

National Seismic Hazard Mapping Project Colorado Perspective

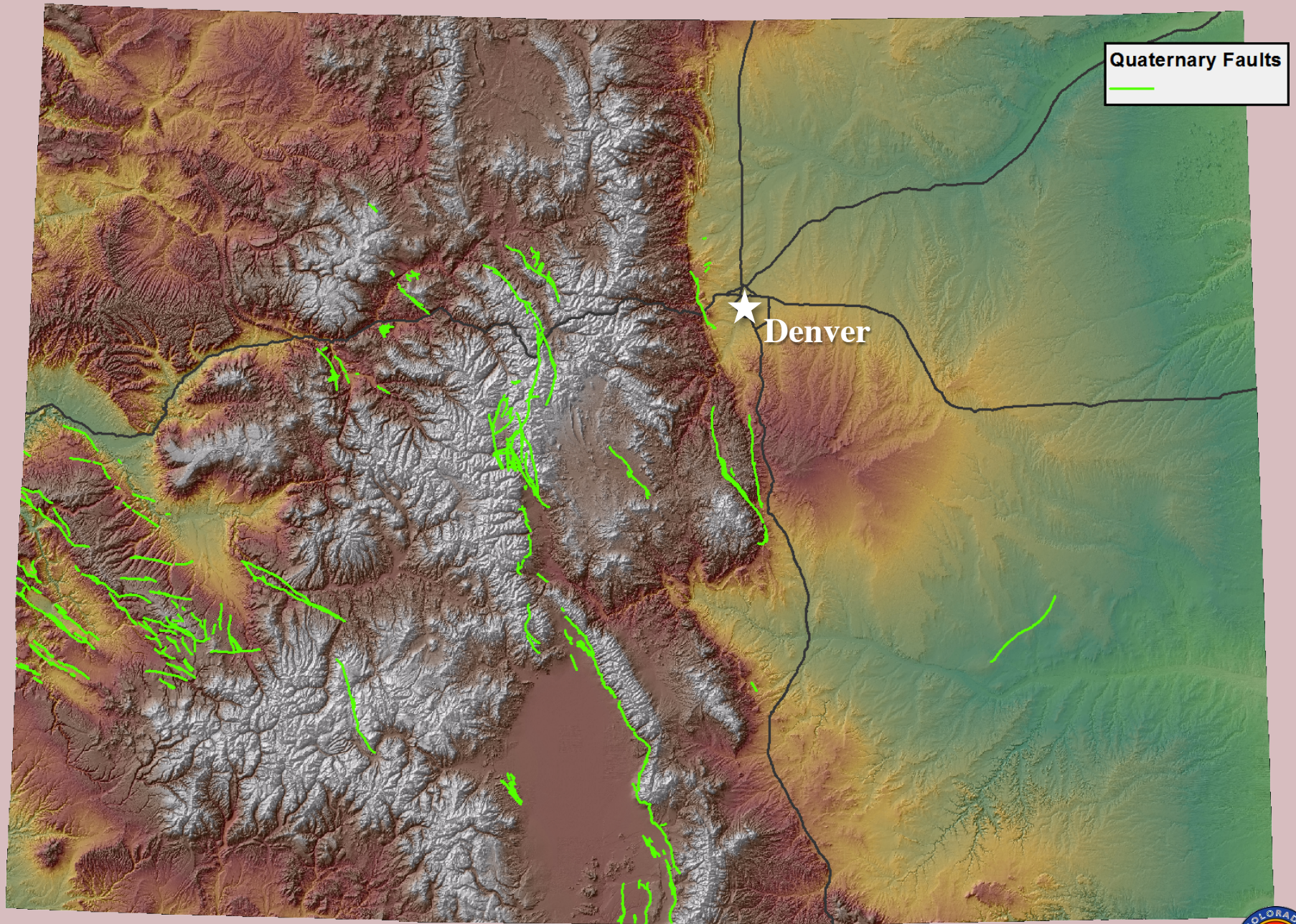


Chris Eisinger
Colorado Geological Survey
NSHMP IMW Workshop
June 13-14, 2012

COLORADO GEOLOGICAL SURVEY



Colorado Quaternary Faults



Quaternary Faults

★
Denver

0 20 40 80 120 160 Km



Colorado Cenozoic Faults (including Quaternary)

