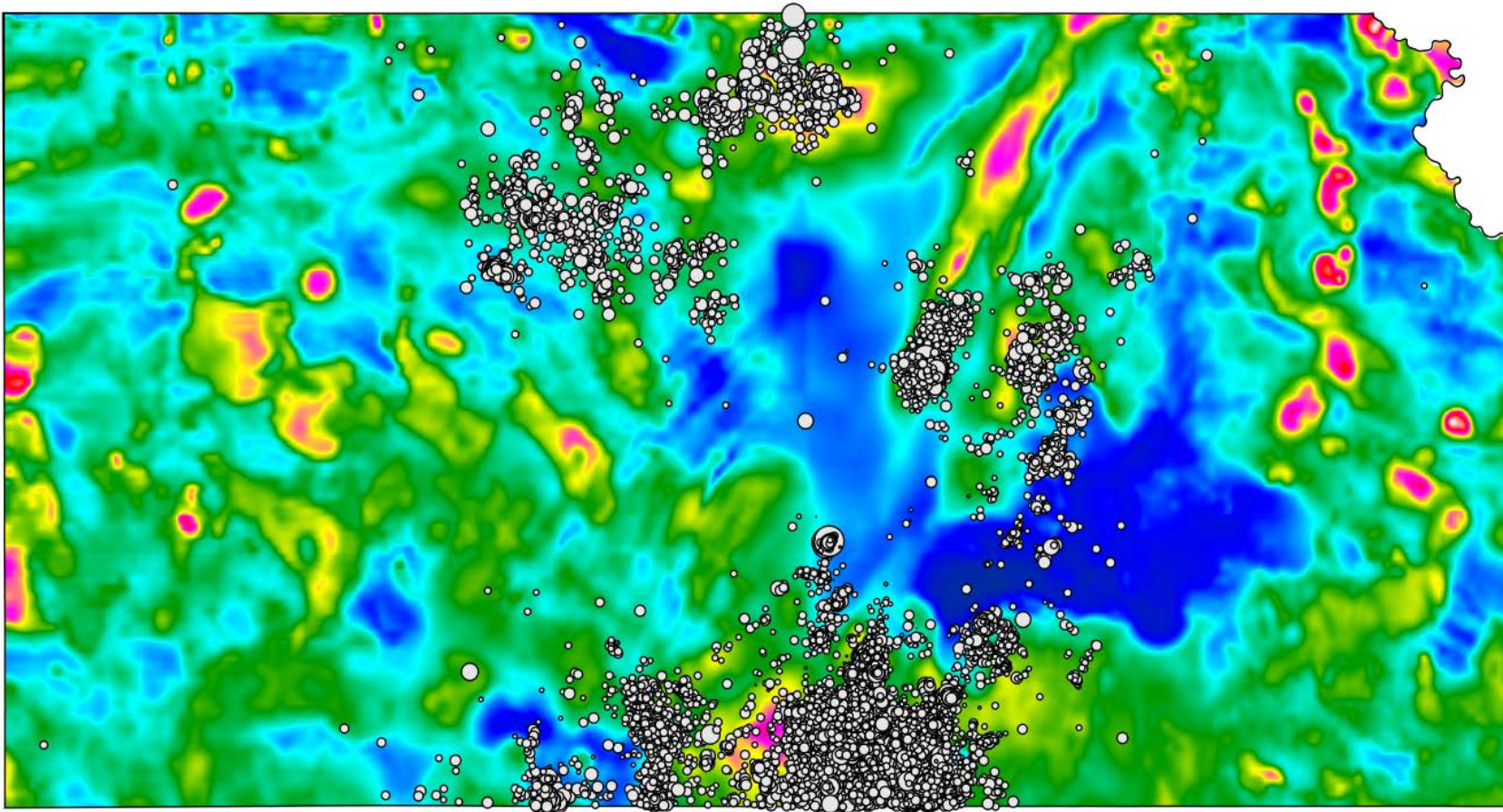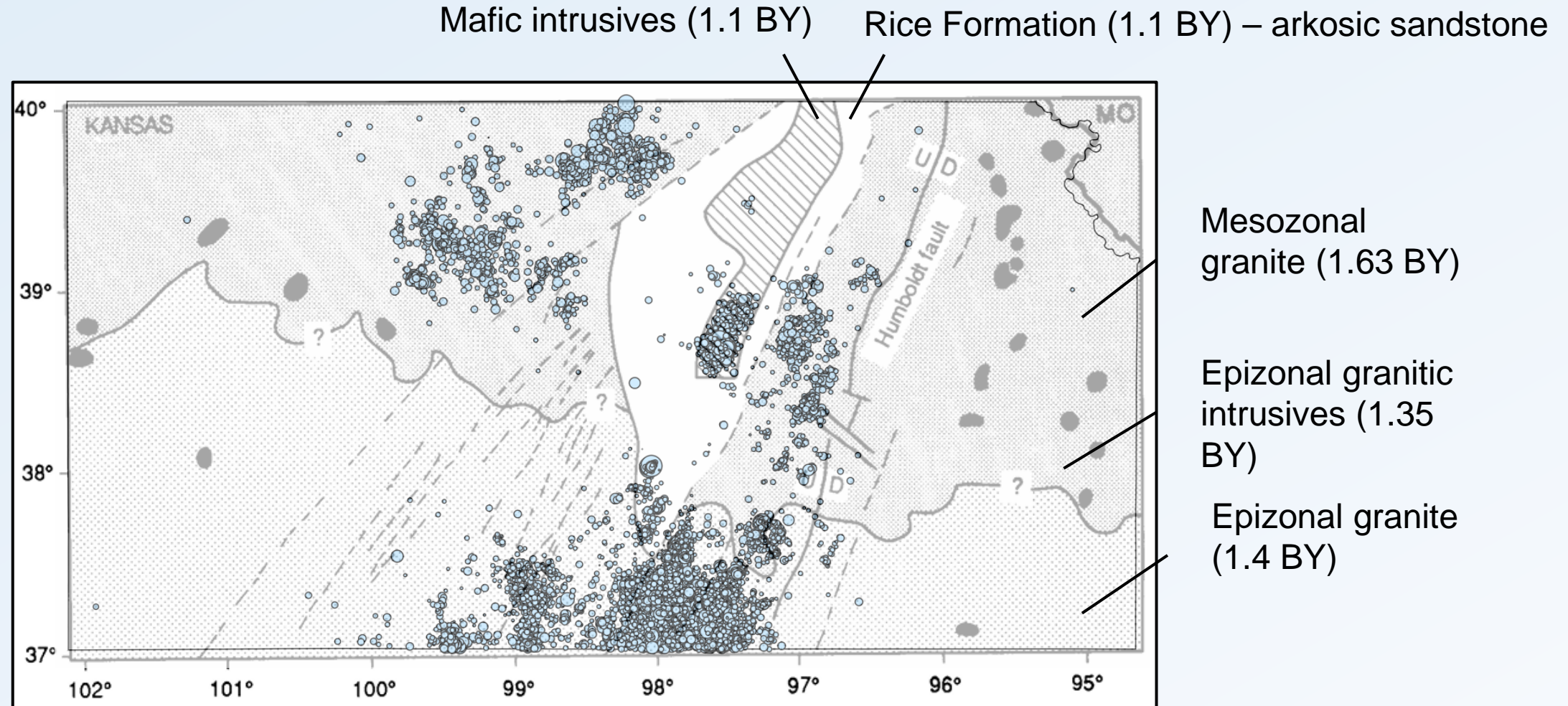# Aeromagnetic Correlation

