# Tectonic Fissures in Dry Lake Valley, Lincoln County Nevada

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Resources Department

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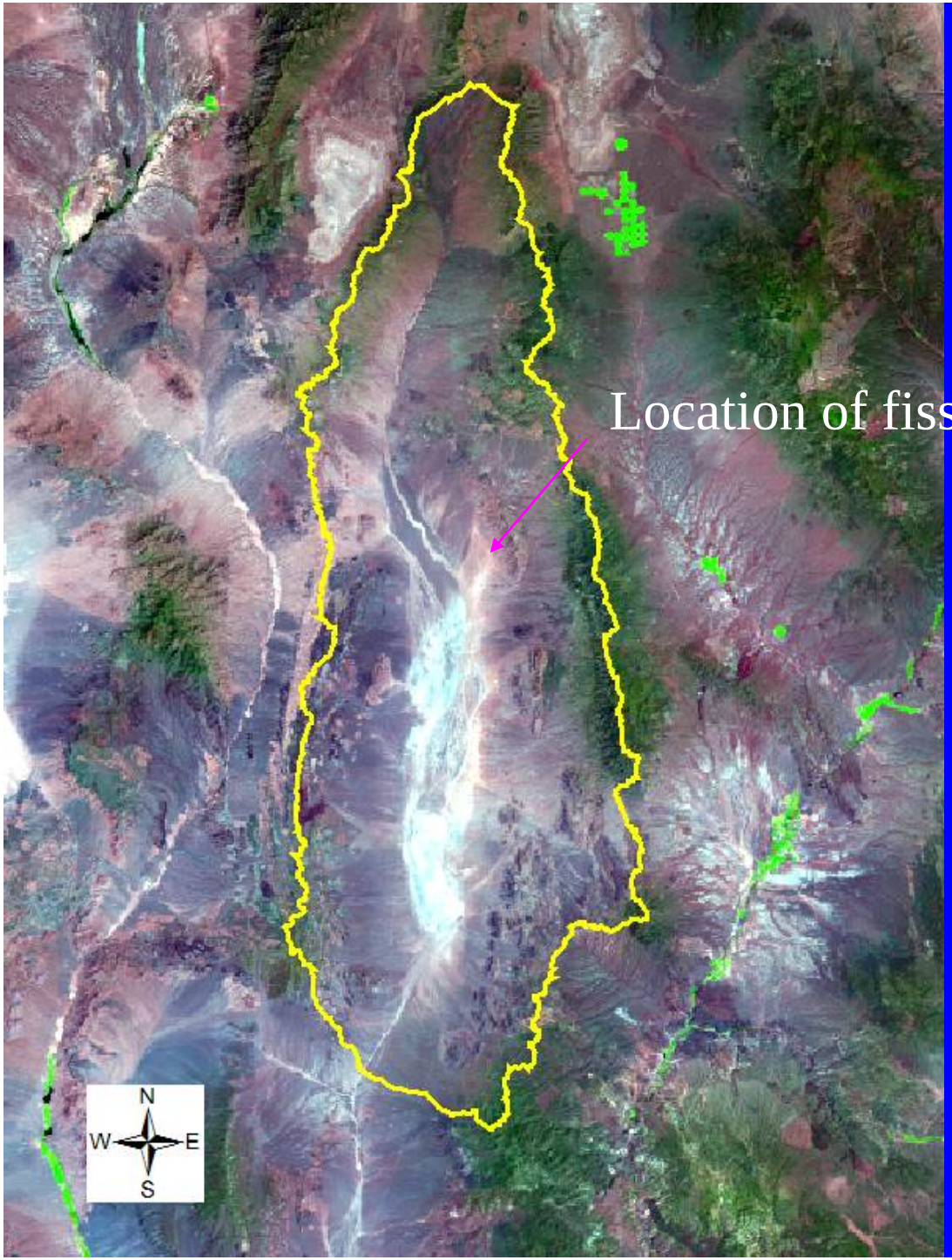
# Acknowledgements


- G. Dixon, Southwest Geology
- P. Rowley, Geologic Mapping
- M. Johnson, Virgin Valley Water District
- T. Katzer, Cordilleran Hydrology
- J. Brandt, Southern Nevada Water Authority
- A. Burns, Southern Nevada Water Authority
- R. Olson, Parsons
- J. Bell, Nevada Bureau of Mines and Geology