Quaternary Faults

Cenozoic Faults



Denver

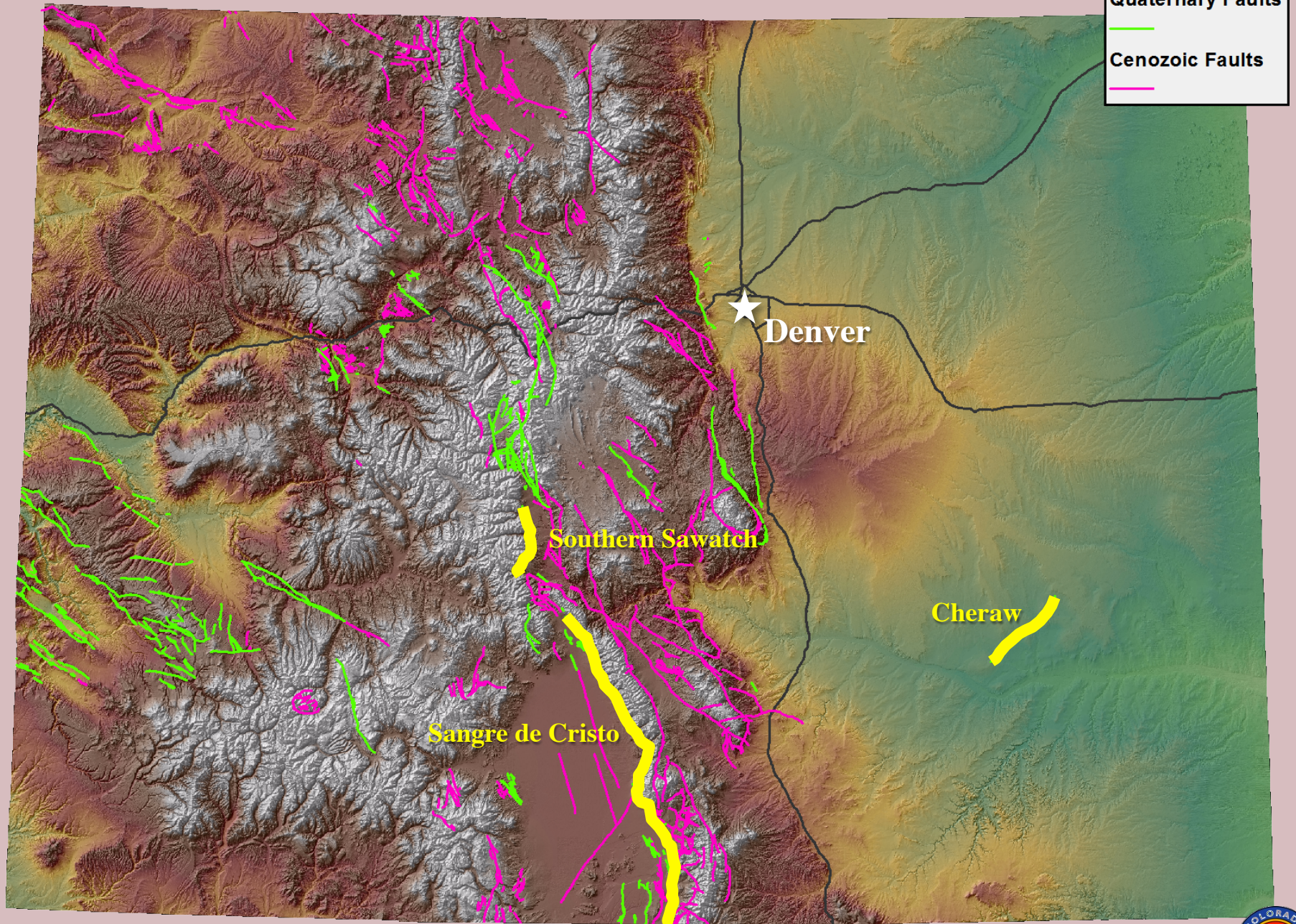
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Colorado Cenozoic Faults (including Quaternary)