The apparent correlation with low to no seismicity associated with the Wichita low and significance of basement structures as controlling mechanism.

Unmapped basement structures therefore play a critical role in understanding the patterns of earthquakes relative to injection practices.
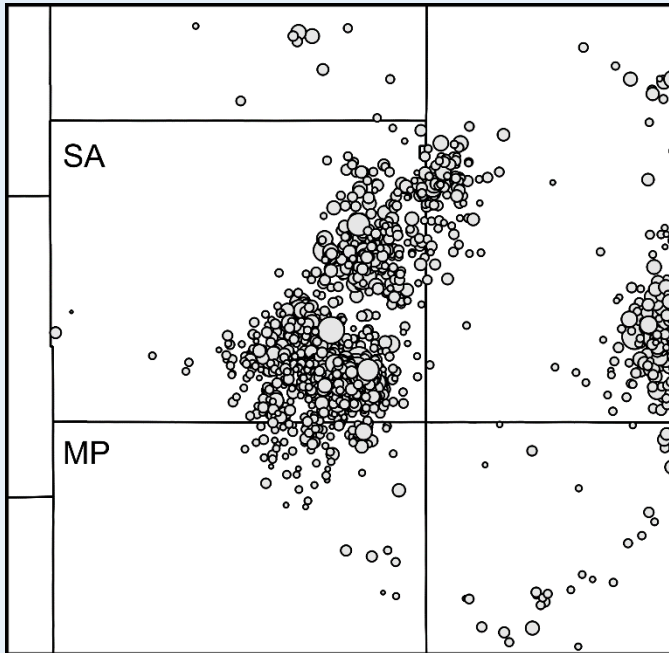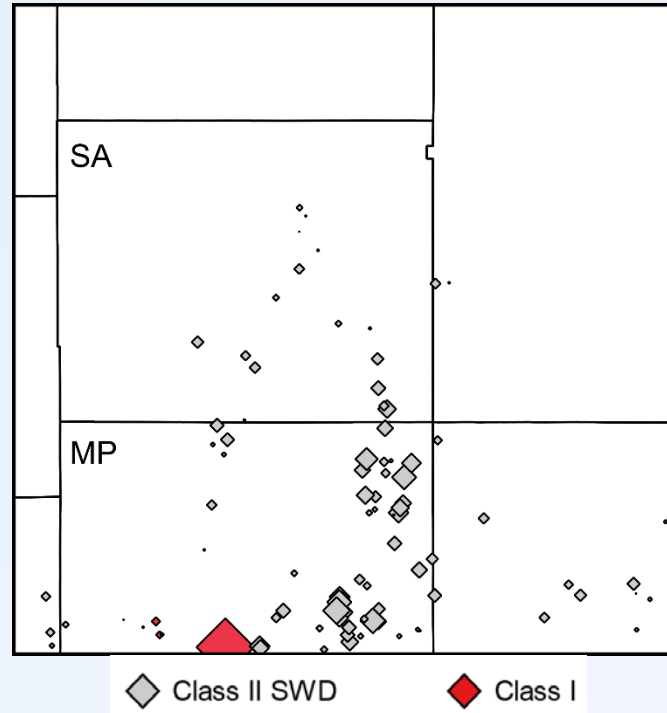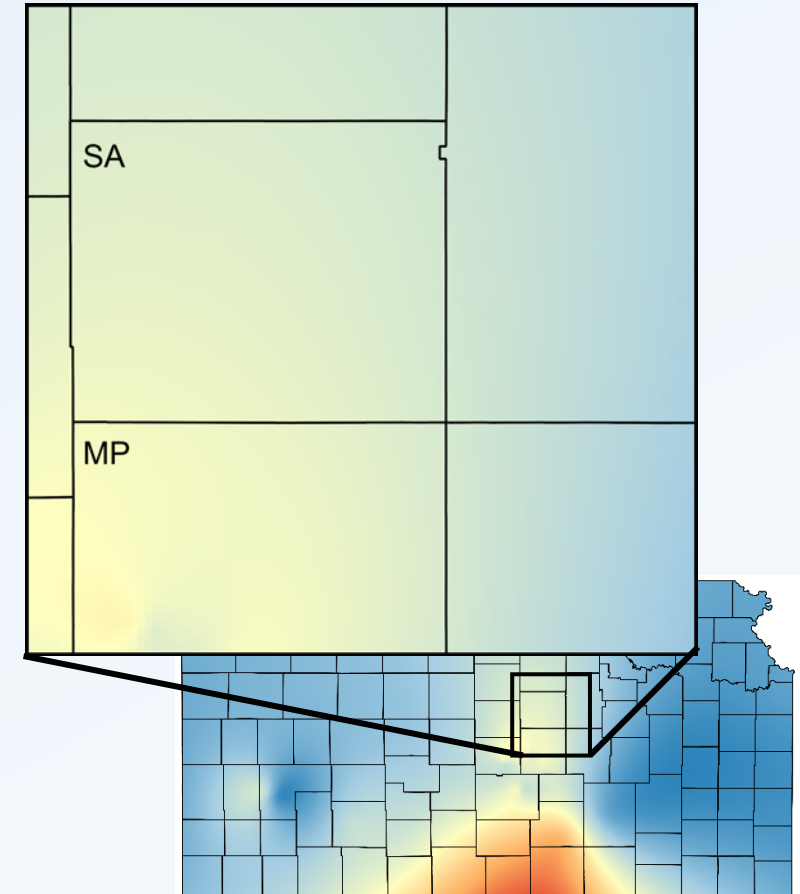
Basement Rock Type

Mafic intrusives (1.1 BY)