# Location of Dry Lake Valley, Lincoln County, Nevada

# Dry Lake and Delamar Valleys

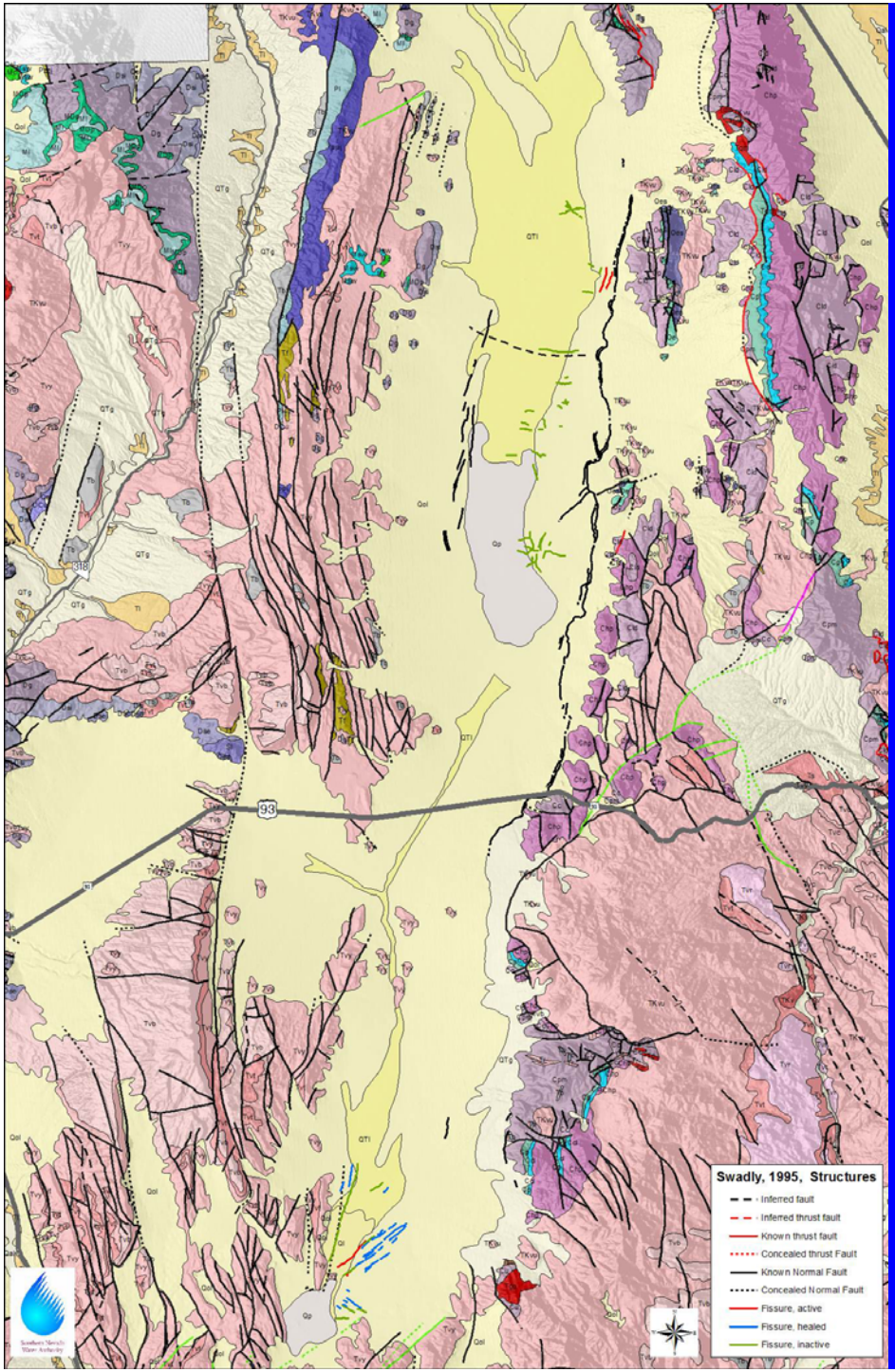
- General Hydrogeologic Setting
  - Both valleys contained within the same structural trough but divided by low alluvial divide
  - Each valley contains a separate dry playa area (depth to water is several hundred feet)
  - Western side of both valleys are Tertiary volcanic rocks, eastern side is more complex