Quaternary Faults

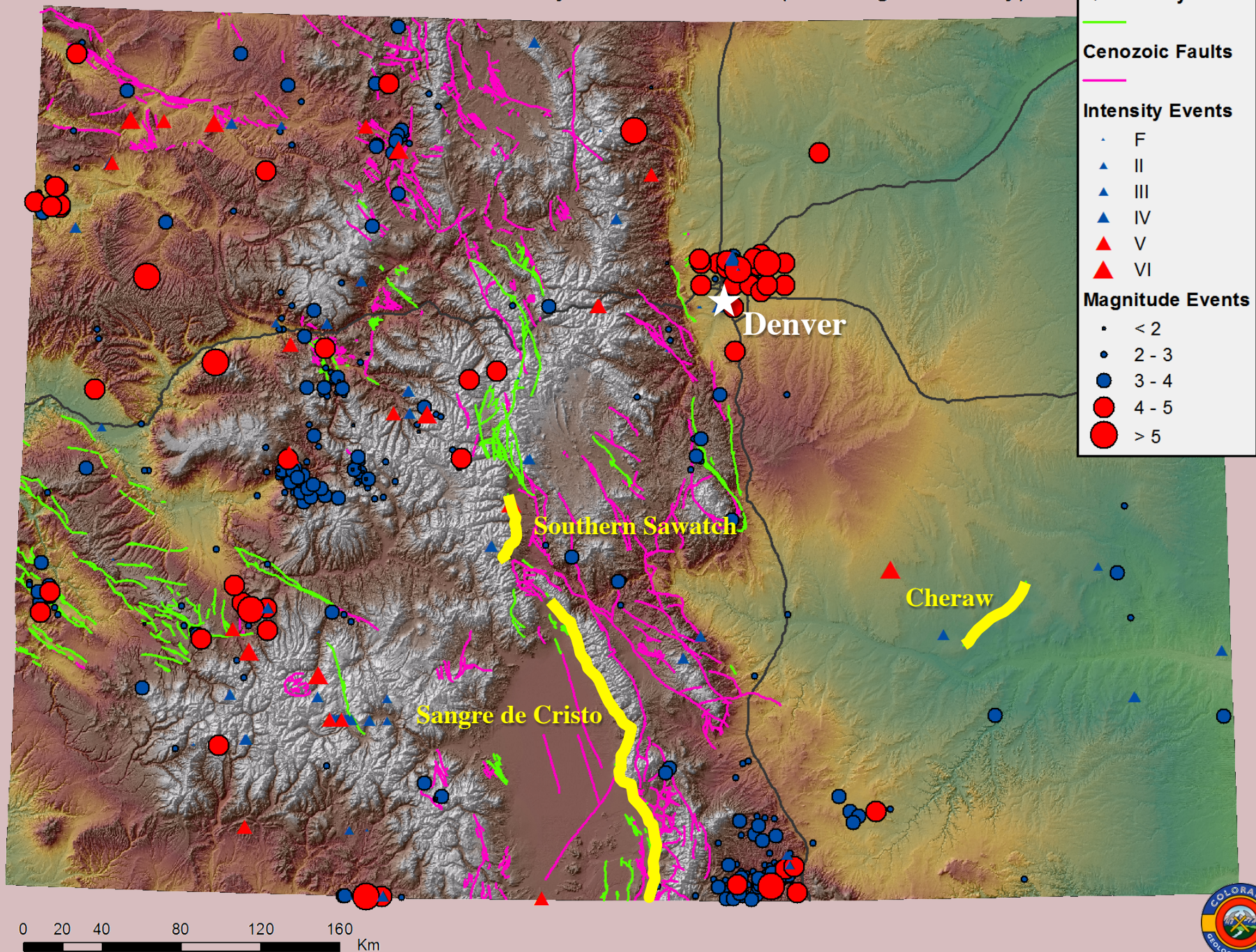
Cenozoic Faults



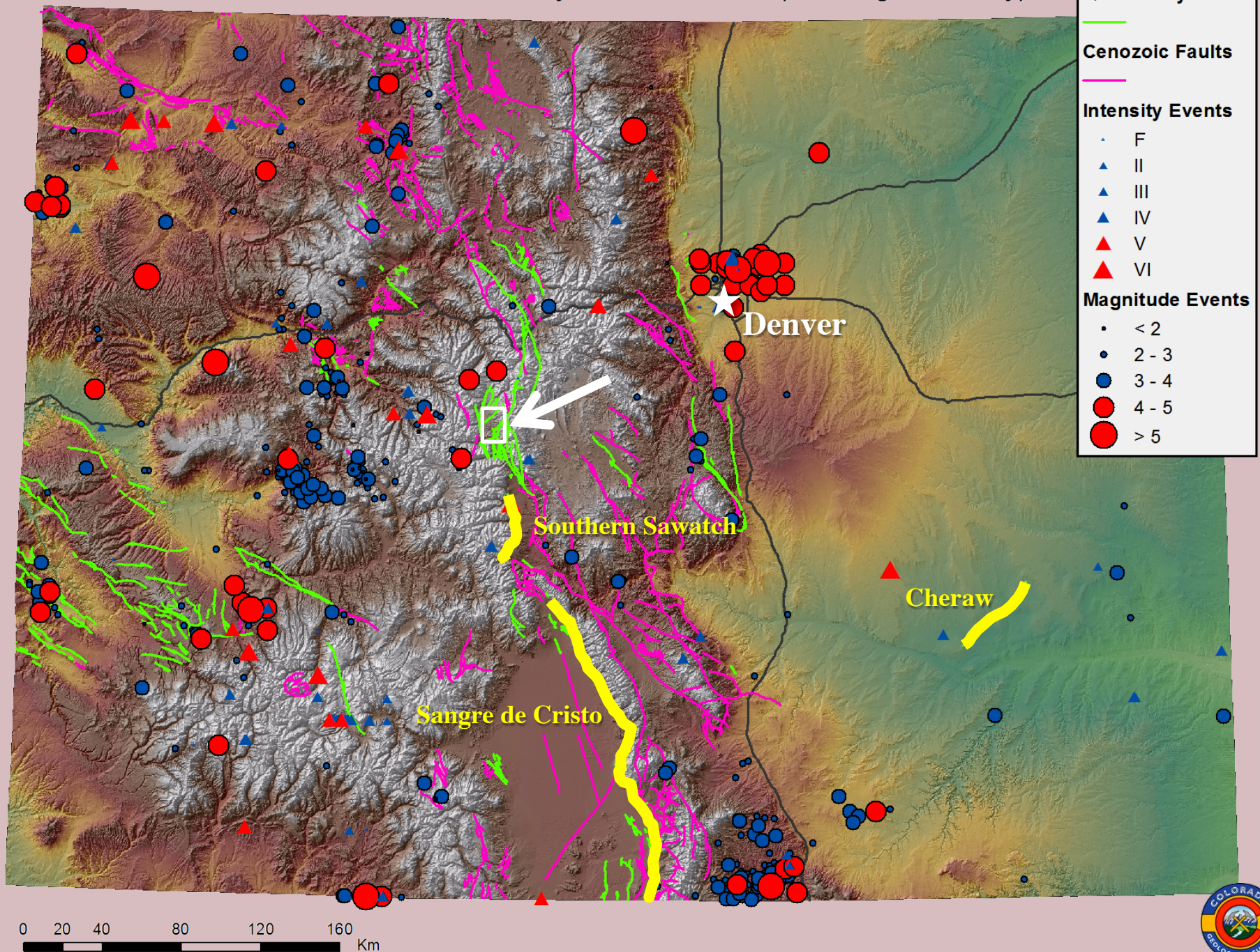
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Colorado Historical Seismicity & Cenozoic Faults (including Quaternary)



Colorado Historical Seismicity & Cenozoic Faults (including Quaternary)



Preliminary Quaternary geologic map of the North Leadville 7.5' Quadrangle and surrounding areas based on LIDAR DEM.



