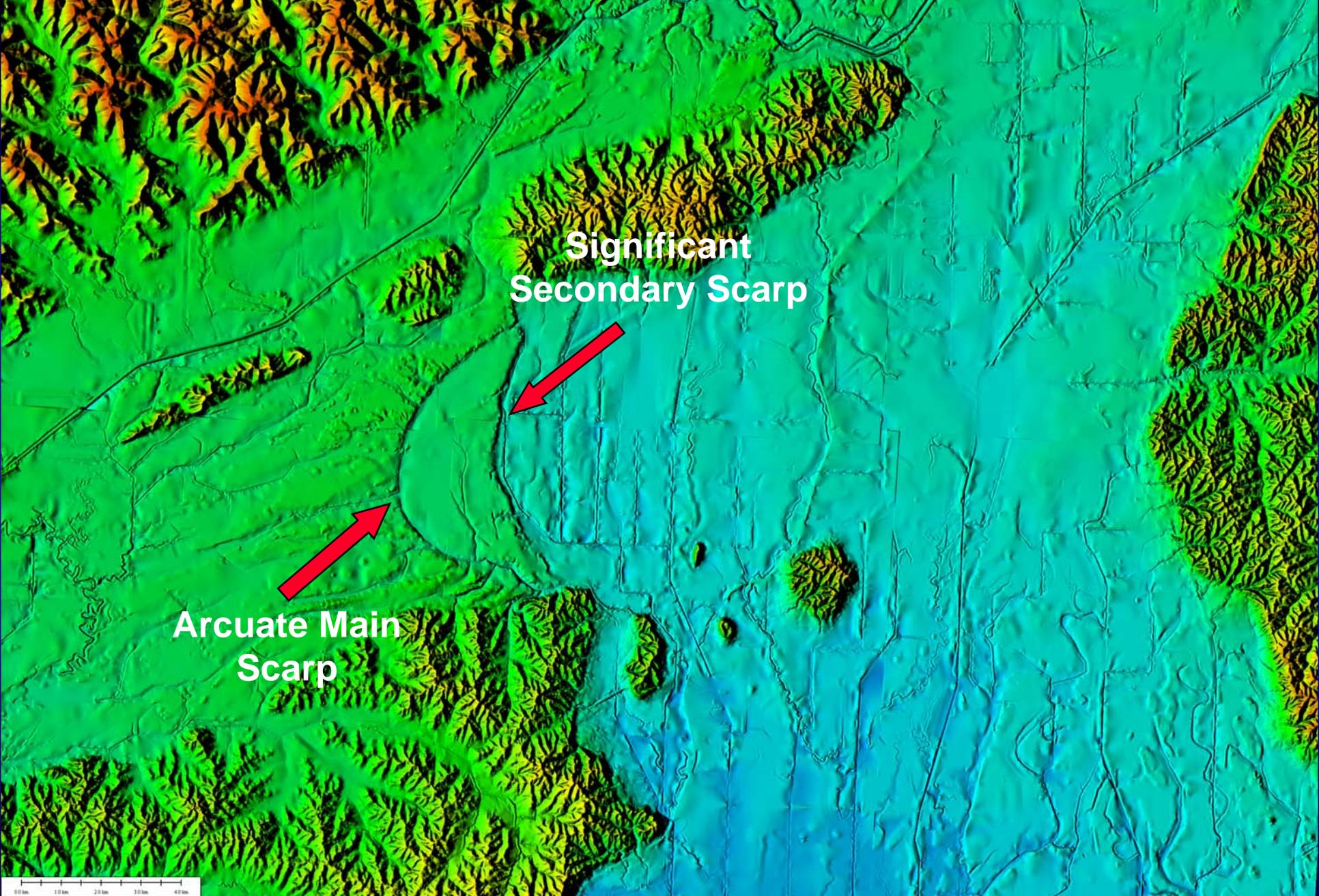
Approximate extent of Advance Lateral Spread covering ~67 sq. km



Identified by its geomorphic expression

- Striking arcuate headscarp with height of ~5 meters
- Numerous subsidiary scarps within translated mass, many of which have been re-used as drainage/irrigation ditches by agricultural users
- Significant secondary scarp, also ~5 meters high, indicative of at least one major reactivation
- Disrupted surface drainages
- Roughly fan-shaped nature