Rice Formation (1.1 BY) – arkosic sandstone

Mesozonal granite (1.63 BY)

Epizonal granitic intrusives (1.35 BY)

Epizonal granite (1.4 BY)

Saline County

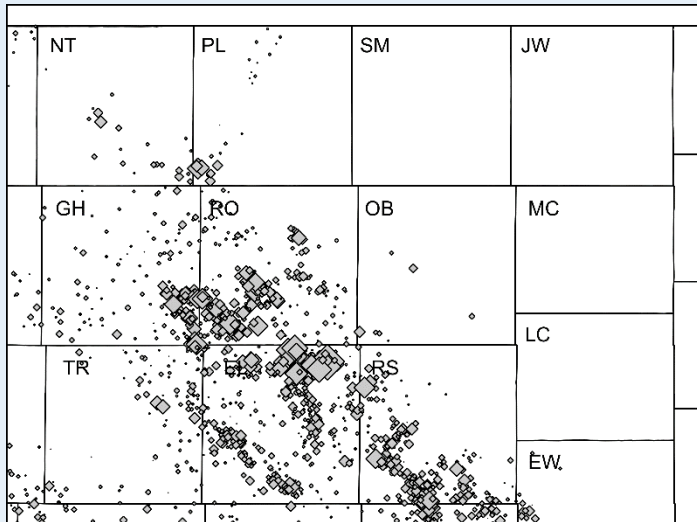seismicity to present

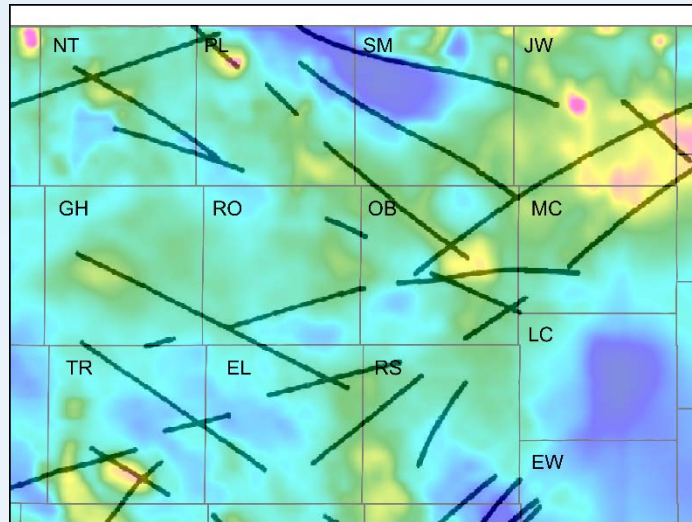disposal wells (2021)

Arbuckle ΔP (2021)

Class II SWD   Class I

Saline County earthquakes could be a cumulative effect of regional changes in fluid pressures and localized injection practices.