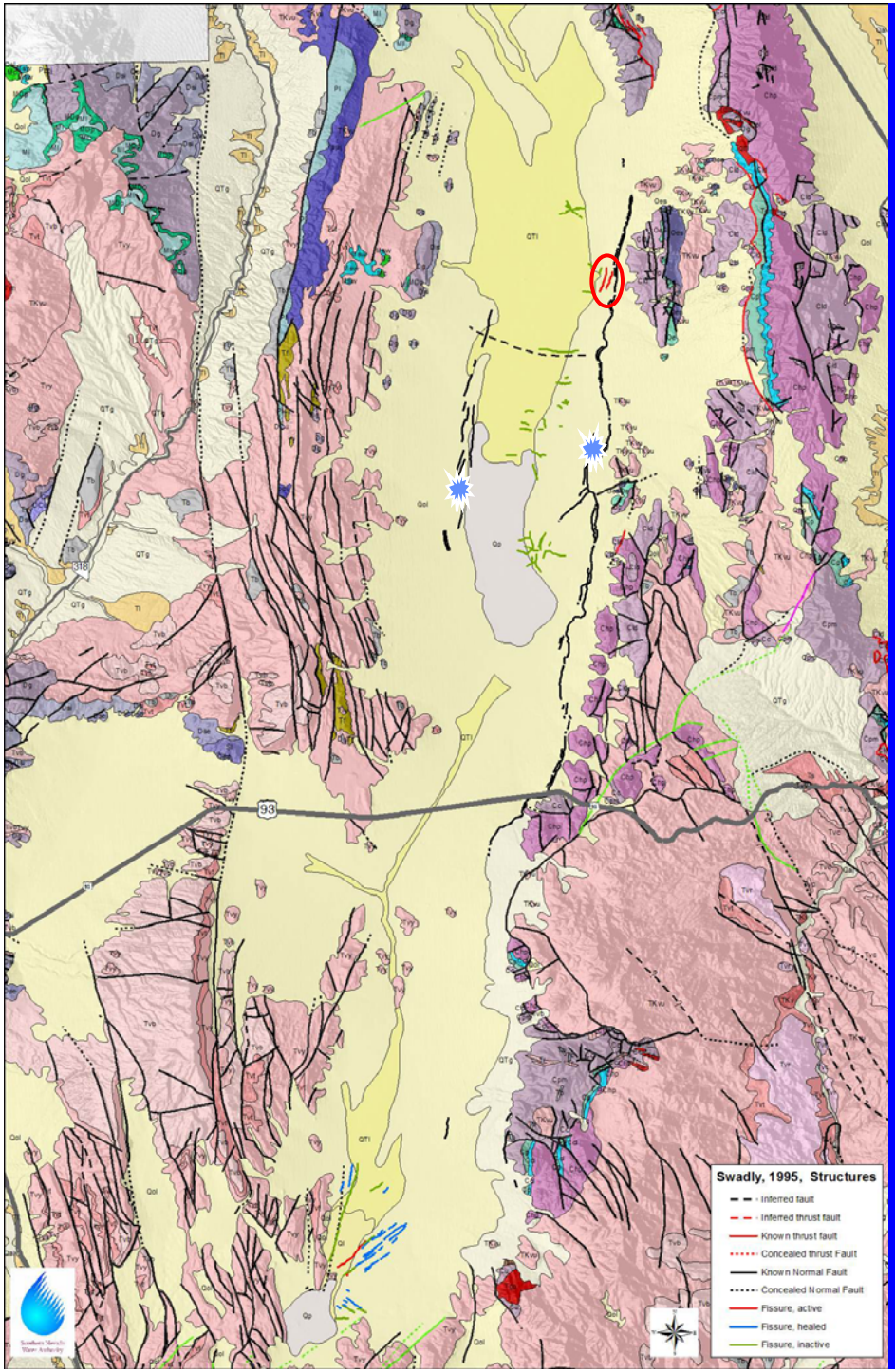

# Dry Lake Valley Satellite Image 2002, Bands 7,4,2

# Previous Work

- Not identified on (1970) Lincoln County Geologic Map
- Investigated by W. C. Swadley (USGS BARCO study) in the late 1980's and early 1990's
- W. C. Swadley work referenced by Brothers and others (1996)




# Swadley (1995) map combined with Lincoln County (1970) Map

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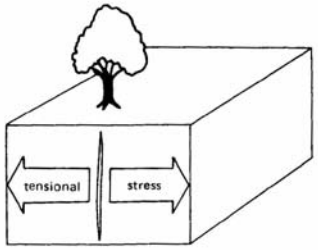
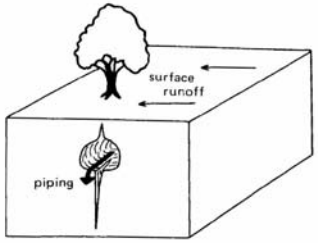
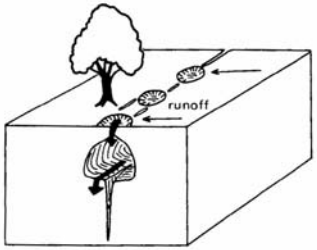
# Dry Lake Playa Facing East