Legend

Structural landforms

- Structural scarps
- Hard beds

Landforms and deposits derived from Mass Wasting

- Sackungen (uphill facing scarps)
- Landslide scarps
- Landslide deposits, undivided

Tectonic landforms

- Possible Quaternary fault scarps
- Quaternary Faults in the CGS database
- Other Cenozoic Faults

Alluvial deposits and landforms

- Erosive alluvial scarps
- Alluvial fan deposits (Holocene)
- Alluvial deposits, undivided
- Qpbo: pre-Bull Lake outwash deposits, undivided (early to middle Pleistocene)
- Qpbo: pre-Bull Lake outwash deposits, younger (middle Pleistocene)
- Qbo: Bull Lake outwash deposits, undivided (late middle Pleistocene)
- Qbo: Bull Lake outwash deposits, older (late middle Pleistocene)
- Qbo: Bull Lake outwash deposits, younger (late middle Pleistocene)
- Qpo: Pinedale outwash deposits, undivided (late Pleistocene)
- Qpo: Pinedale outwash deposits, older (late Pleistocene)
- Qpo: Pinedale outwash deposits, younger (late Pleistocene)

Glacial and Periglacial landforms

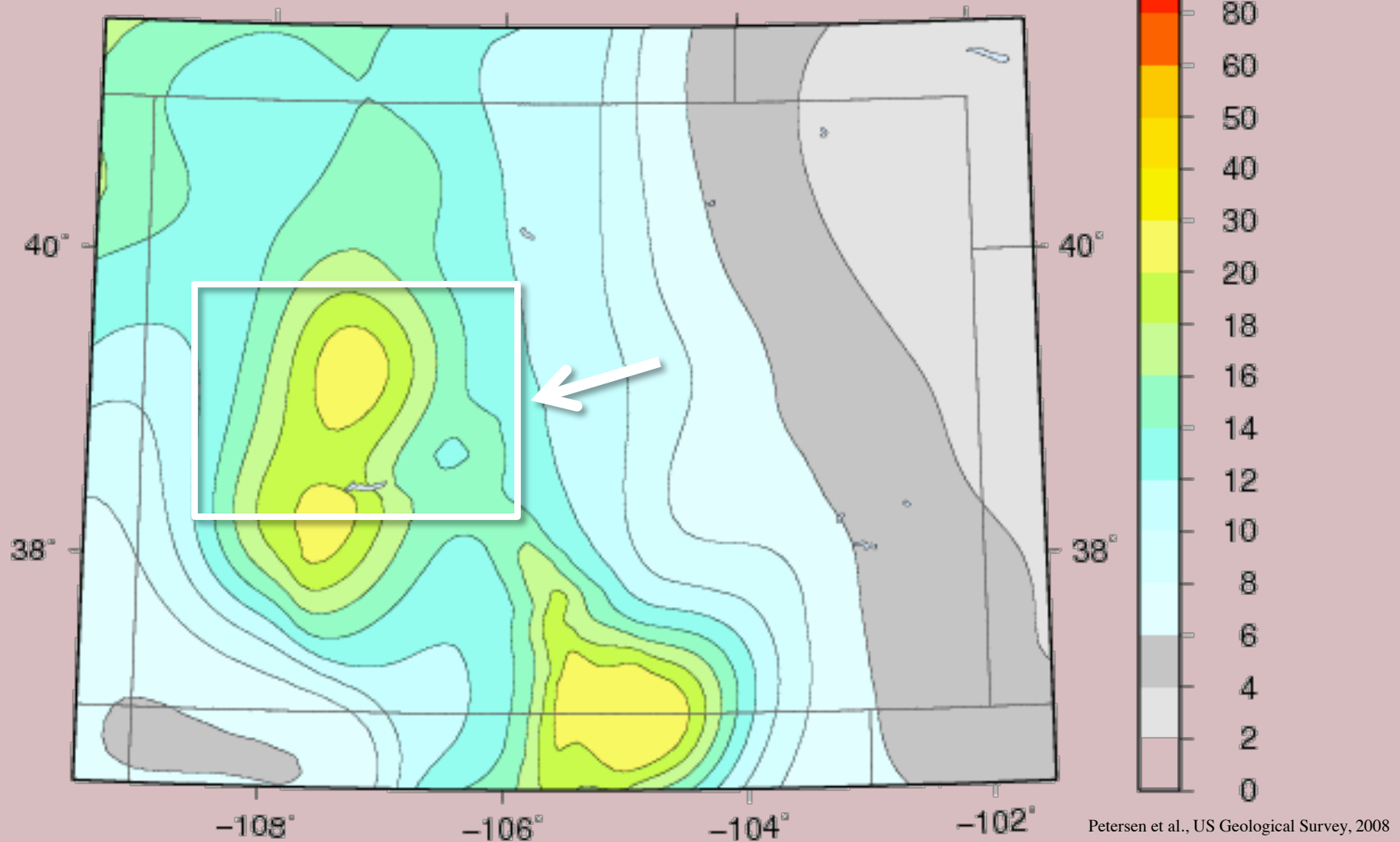
- Proglacial Rampart
- Moraine crests
- Glaciolacustrine plains
- Till, undivided
- Qpbt: pre-Bull Lake till, undivided (early to middle Pleistocene)
- Qpbt: pre-Bull Lake till, younger (middle Pleistocene)
- Qbt: Bull Lake till, undivided (late middle Pleistocene)
- Qbt: Bull Lake till, older (late middle Pleistocene)
- Qbt: Bull Lake till, younger (late middle Pleistocene)
- Qpt: Pinedale till, undivided (late Pleistocene)
- Qpt: Pinedale till, older (late Pleistocene)
- Qpt: Pinedale till, younger (late Pleistocene)