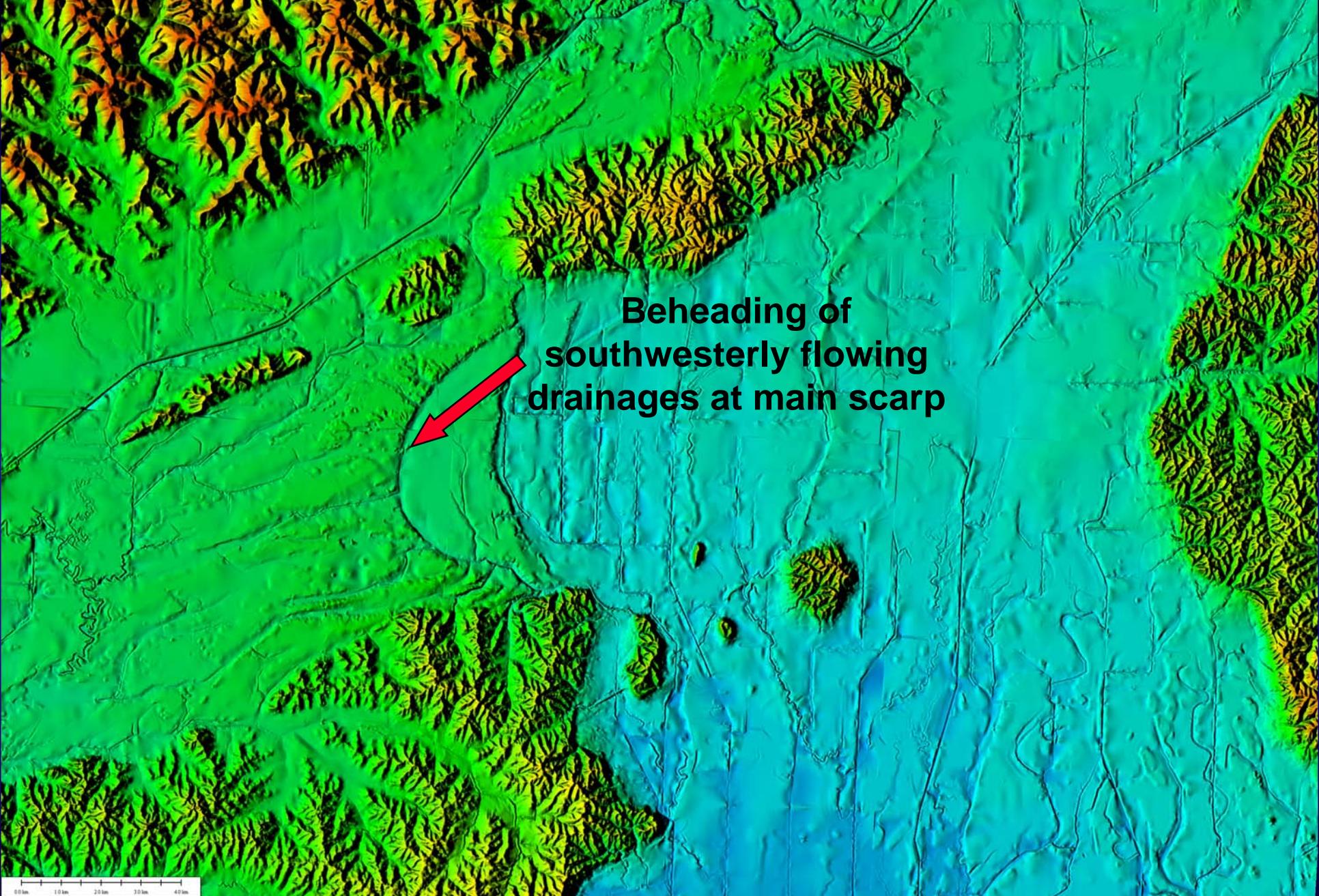




Disruption of Surface Drainage

- Beheading of drainages flowing to the southwest by main scarp
- Water commonly ponds in fields in low portions of feature
- Diversion of Whitewater River (at toe of feature) by approximately 1.6 km and hydraulic choking of the waterway

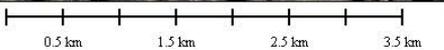




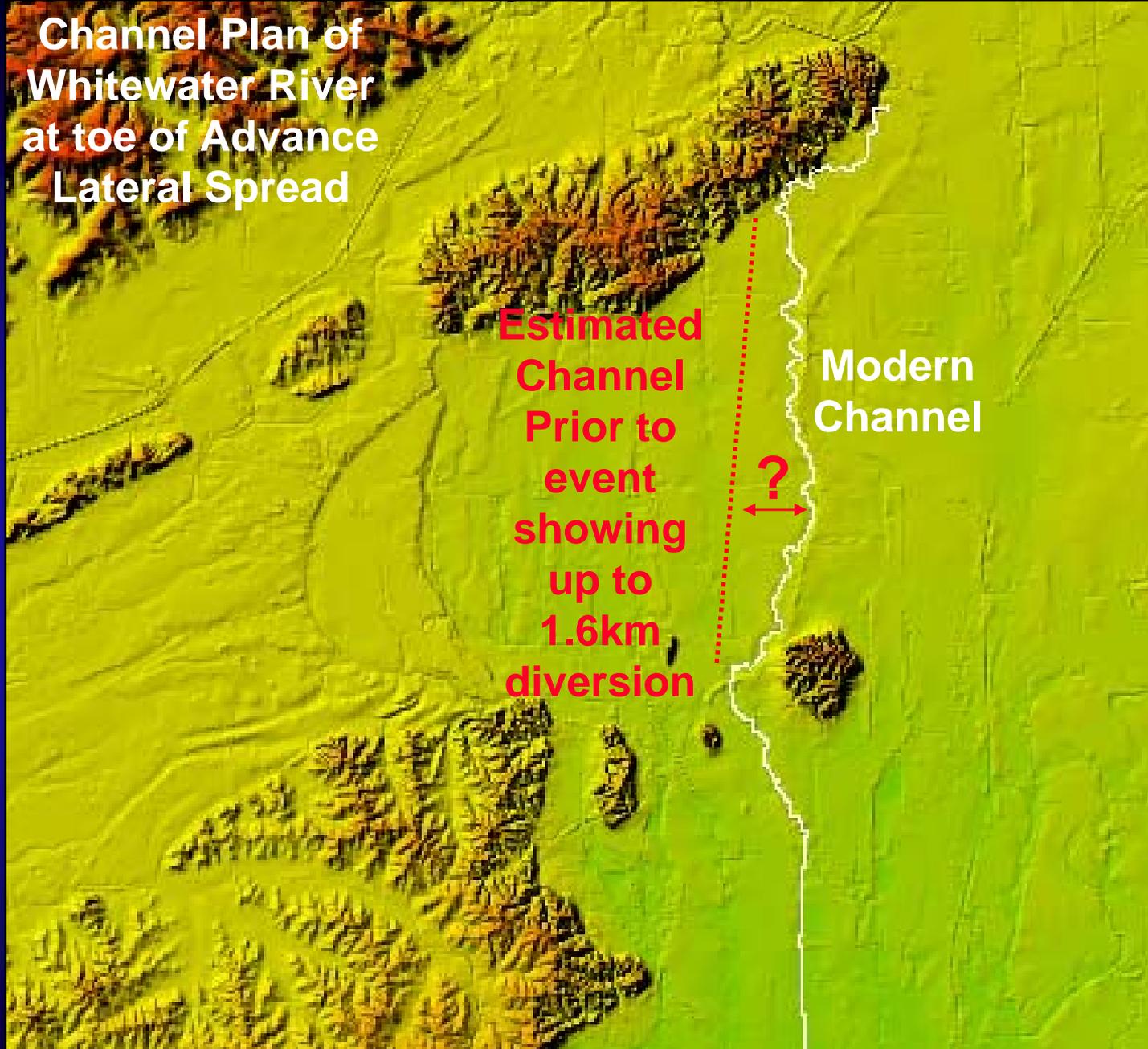
**Beheading of
southwesterly flowing
drainages at main scarp**