Jewell County

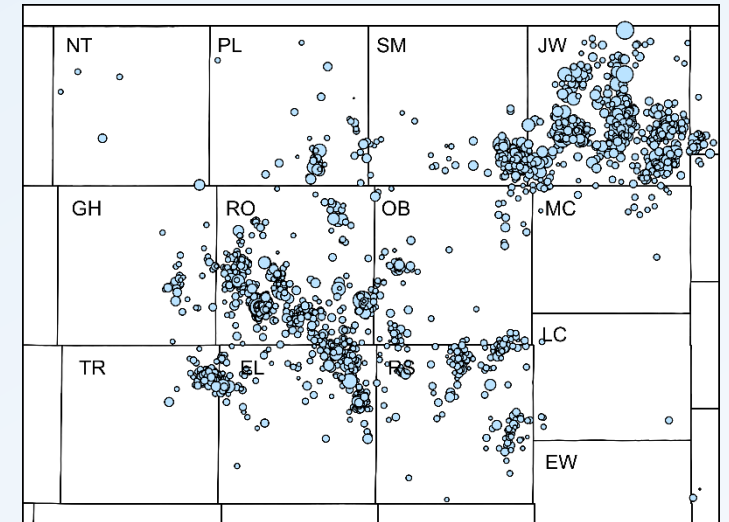

Increased seismicity in Jewell County clearly indicate that regional volumes along basement trends with apparent permeability are responsible for pore pressures reaching triggering thresholds and catalyzing these historically unprecedented earthquakes.
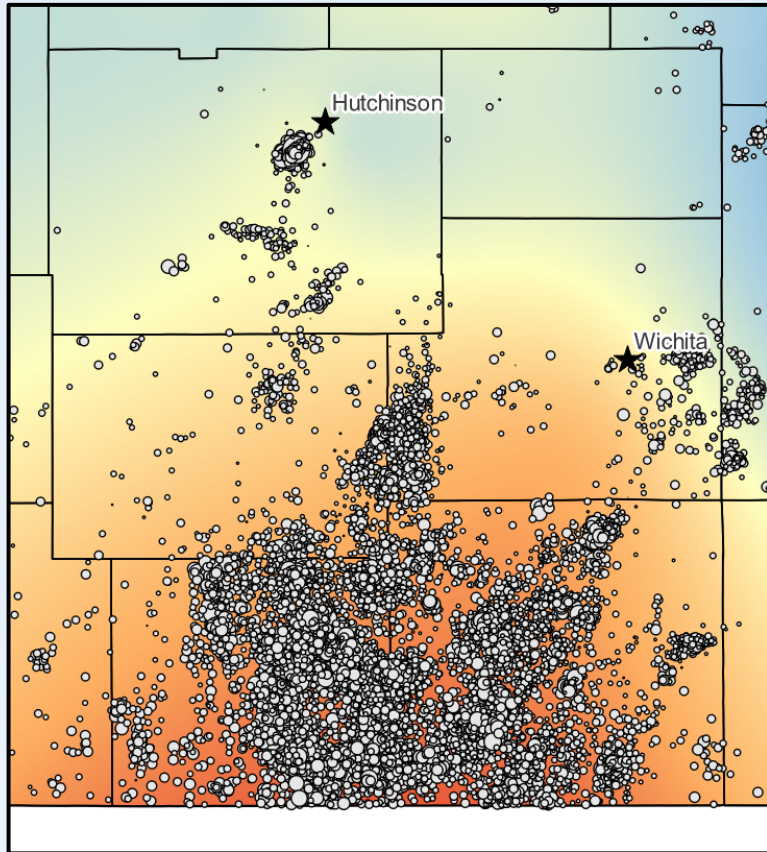
Rice County M 2.9

Foreshocks, Mainshock, Aftershocks sequence key to level of concern about consistently increasing pressures.