LGM: Last Glacial Maximum. Numbers bigger than 0 indicate progressively younger moraine deposits. Numbers below 0 indicate progressively older moraine deposits.

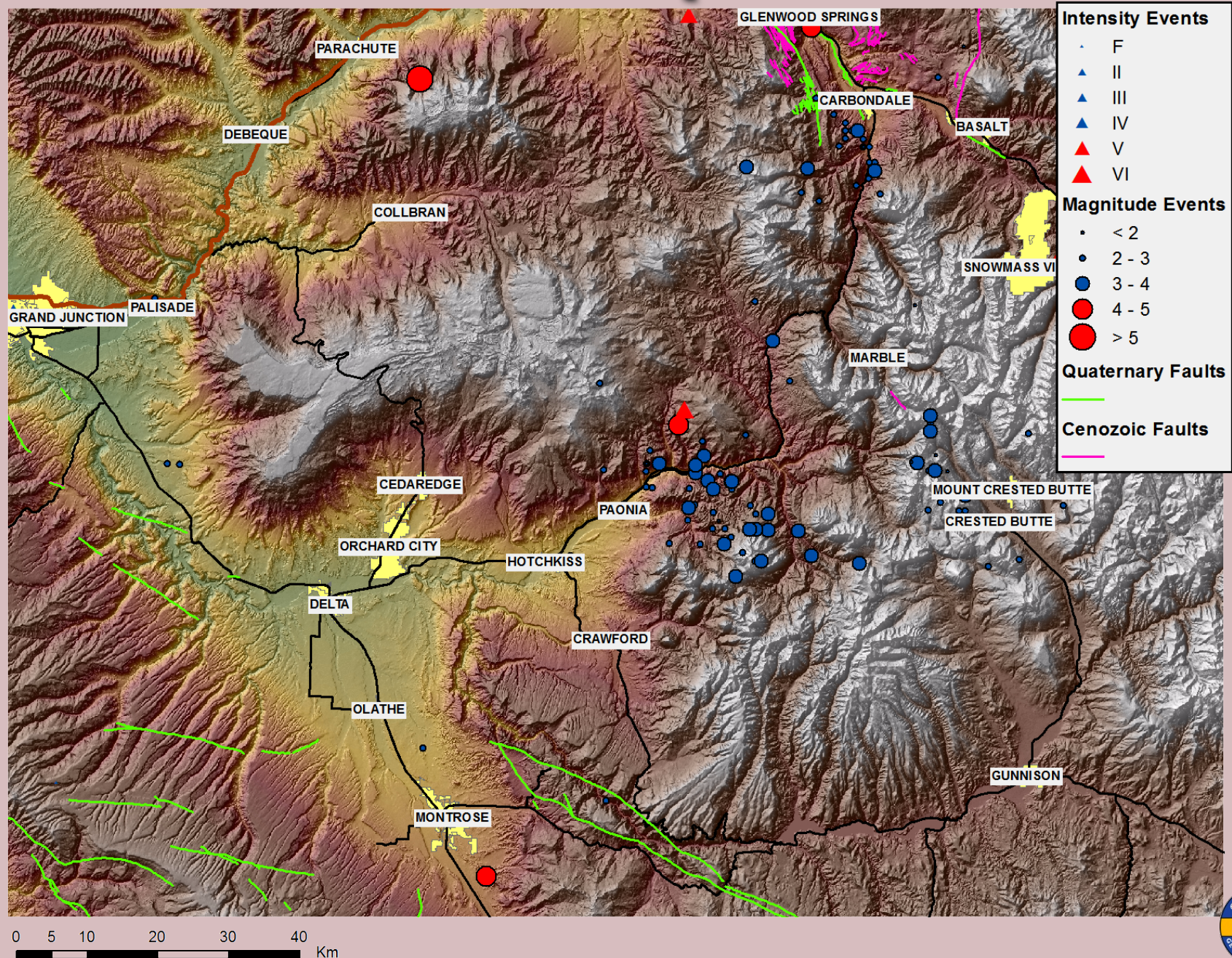
■ Points of Interest. Numbers refer to notes in a separate document

What is driving the higher acceleration area of western Colorado?