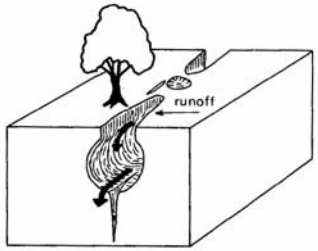

I. Lateral stresses induce tension cracking.



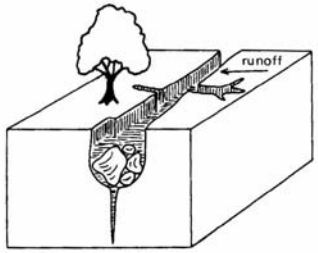

II. Surface runoff and infiltration enlarge crack through subsurface piping.



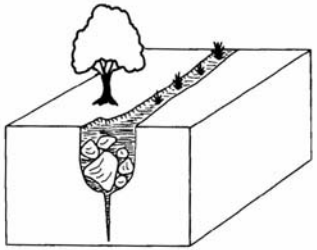

III. As piping continues, fissure begins to appear at surface as series of potholes and small cracks.




IV. As infiltration and erosion continue, fissure enlarges and completely opens to surface as tunnel roof collapses.




V. The entire fissure is opened to the surface and enlargement continues as fissure walls are widened; extensive slumping and side-stream gullying occur.

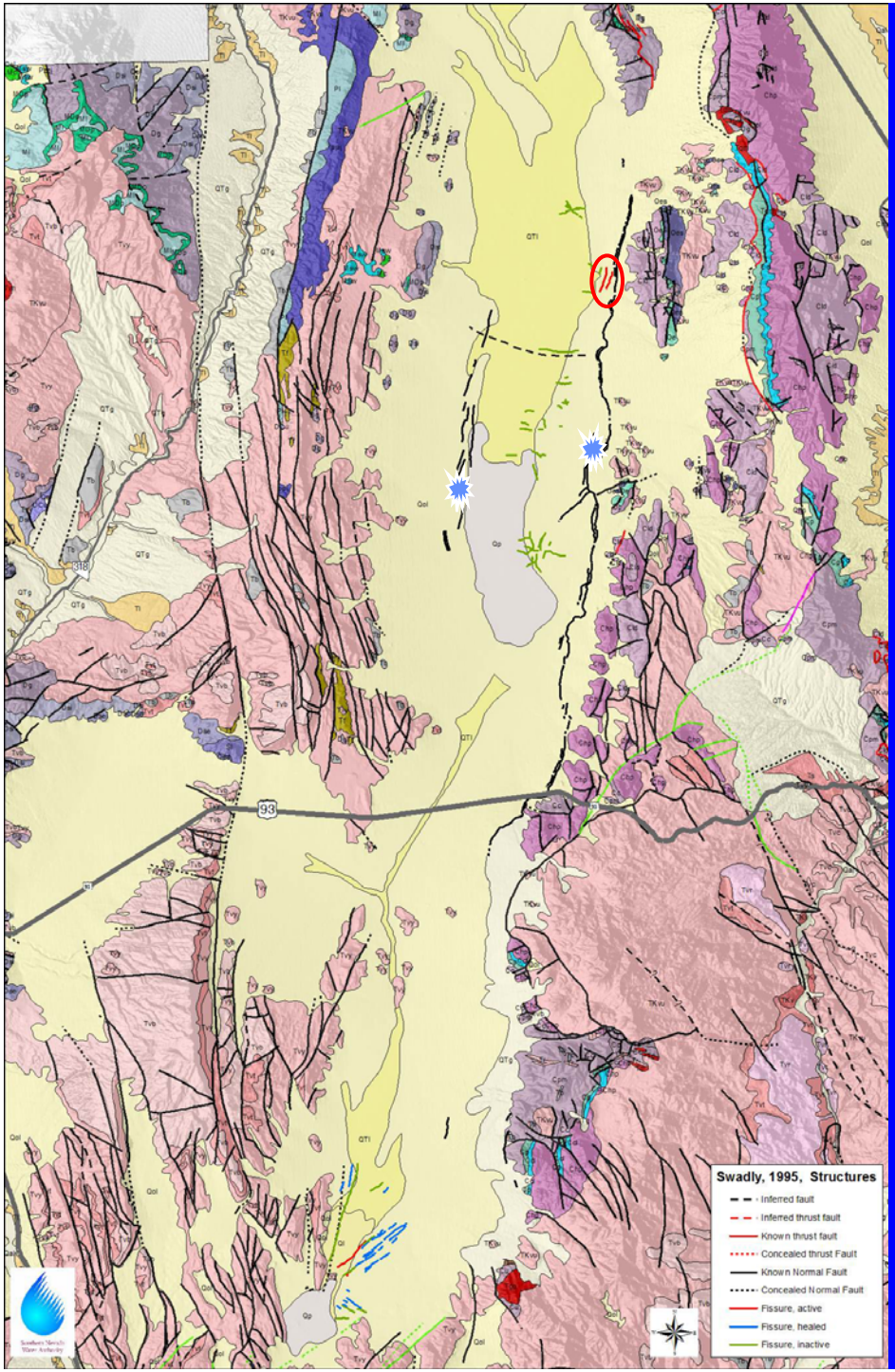


VI. Fissure becomes filled with slump and run-off debris and is marked by vegetation lineament and slight surface depression; it may become reactivated upon renewal of tensile stress.