change in Arbuckle pressure
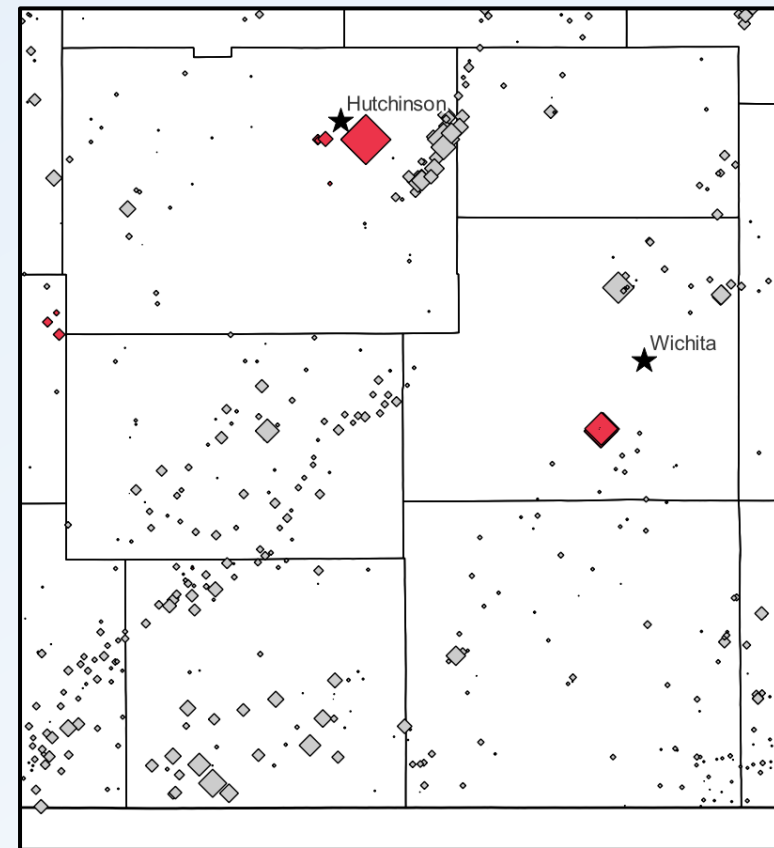

annual disposal volume
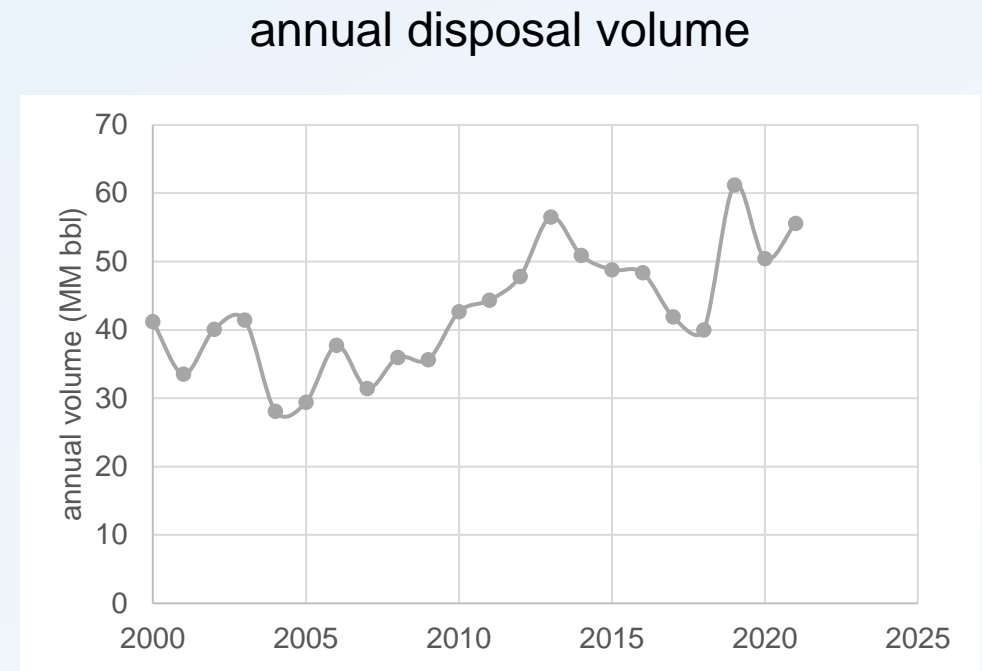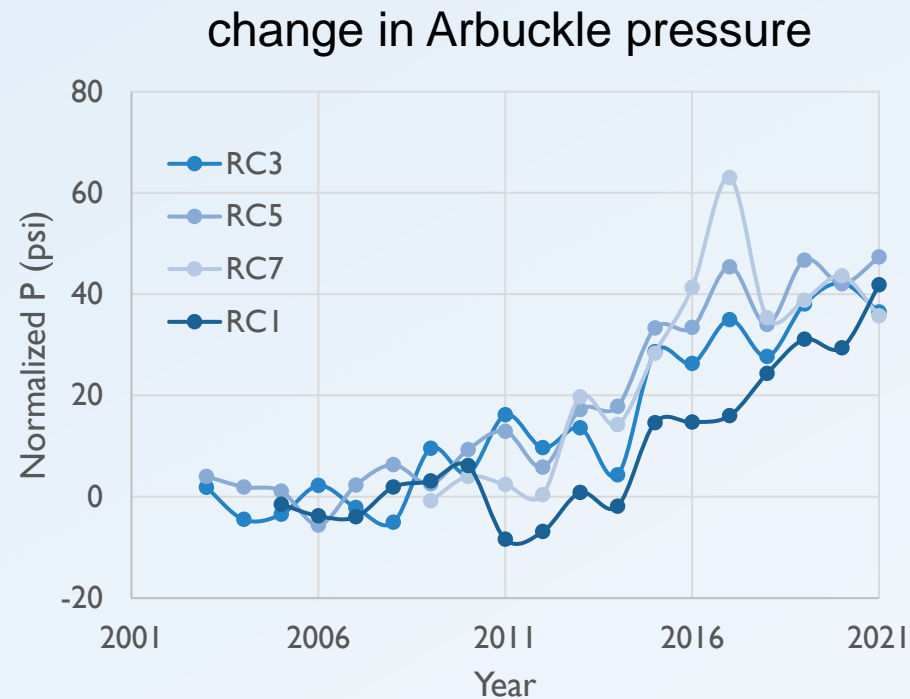
Hutchinson and Wichita

