

GRAND JUNCTION GEOLOGICAL SOCIETY

www.gjgs.org

MAY MEETING

WEDNESDAY, MAY 17, 2017

Joint meeting with the CMU Geology Students

7:30 PM

Saccomanno Lecture Hall

(In the Wubben-Science Building)

Harvey R. DuChen, Lake City, Colorado

Karst Waters Institute

Will Speak On

**“Tectonic influences on Petroleum Migration and
Speleogenesis in the Guadalupe Mountains, New Mexico and
Texas”**

Guests Are Always Welcome

**Abstract on Next Page, Followed by Field Trip
Announcement**

Tectonic Influences on Petroleum Migration and Speleogenesis in the Guadalupe Mountains, New Mexico and Texas

Harvey R. DuChene
P.O. Box 362
Lake City, Colorado USA
hrduchene@gmail.com
Affiliation: Karst Waters Institute

Abstract

Sulfuric acid speleogenesis in the Guadalupe Mountains is a consequence of the rise of the Southern Rocky Mountains and subsequent opening of the Rio Grande Rift during Cenozoic time. Prior to rifting, the border between the Southern Rockies and the Great Plains was a continental scale, east facing monocline extending from Colorado to west Texas. Uplands of the Late Laramide (~38-35 Ma) Southern Rocky Mountains provided an immense recharge area that supplied water to aquifers draining eastward to the Permian Basin. Evidence for east-directed hydrodynamic flow is the displacement, microbial degradation and subsequent recharging of hydrocarbons in large structural and stratigraphic traps in Artesia Group (Permian, Guadalupian) reservoirs in southeast New Mexico and west Texas. Prior to the early stages of development of the Rio Grande Rift, hydrostatic head in the Capitan aquifer caused water to move eastward through the confined Capitan Aquifer toward the Permian Basin. As overlying confining beds were eroded, some of the water in the aquifer moved upward along fractures to artesian springs in the Guadalupe Mountains. This resulted in solutional enlargement of fractures and development of early stage caves. Extensional faulting since 29 Ma fragmented the anticlinal bend of the regional monocline, progressively reducing the size of the upland recharge area and reducing hydrostatic head. Fresh water influx introduced microbes into Artesia Group (Permian, Guadalupian) reservoirs causing biodegradation of petroleum and generating copious H₂S. The water table within the Guadalupe Mountains began to fall 14-12 Ma in response to erosion and tectonism. During this time, oxygen-rich meteoric water mixed with H₂S to form sulfuric acid, which enlarged passages and galleries at the water table. Tectonic spasms related to the opening of the Rio Grande Rift caused relatively abrupt drops in the water table, shifting the locus of sulfuric acid dissolution eastward and downward. Cave levels formed by sulfuric acid record the position of the water table at a given time, and the elevation difference between levels may correlate with episodes of Rio Grande Rift tectonism since 12 Ma.

SAN JUAN MOUNTAINS SUMMER FIELD TRIP AND PROGRAM: LAKE CITY LANDSLIDE AND SLUMGULLION EARTHFLOW

Leader: Joe Fandrich. EMAIL ADDRESS joefandrich@hotmail.com.

Location: Lake City, Hinsdale County, northeast corner of the Lake City caldera.

Dates: August 18, Friday evening, program presentation in Lake City. Venue for the program, (either the Lake City theatre or armory), and time to be announced.

Saturday, August 19, gather 0930 hours at the Lake City Park (located one block west of highway 149 in the middle of Lake City) to start the field trip tour of the Lake City Landslide in the morning and the Slumgullion Earthflow in the afternoon.

Transportation: Attendees will provide their own vehicles for transportation. Any two-wheel drive automobile will suffice as all access roads will be on asphalt with parking on suitable dirt or gravel areas.

Food and Lodging: There are several motels and restaurants in Lake City ([Google Lake City for the web site and information re: lodging and restaurants](#)). Attendees should provide their lunches with plenty of water for the Saturday field trip.

Walking/Hiking: A short easy walk to view the landslide and a short (one-quarter mile) medium hike to view the earthflow will be required. Be prepared for any weather condition.

Field Guide Books: A guide book will be given to each attendee [that contacts Joe Fandrich via email by no later than August 4, 2017.](#)

Suggested Personal Items: Cameras, binoculars, suitable hiking clothes, walking shoes or boots, jackets (can be cold any day in the San Juans), sun screen, caps or hats, water in canteens or bottles, and any personal medical necessities are some of the items you might want to bring.

Miscellaneous: Several motels are available in Lake City for those wishing to stay in Lake City and attend the Friday evening program. It takes about three hours to drive from Grand Junction to Lake City so the field trip can be attended by leaving Grand Junction no later than 0600 hours Saturday morning. The field trip will terminate by around 1600 hours (4:00 p.m.) Saturday afternoon.

Questions? Email joefandrich@hotmail.com for any questions regarding this field trip or program.