FIGURE 33. Generalized stages of fissure development.



# Fissure Formation and Filling Bell, 1981

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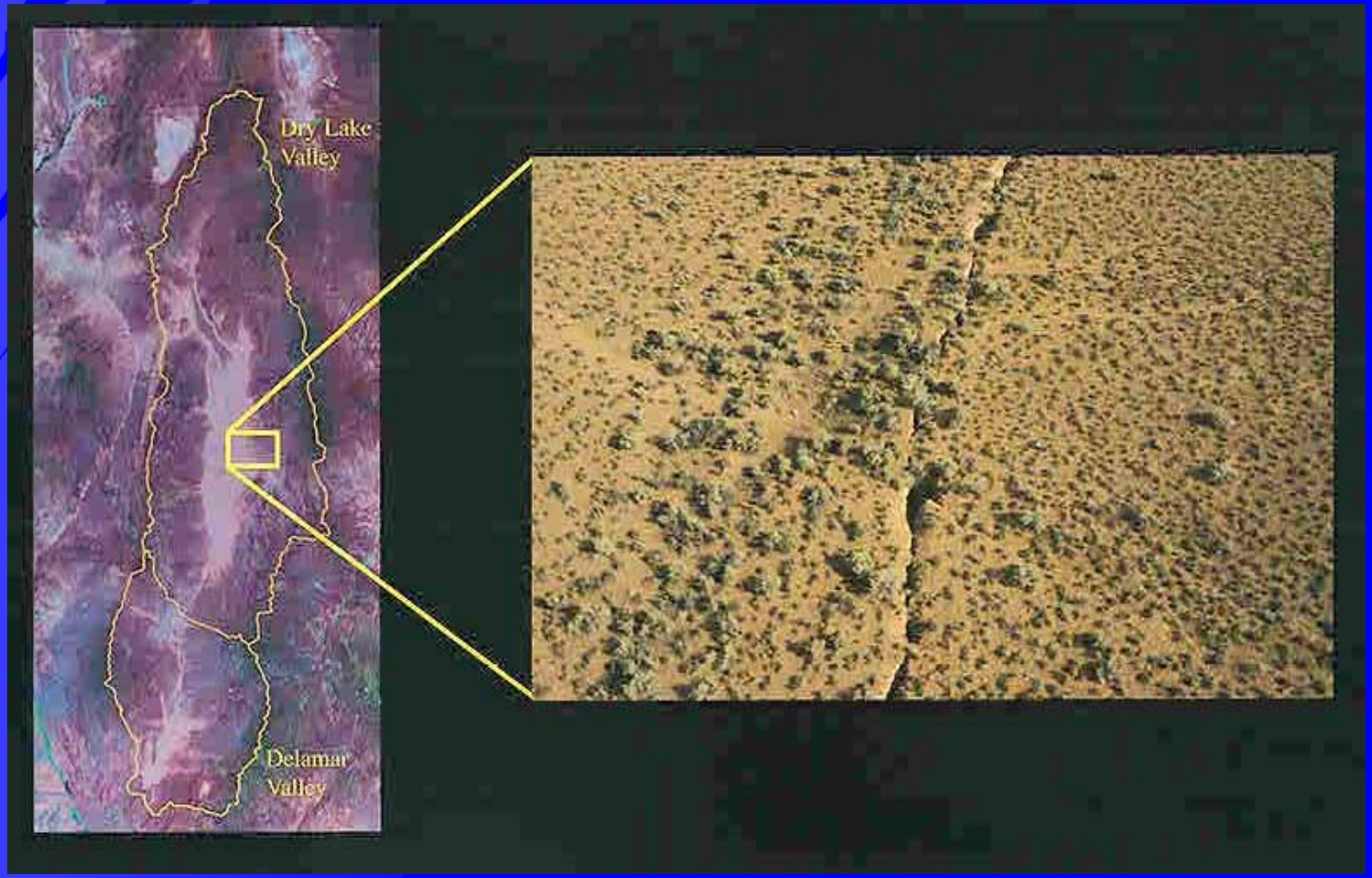
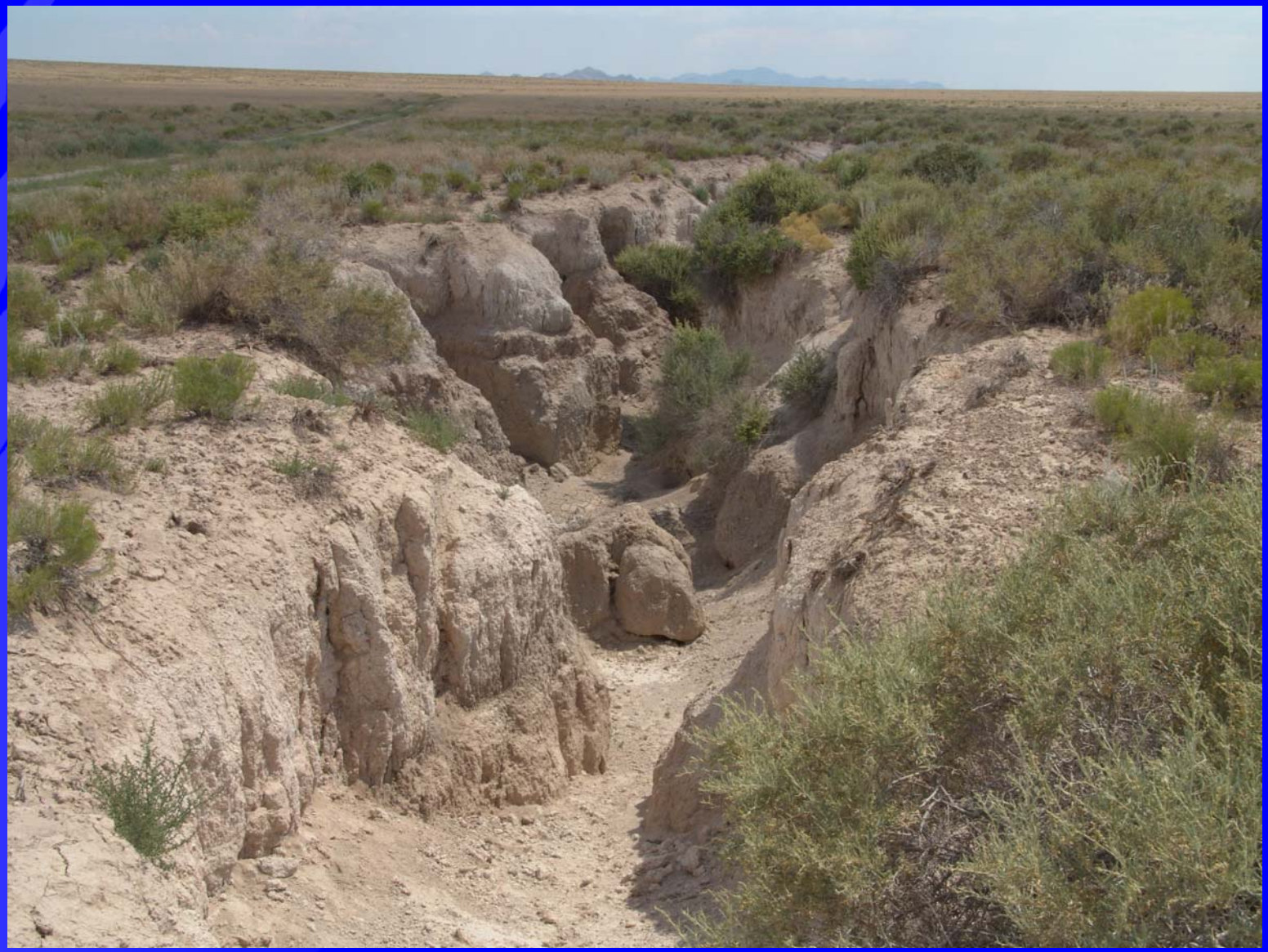
# Aerial View (1995)