Colorado – PGA 2% in 50 Yrs

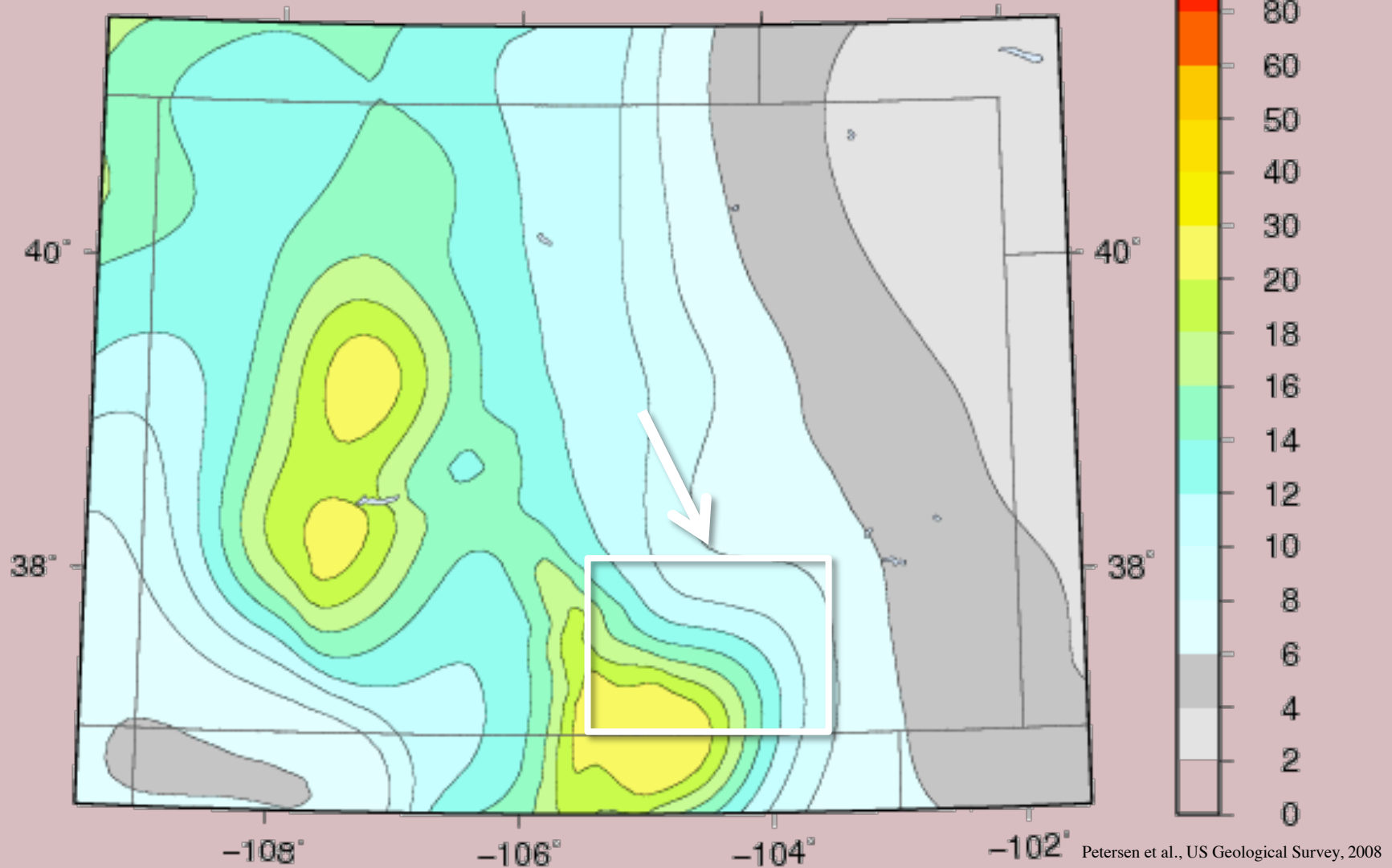


Paonia earthquakes?