2015-present earthquakes
change in Arbuckle formation pressure

class I (red) and class II (gray)
disposal wells

Continued low-magnitude seismicity in Hutchison and Wichita is a result of surpassing the triggering threshold due to regional cumulative fluid accumulations with the temporal and geographic clustering of felt events due to local variations in injection that have not historically impacted seismicity.

Saline County Magnitude Distribution
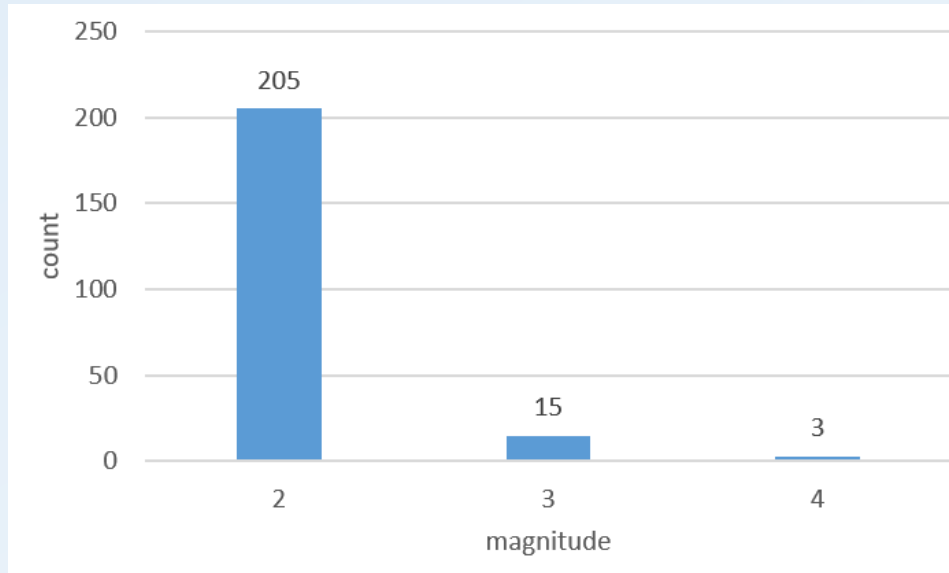
When should we expect a M5?

Based on rate of M 3+
    average 1 M3+ every 12 days
    b-value = 1....one M 5 for every
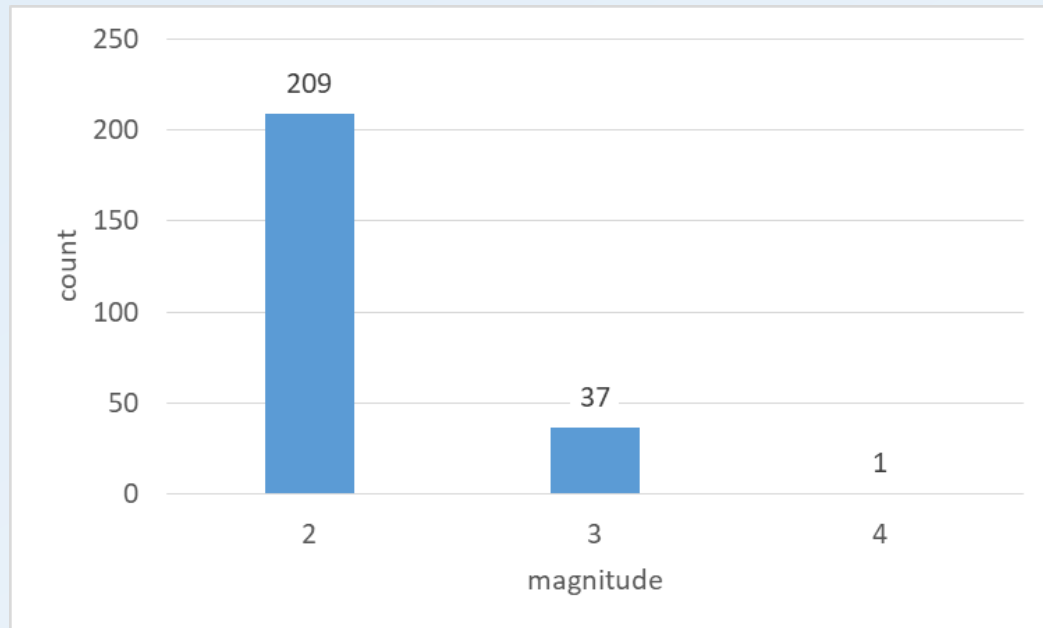   100 M 3+
M 5 within **3 years**
    statistically
    requires fault of sufficient size

<u>Earthquake Forecasting</u>

Recursion relationship and b value with statistical time for a M5, Saline, Jewell, Chase, Wichita, Hutchinson, Rooks.