Note: Darker areas in center of feature are fields containing ponded water

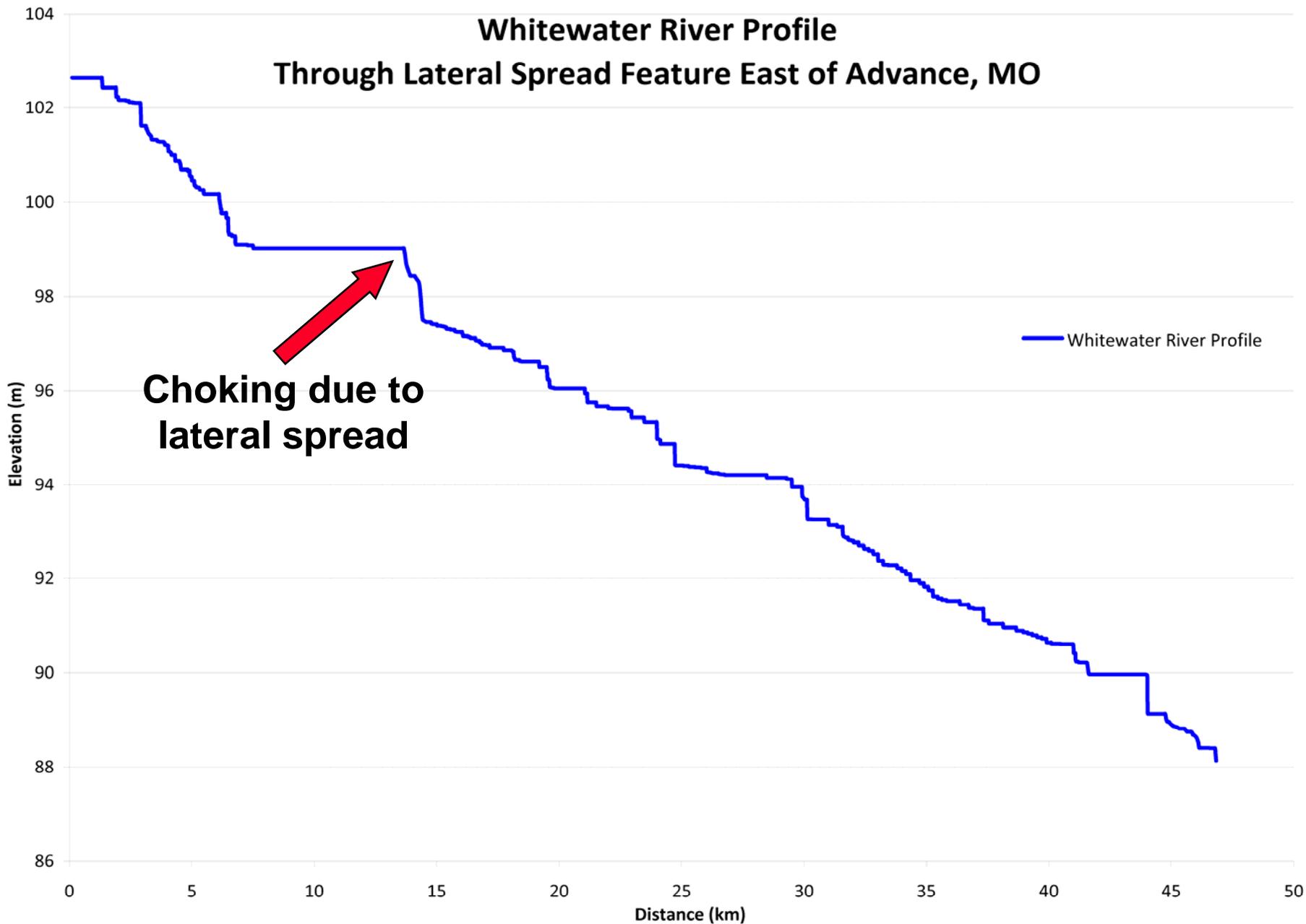


**Channel Plan of
Whitewater River
at toe of Advance
Lateral Spread**

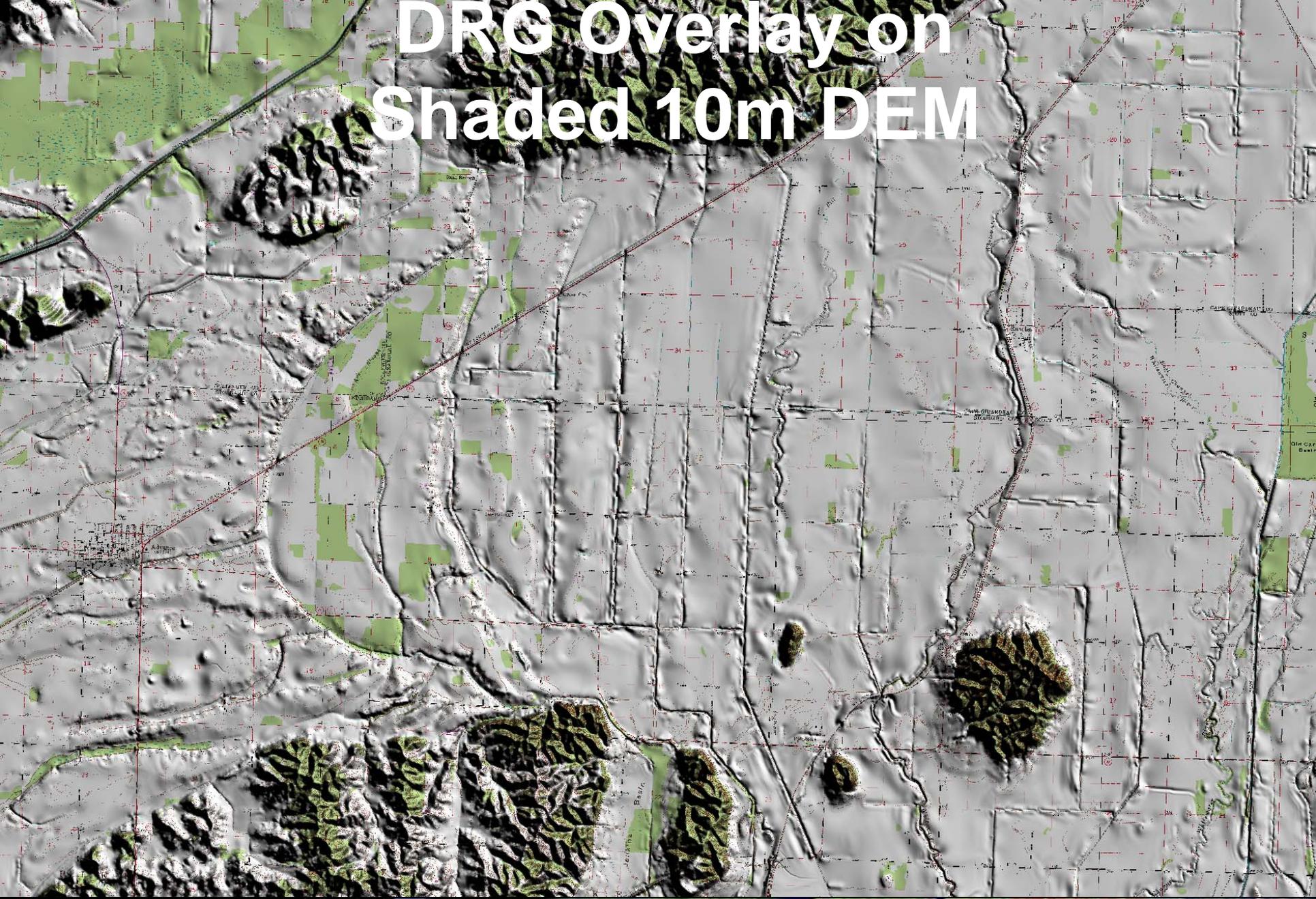


Whitewater River Profile

Through Lateral Spread Feature East of Advance, MO



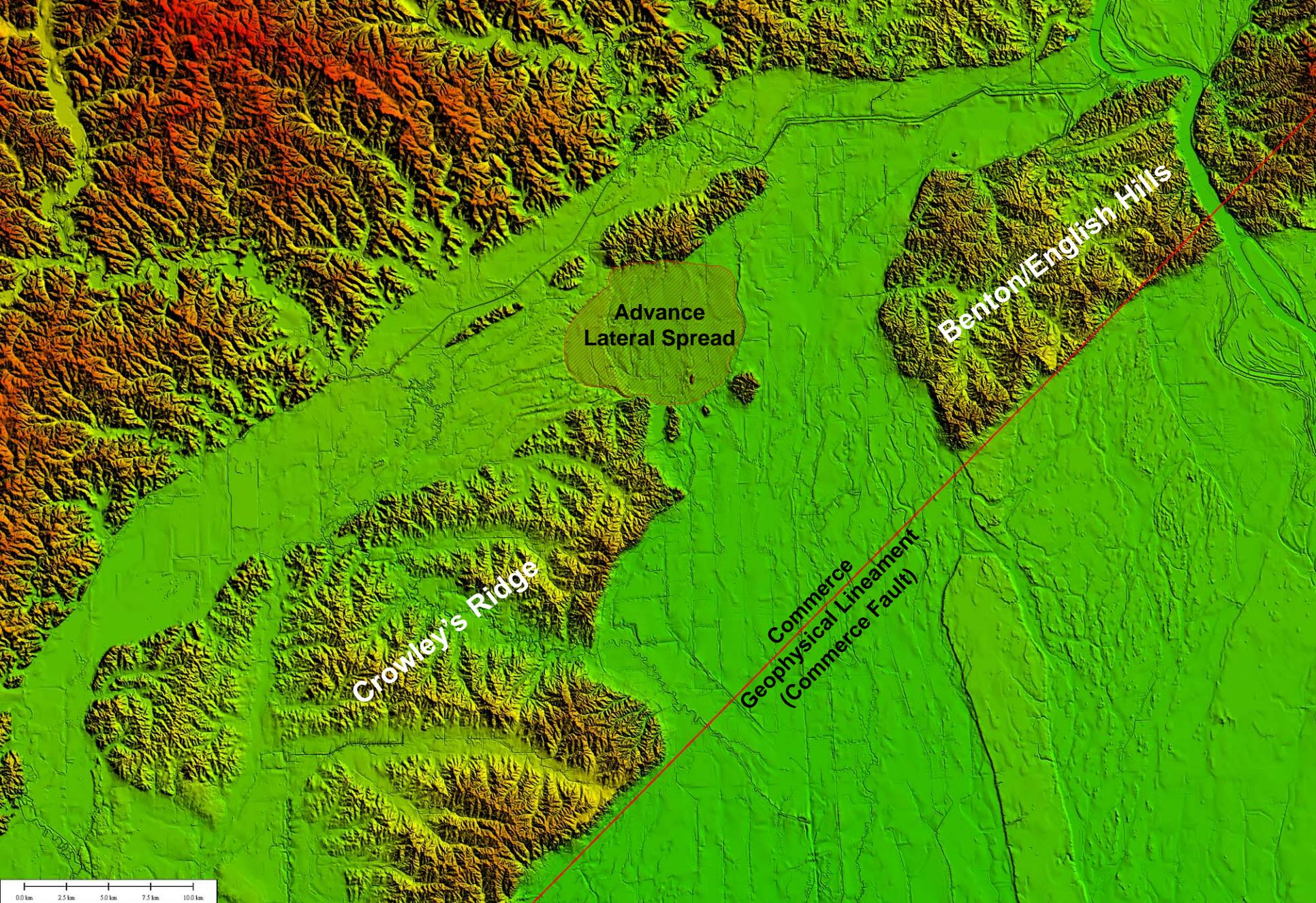
DRG Overlay on Shaded 10m DEM



Feature is Located in Active Seismic Region

- Located within 50 kilometers of 3 of at least 6 segments comprising the New Madrid Seismic Zone
- Located just 16 kilometers northwest of the Commerce Geophysical Lineament (also known as Commerce Fault), named for the nearby town of Commerce, Missouri.
- Recent trenching along the English/Benton Hills and Crowley's Ride have discovered Holocene faulting, likely related to Commerce Geophysical Lineament.