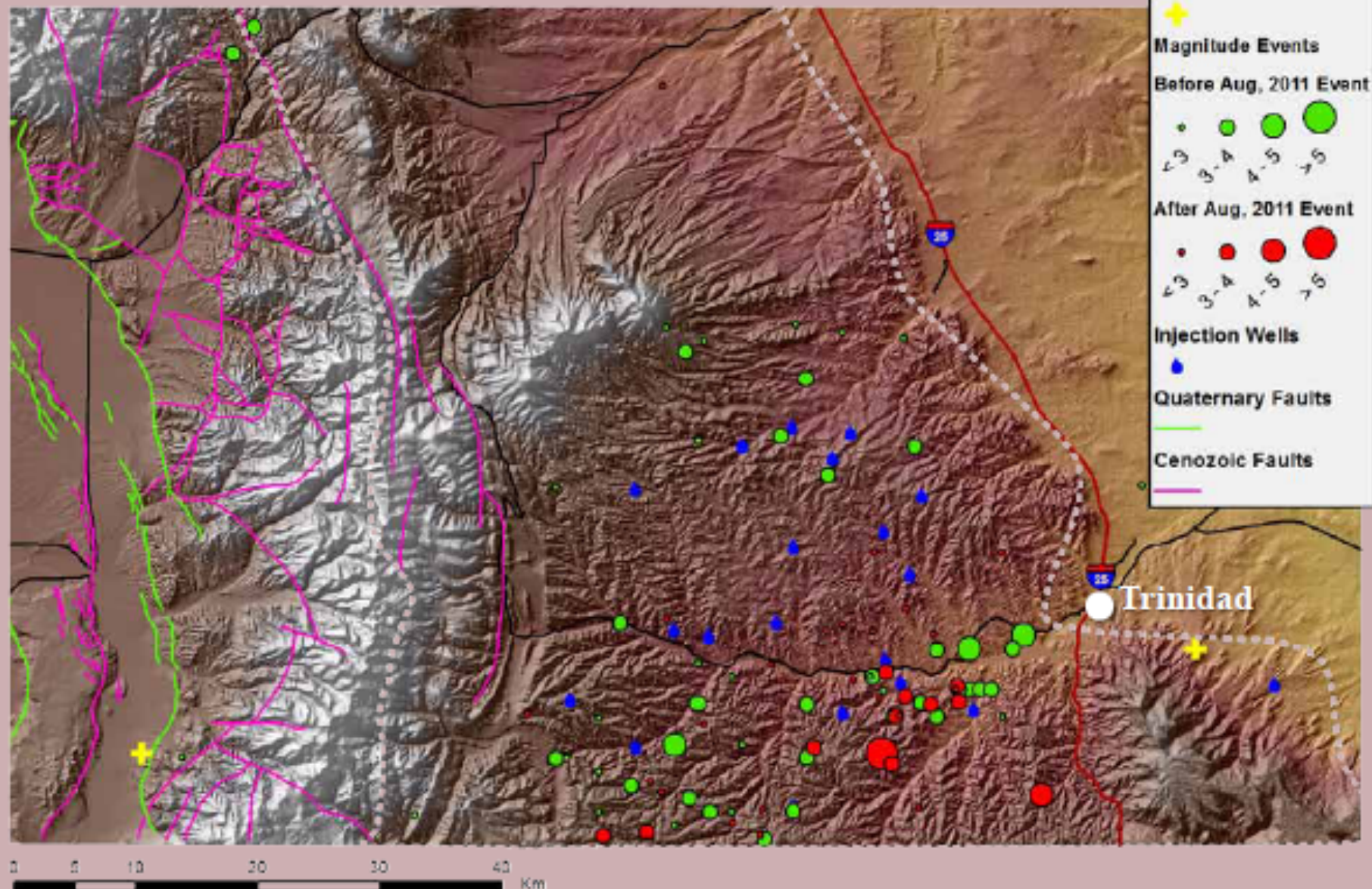
And the Raton Basin?