# Eastern Fissure 1

# Eastern Fissure 2

# Eastern Fissure 3



# Eastern Fissure 4

# Eastern Fissure 5

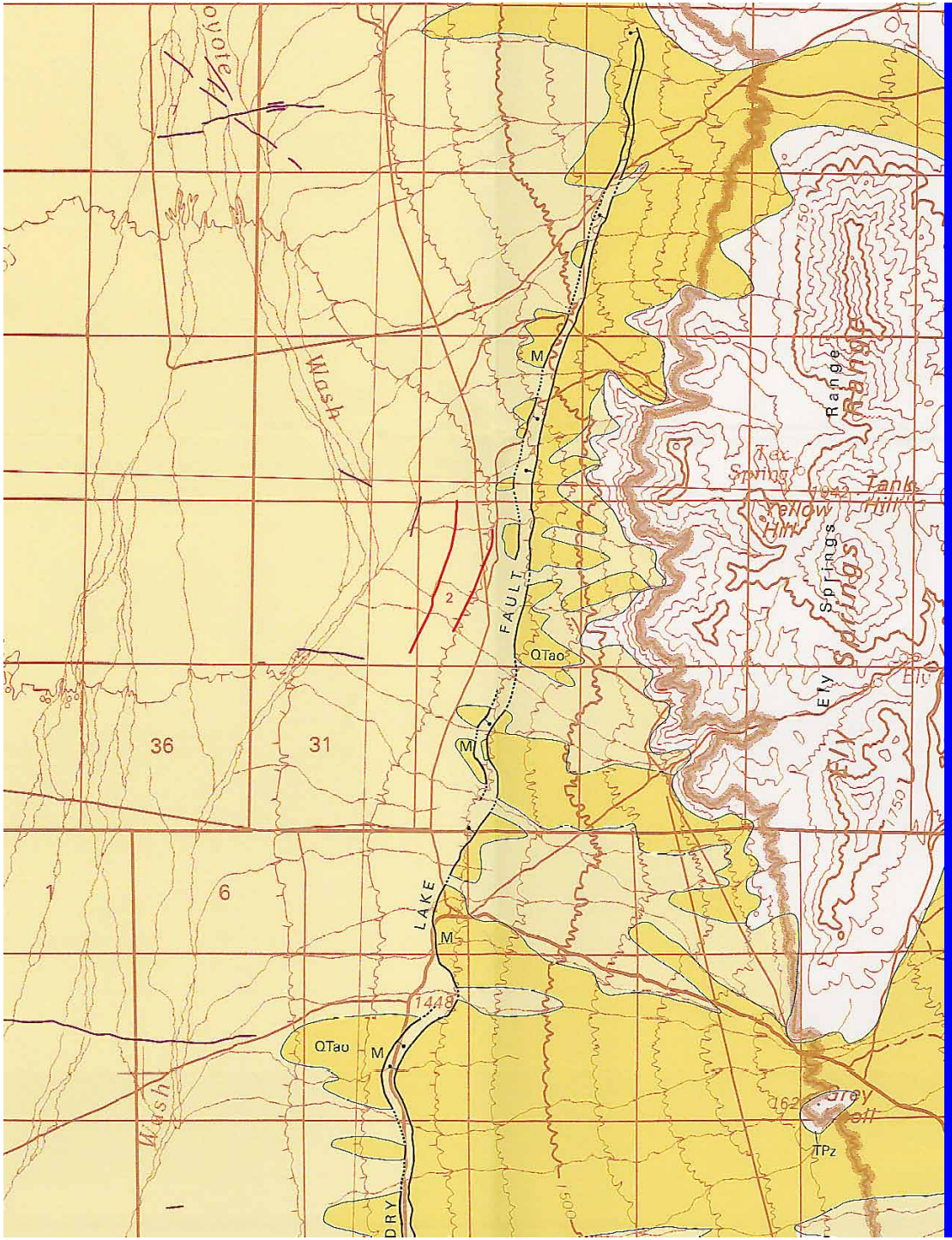
# Road Offset

# Ely Springs Range

# To Hill (N)

# Hill

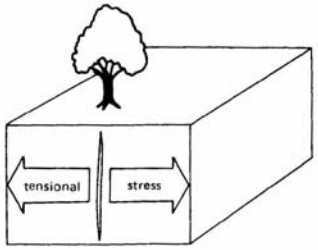
# Potholes and Piping




# Detail of Swadley (1995) Map

# Western Fissure 1

# Western Fissure 2

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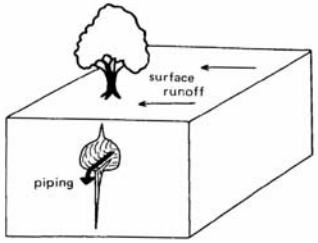


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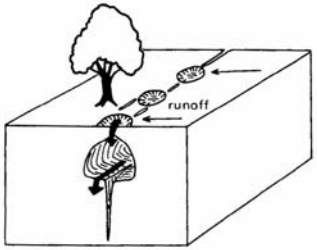


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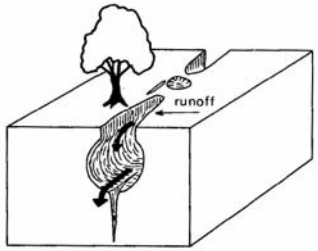


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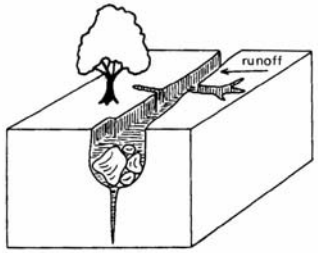


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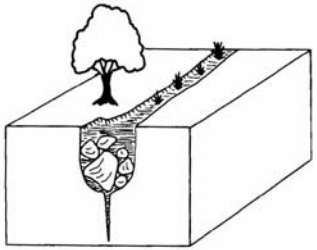