Advance
Lateral Spread

Crowley's Ridge

Benton/English Hills

Commerce
Geophysical Lineament
(Commerce Fault)



Recently Trenched Holocene Faults

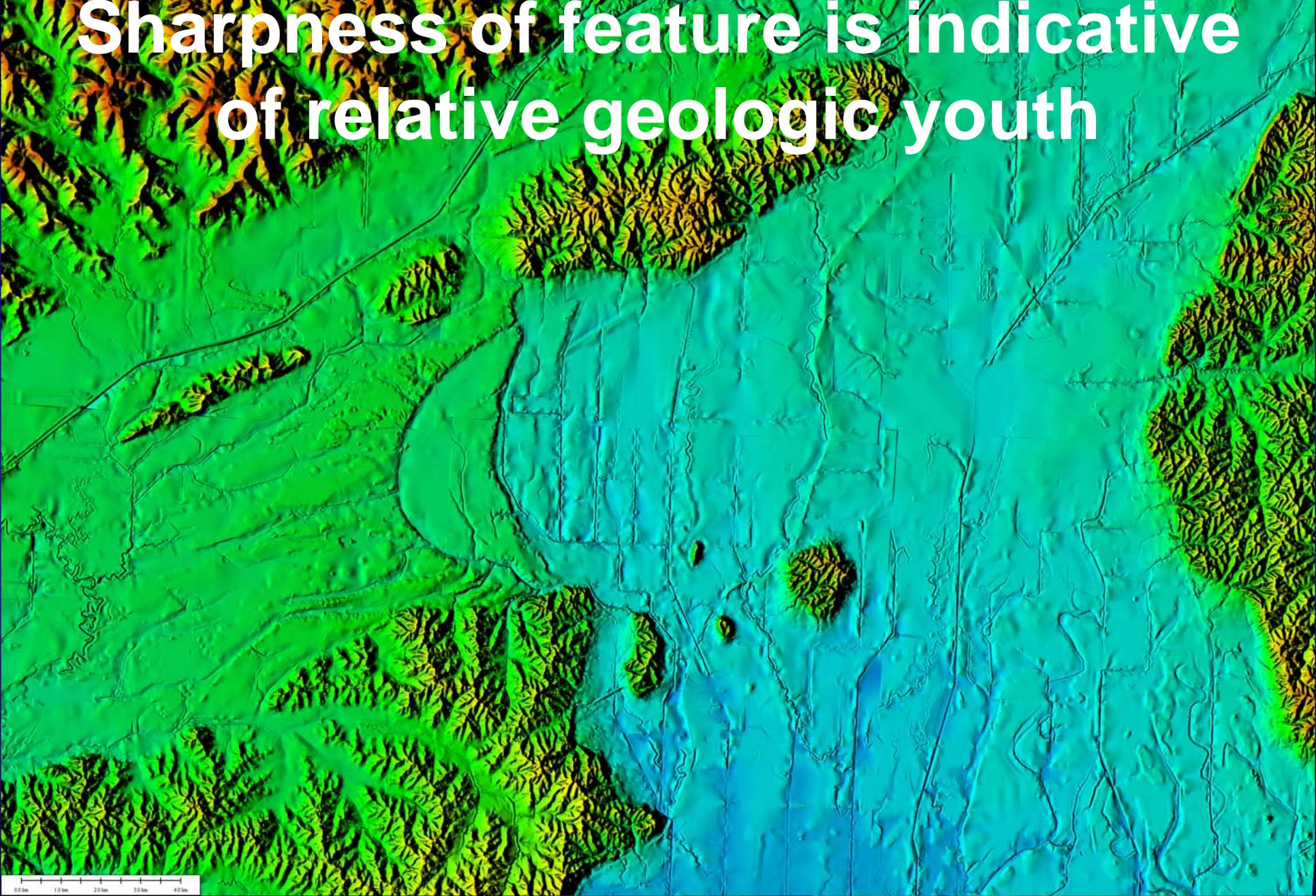


From: Missouri Seismic Safety Commission – 1999 Annual Report

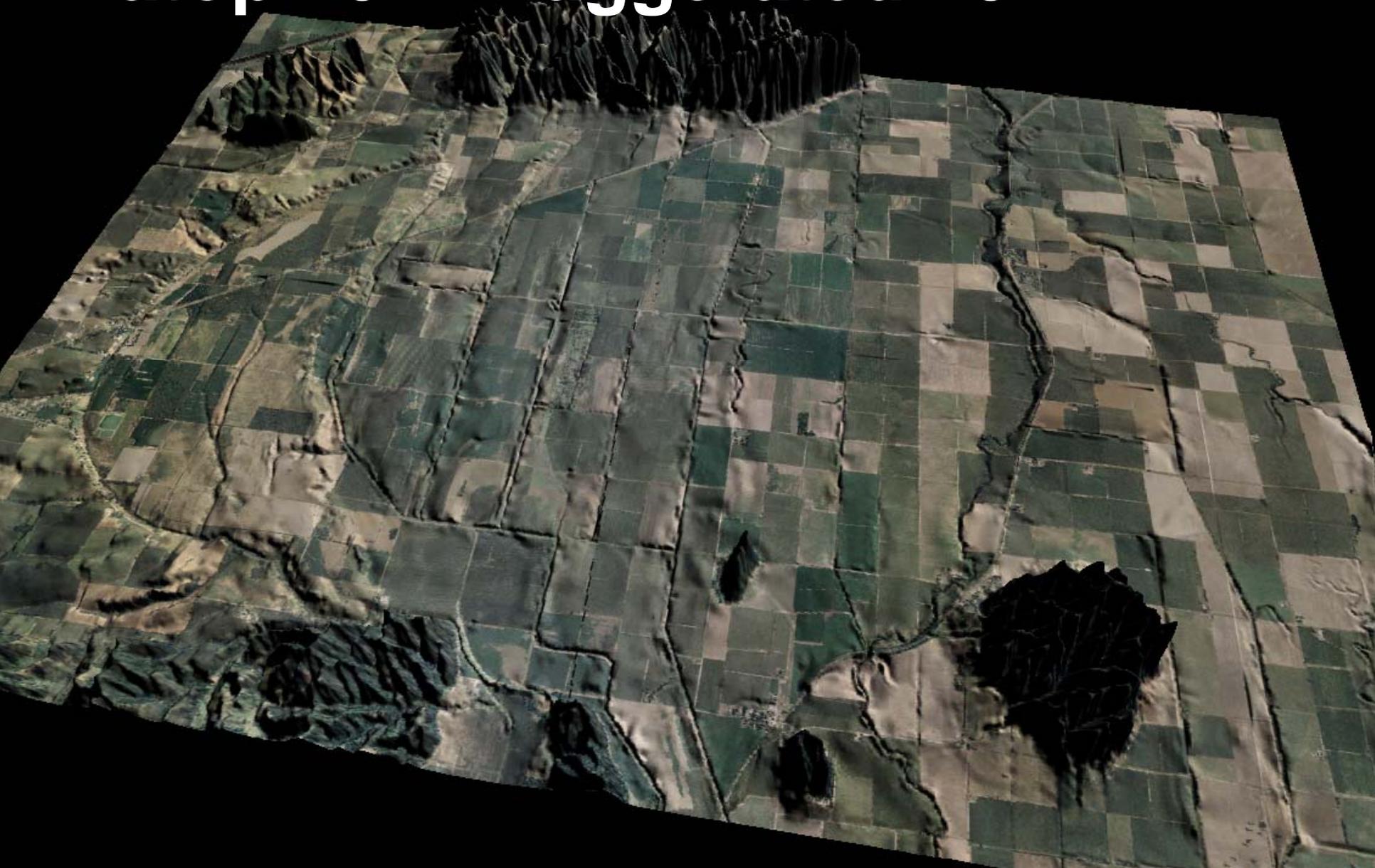
Feature Appears Geologically Young

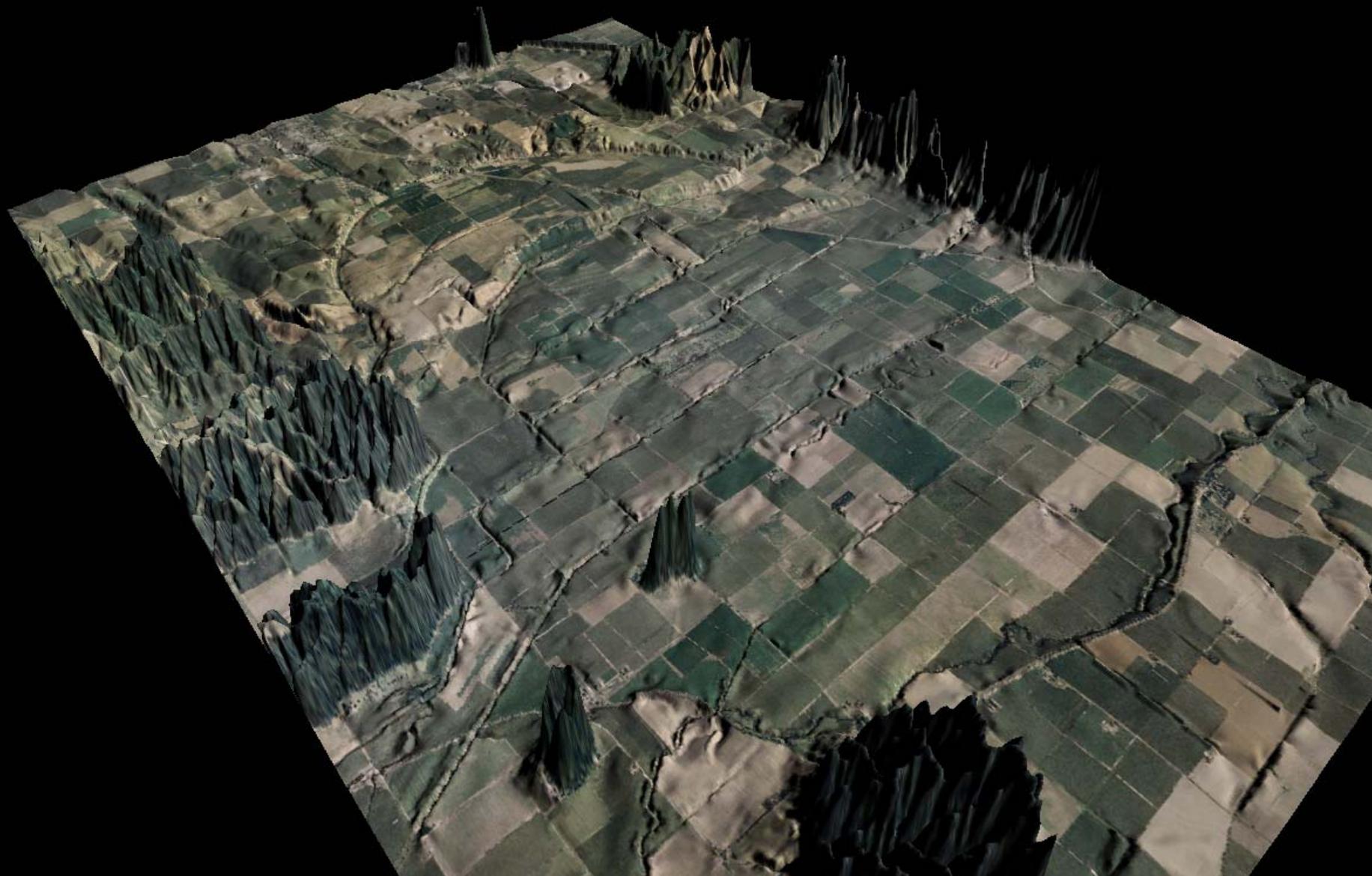
- Feature is formed in soft and easily erodible alluvium and loess, yet maintains sharp appearance clearly visible in 10 meter DEMs
- Feature is poorly drained, even with artificial drainage
- Whitewater River channel profile remains choked by the feature. The channel gradient has yet to re-establish equilibrium in this erodible sediment.
- Feature may have been triggered by an earthquake, possibly the 1811-1812 New Madrid sequence or another quake in the region when the area was less populated.