Jewell County

When should we expect a M5?

Based on rate of M 3+
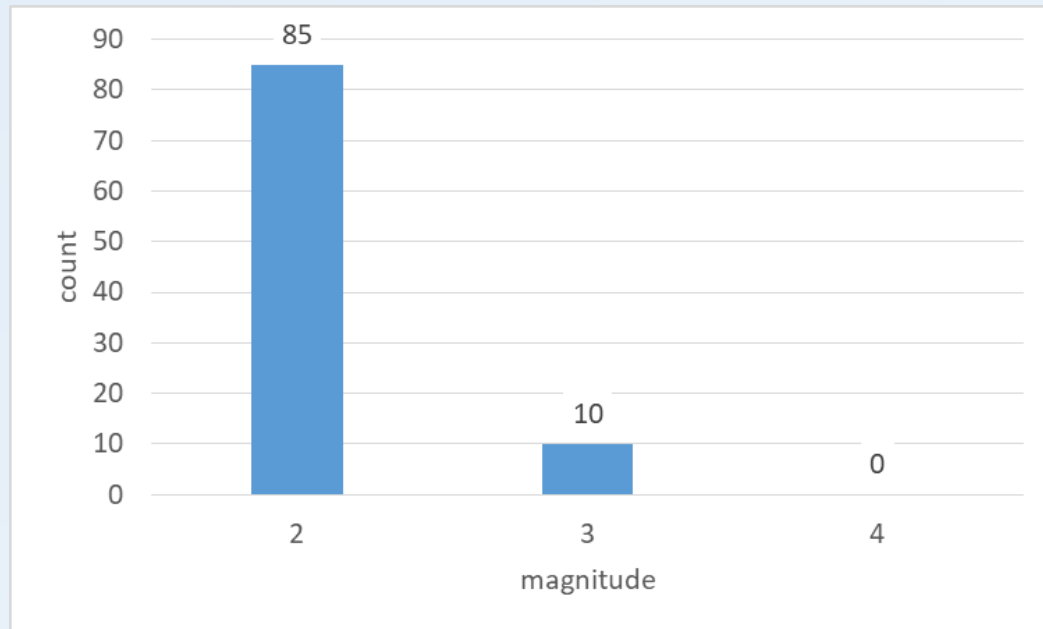   average 1 M3+ every 37 days
    b-value = 1.2
    statistically M 5 within **30 years**
    requires fault of sufficient size

Dickinson County

When should we expect a M5?
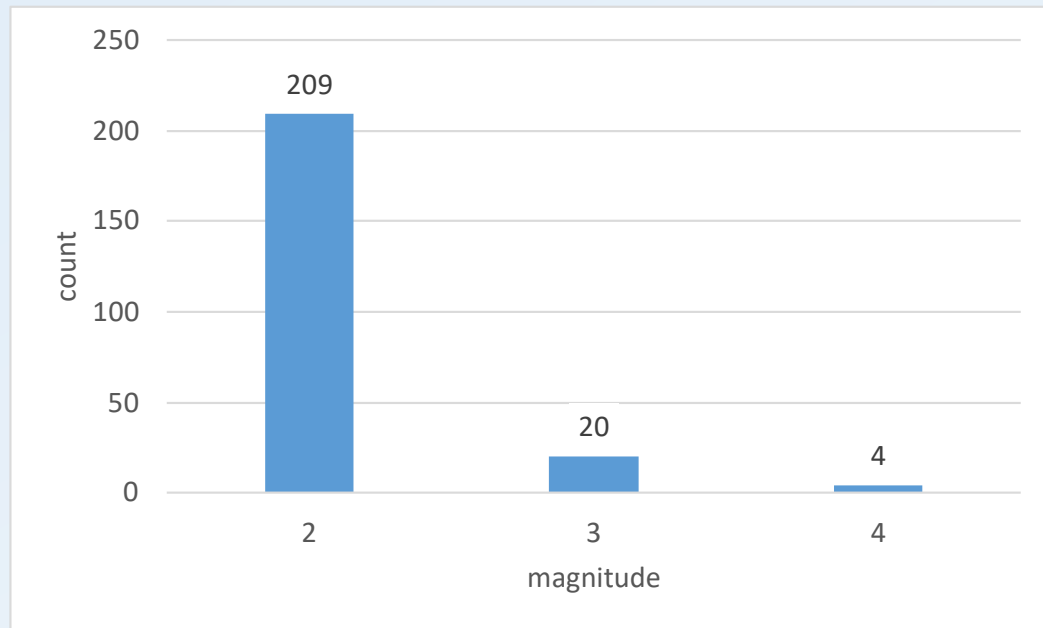
Based on rate of M 3+
    average 1 M3+ every 10 days
    b-value = 0.98
    statistically M 5 within **13 years**
    requires fault of sufficient size