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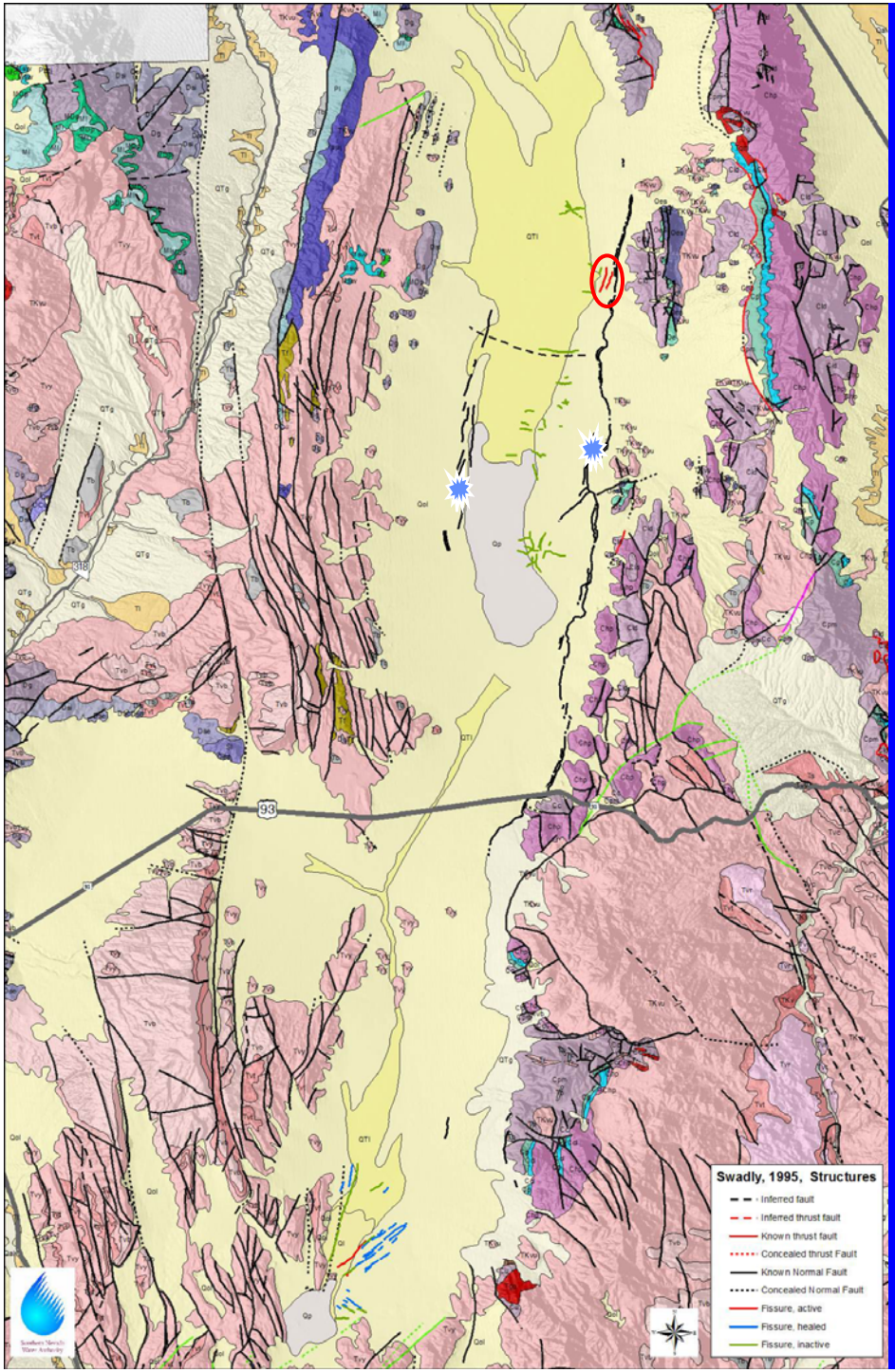


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# Fault Escarpment

# Possible Origin

- Ground-water Production
  - Volumes very minimal
- Differential Compaction
  - Sand to gravelly sand
- Desiccation of sediments
  - Not located in actual playa
- Tectonic Movement
  - Most consistent with known attributes

# Tectonic Movement

- Strike of features are subparallel with or perpendicular to large known faults (Dry Lake Fault and Pahranagat Shear Zone)
- Consistent with nearby Late Quaternary subsidence
- Offset not observed
  - Fissures appear to be formed by tension

# Known History

- The two small "active" fissures near Delamar playa were not present in 1975 and were inactive by 1993
- Of the two major active fissures, in 1969, the western one was about half as long and the eastern was about a tenth as long
- Probable large increases in size in 1970 and 1991 -1993

# Recent History

- The eastern fissure has grown in length and depth since 1993, western fissure now much less active
- Maximum depth now exceeds 10 meters
- Northernmost point of eastern fissure now controlled by a small ridge of alluvium

# Dry Lake Valley Fissures

- Unusual geologic features
- Easily accessible
- Large and active
  - May be very short lived features
- Appear to have a natural origin
  - Most probably tectonic


Questions ??