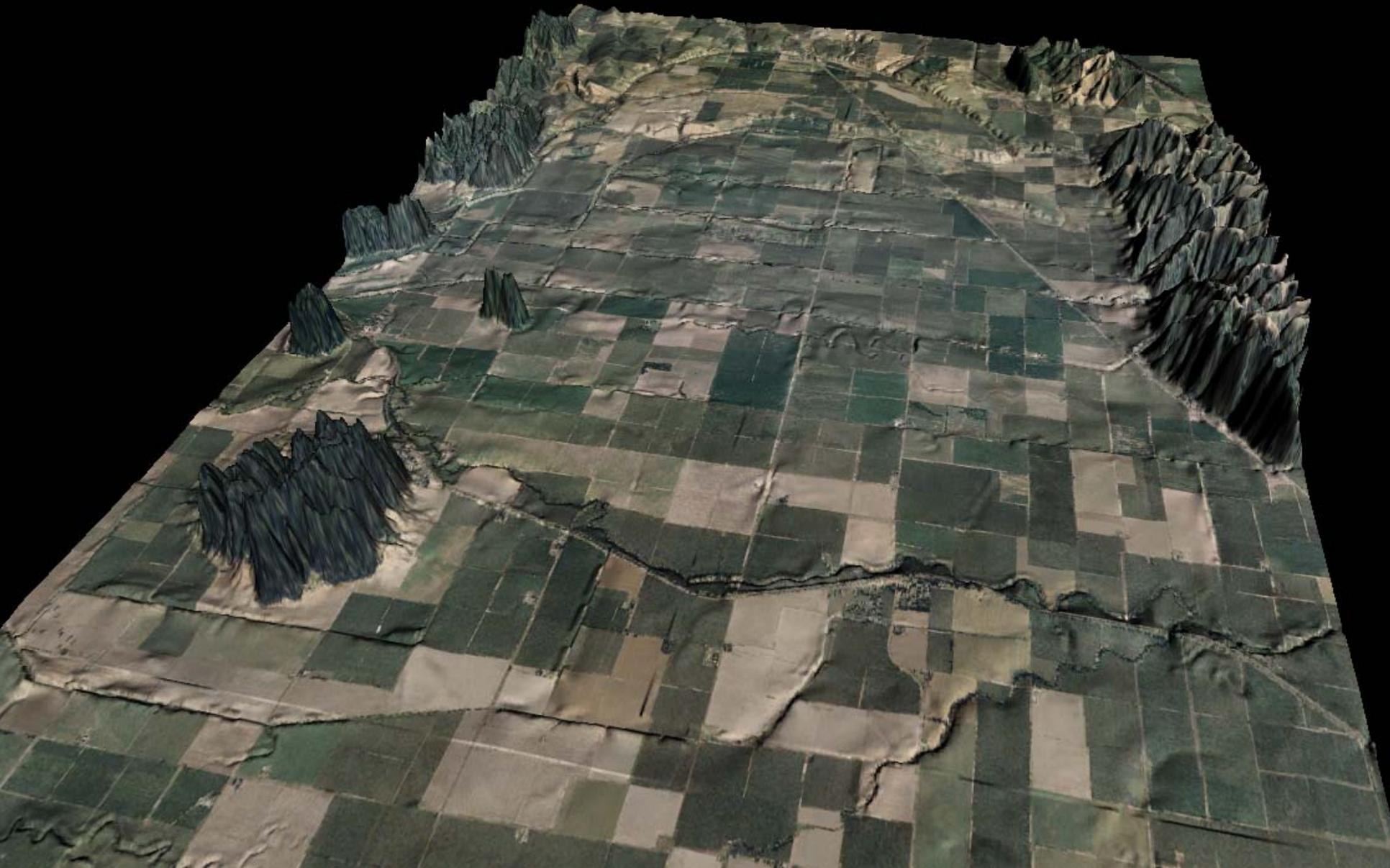
**Sharpness of feature is indicative
of relative geologic youth**