Rooks County

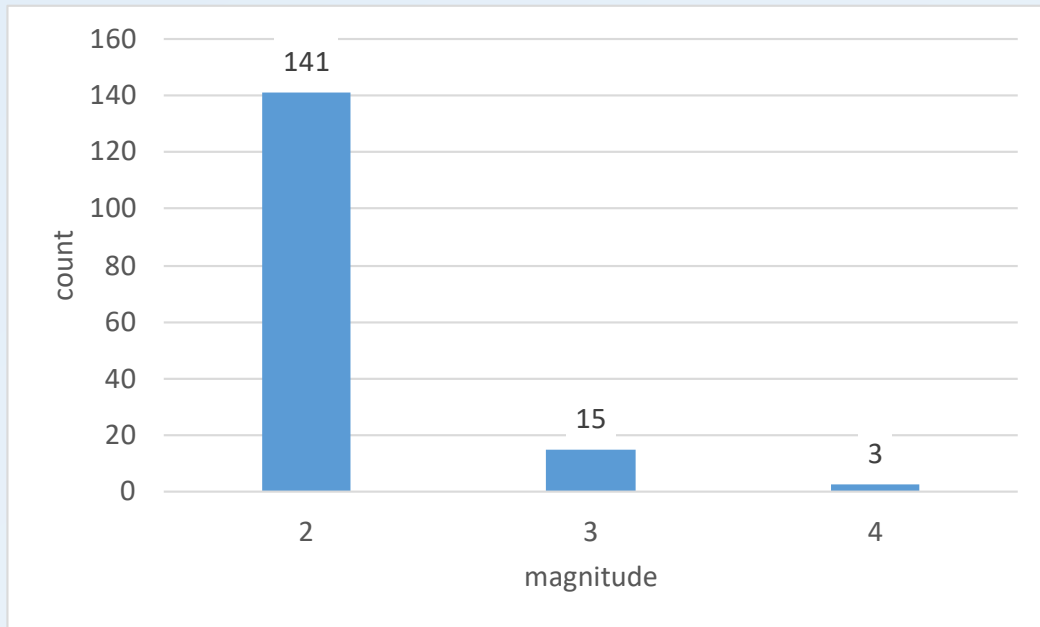When should we expect a M5?

Based on rate of M 3+
average 1 M3+ every 127 days
b-value = 0.88
statistically M 5 within **12 years**
requires fault of sufficient size

Hutchinson

When should we expect a M5?
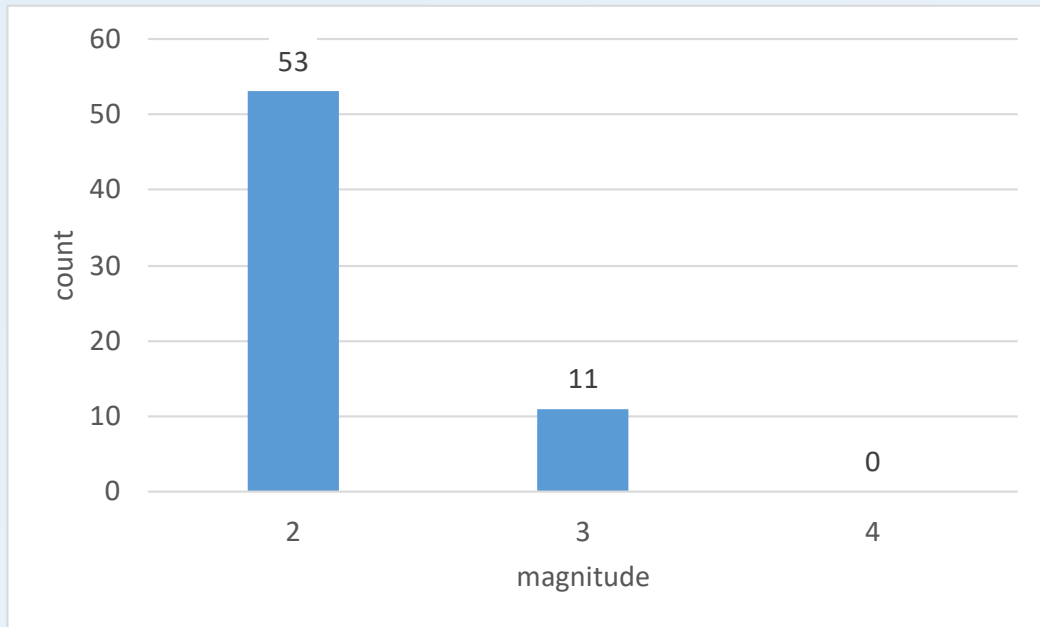
Based on rate of M 3+
    average 1 M3+ every 90 days
    b-value = 0.86
    statistically M 5 within **8 years**
    requires fault of sufficient size

Wichita

When should we expect a M5?

Based on rate of M 3+
  Calculated June 2021
    average 1 M3+ every 10 days
    b-value = 0.9
    statistically M 5 within **1.4 years**
  Calculated 1 year after above (June 2022)
    average 1 M3+ every 50 days
    b-value = 0.9
    statistically M 5 within **7.5 years**

requires fault of sufficient size