Colorado – PGA 2% in 50 Yrs

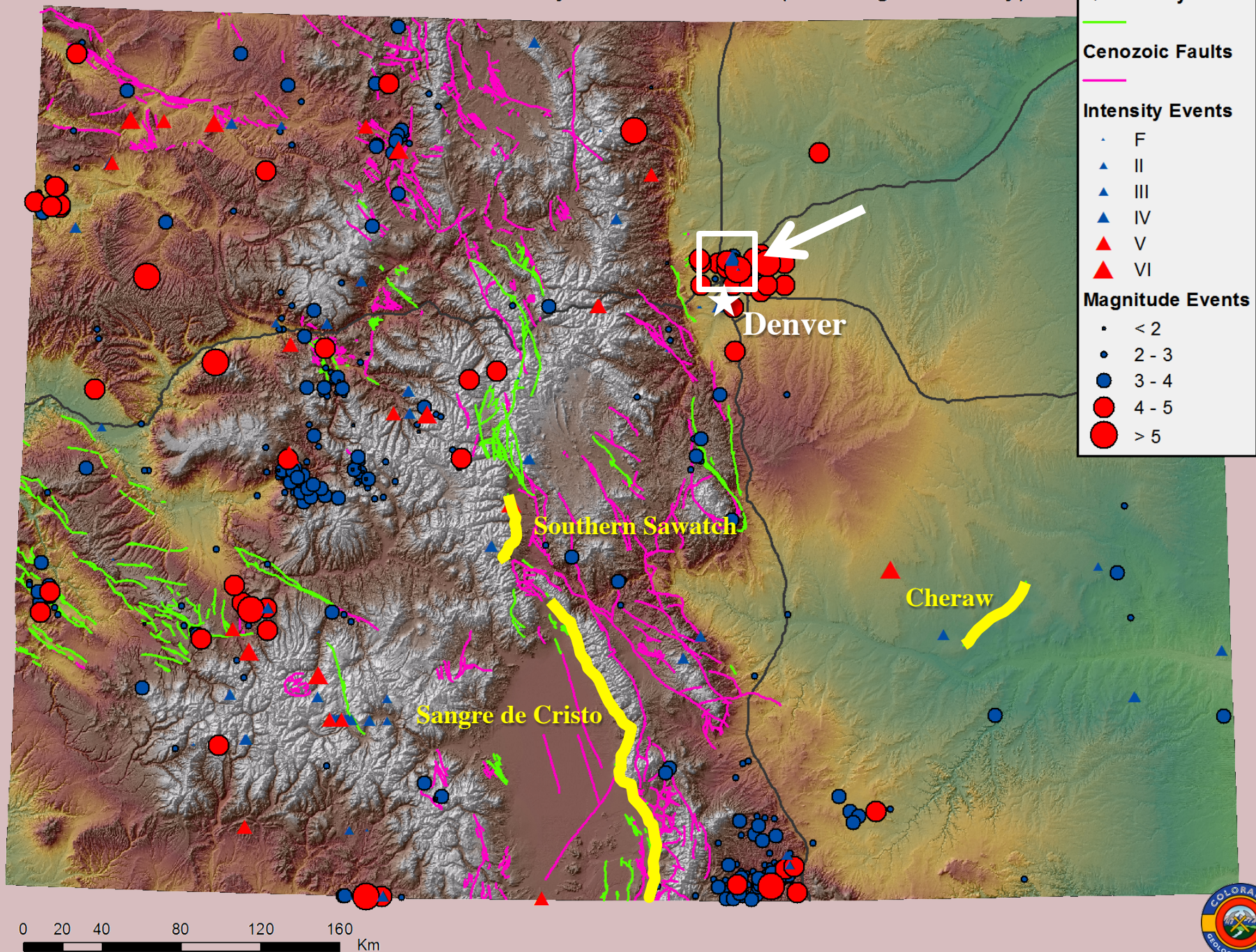


Trinidad earthquakes?

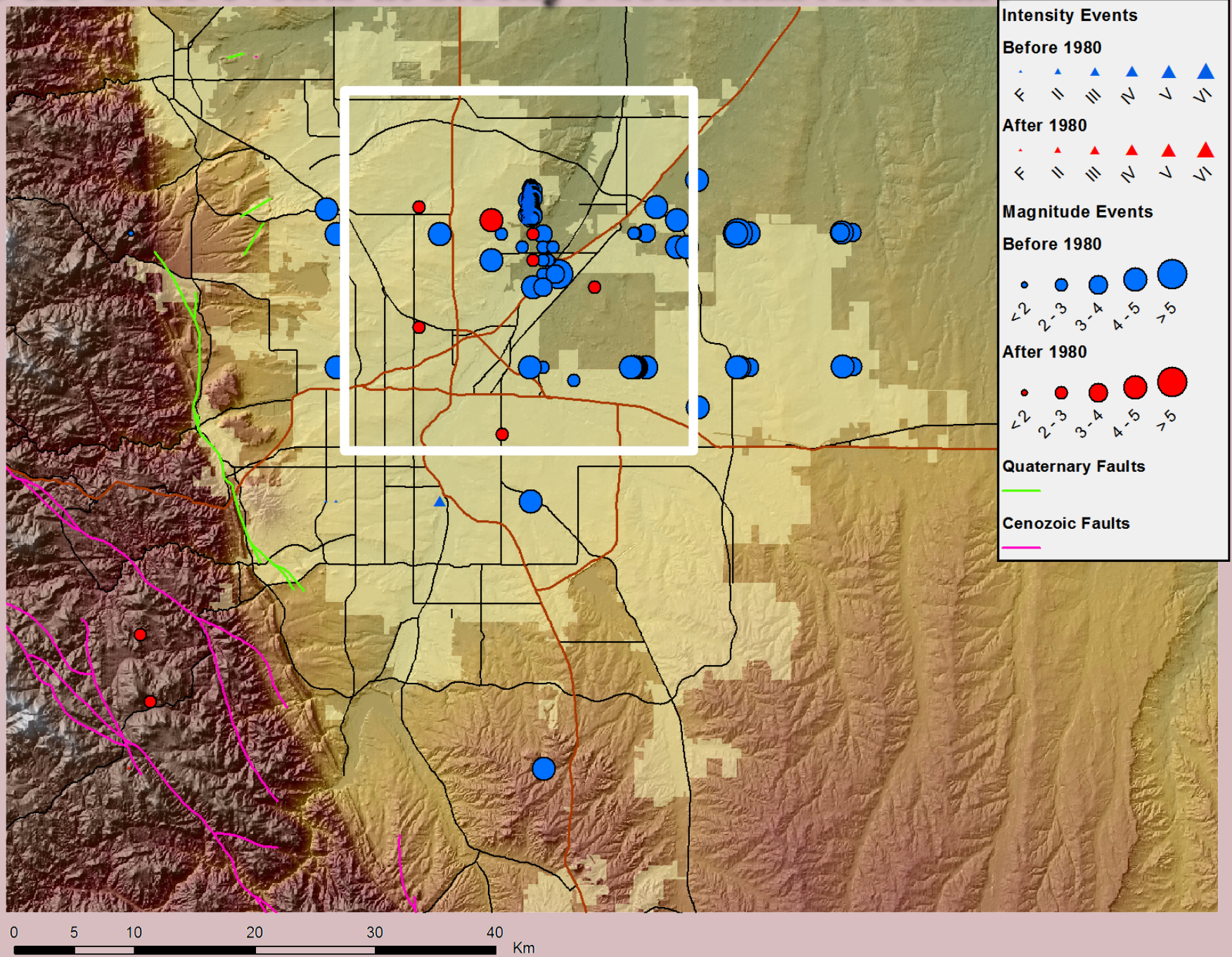
Raton Basin - Seismicity and Injection Wells



Colorado Historical Seismicity & Cenozoic Faults (including Quaternary)



Post-1980 events at Rocky Mountain Arsenal?



Colorado Questions for NSHMP

1. Assessment of previously identified faults

- Criteria for inclusion in NSHMP inventory?
- Geophysical data alone?
- Geomorphic expression necessary?
- Process for removing from Quaternary fault database?

2. Higher PGA areas in western CO

3. Natural vs. triggered events

- What is being included/not included for NSHMP in areas with potential for both?
 - Trinidad
 - Paonia
 - Rocky Mountain Arsenal