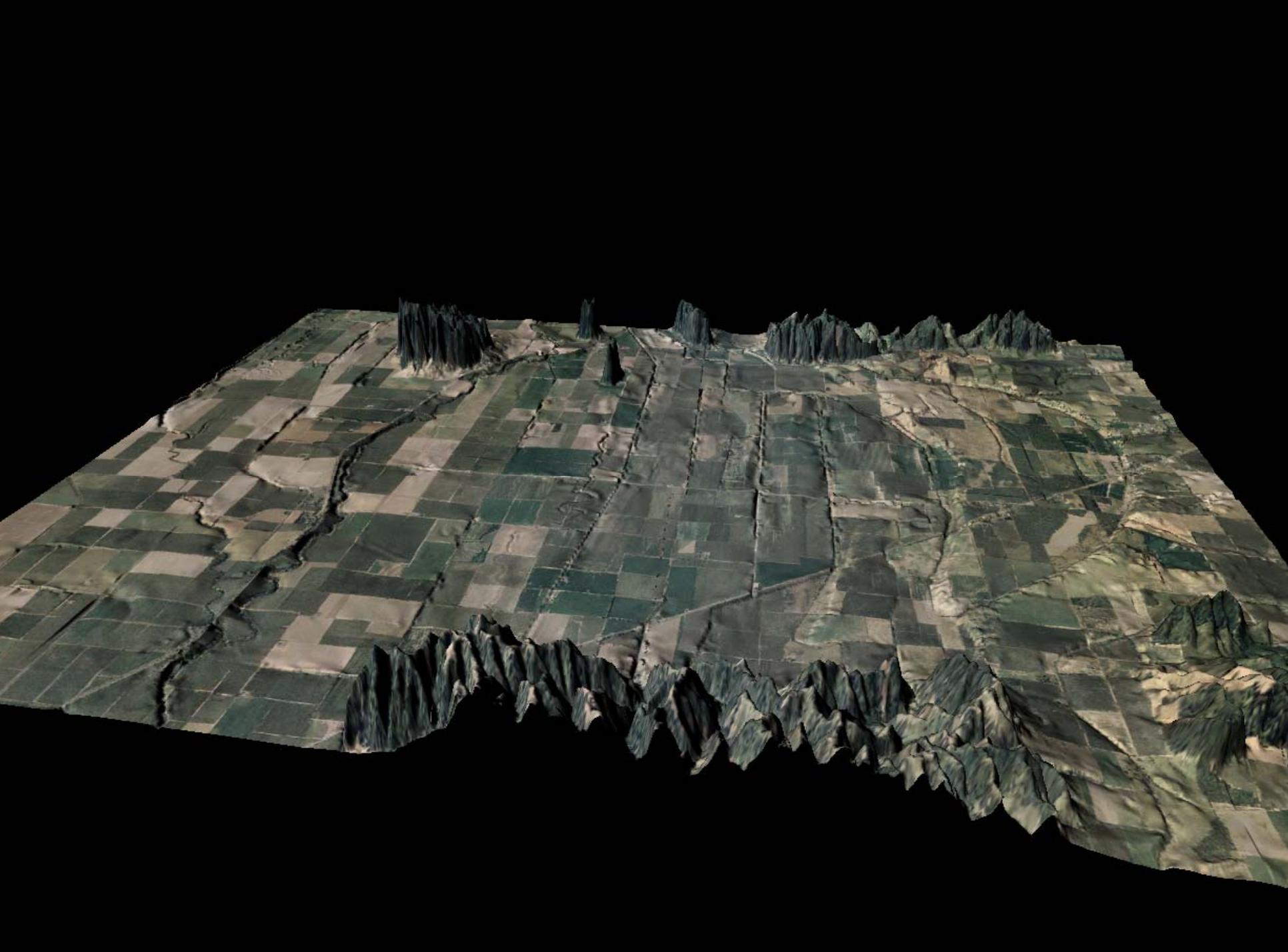


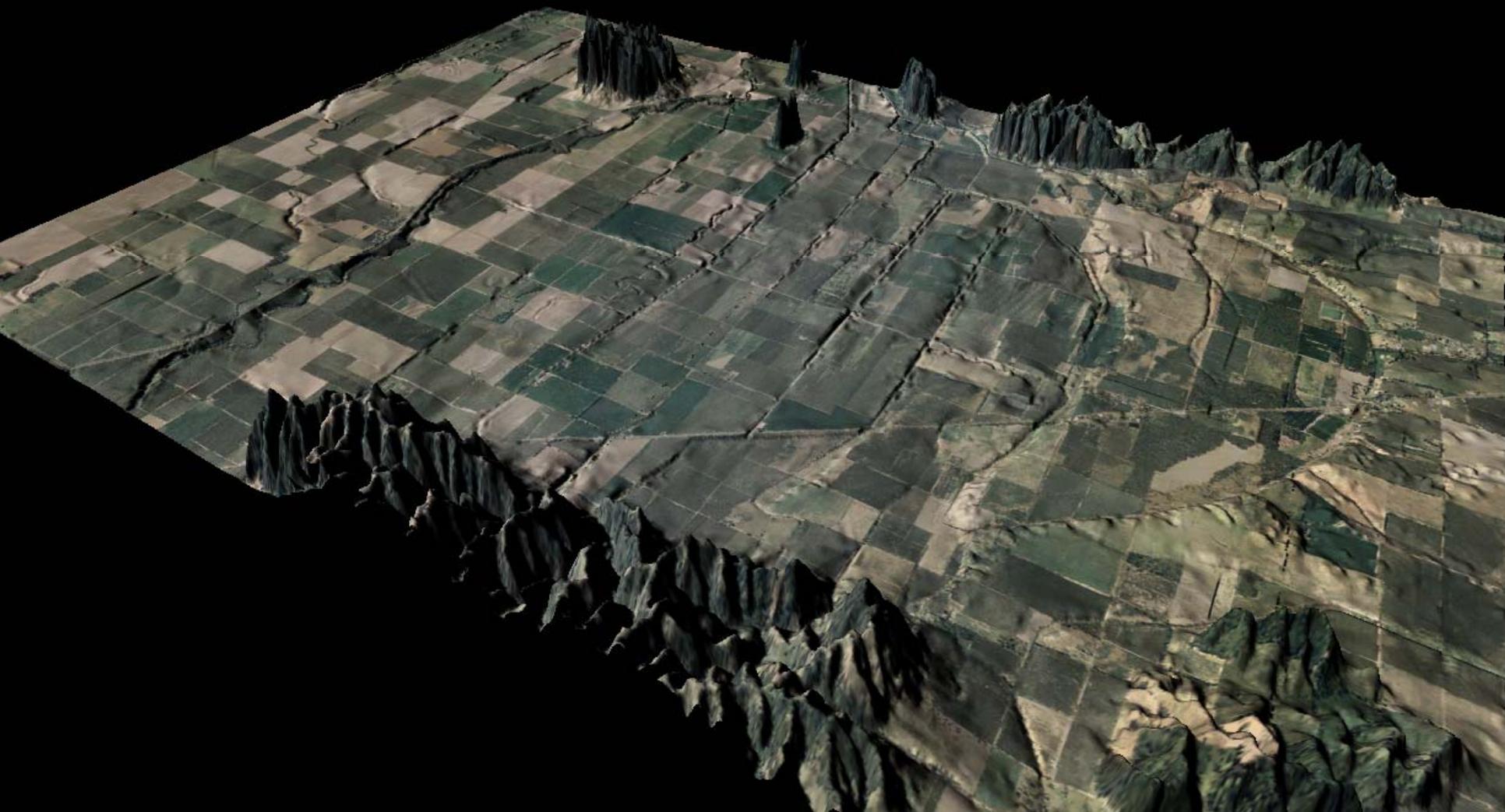
GIS Generated Aerial Obliques atop 10x Exaggerated 10m DEM











Other Interpretations of Feature

- Pleistocene cut-bank of the Mississippi River
- Alluvial deposits left by prior flooding
- Old lakebed

