BULLETIN

Corpus Christi Geological Society

and

Coastal Bend Geophysical Society

November
2024
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P.O. BOX 1068* C.C.TX. 78403
2024-2025
www.ccgeo.org

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P.O. BOX 2741*C.C. TX. 78403
2024-2025

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Scholarship Chairman	Matt Hammer	361-888-4792 361-563-6137	mhammer@royalcctx.com

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Visit the geological web site at www.ccgeo.org

CCGS/CBGS JOINT MEETING SCHEDULE 2024-2025

September 2024

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
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2024-25 Membership Kickoff—Nueces Brewing Co. Downtown, 5-8 p.m.

October 2024

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Meeting at Joe's Crab Shack Downtown. 11:00 Bar, 11:45 lunch, 12:00 speaker.
Speaker: Julie Bloxson Associate Professor at Stephen F. Austin State University.
"Understanding the Lithium Content Trends in the Smackover Formation"

November 1024

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Meeting at Joe's Crab Shack Downtown. 11:00 Bar, 11:45 lunch, 12:00
Speaker: Mark Morford, Geophysicist (Technical Sales), Lumina
"State-of-the Art Seismic Processing."

December 2024

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January 2025

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Meeting at Joe's Crab Shack Downtown. 11:00 Bar, 11:45 lunch, 12:00 speaker: Chuck Benson, USAF Meteorologist (Retired). "Hurricanes of the Coastal Bend."

February 2025

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Meeting at Joe's Crab Shack Downtown. 11:00 Bar, 11:45 lunch, 12:00 speaker: Jason Ashby. "Hydrogen As a Future Alternative Source of Energy."

CCGS/CBGS Joint Meeting Schedule 2024-2025

March 2025						
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May 2025						
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25	26	27	28	29	30	31

Meeting at Joe's Crab Shack downtown. 11:00 Bar, 11:45 lunch, 12:00 speaker

Calendar Of Meetings and Events

Corpus Christi Geological/Geophysical Society..... Third Wed.—11:30a.m.
SIPES Corpus Christi Luncheons..... Last Tues.—11:30a.m.
South Texas Geological Society Luncheons..... Second Wed—noon San Antonio
San Antonio Geophysical Society Meetings..... Fourth Tuesday
Austin Geological Society..... First Monday
Houston Geological Society Luncheons..... Last Wednesday
Central Texas Section of Society of Mining, Metalllurgy & Exp..... 2nd Tues every other month in San Antonio

www.ccgeo.org

It is time to renew membership in the Corpus Christi Geological Society and/or the Coastal Bend Geophysical Society.

The easiest way to do that is to use our pay online website found at **https://corpus-christi-geological-society.square.site/**

Or use your smartphone with this QR Code

PRESIDENT'S LETTER

Greetings to All

Heat has broken. The temperatures have dropped from 97 to 92 degrees. I spent a few weeks in Missouri, and fall was upon them. The day I left the morning temperatures were in the 30's. What does this have to do with geology, you ask? My view is the colder the winter, the more natural gas, propane, and fuel will be consumed. Hopefully this will help the prices for our commodities.

Personally, I had a rather slow summer as far as the oil business, but all indications are the end of the year will be busier. Hopefully you were able to stockpile and generate some new prospects during the slower times.

December 1st is the deadline for abstracts for GeoGulf at Stephen F. Austin this spring. There is more.

The CCGS/CBGS luncheon meeting and talk were well received on October 16th. Dr. Julie Bloxson discussed Lithium research and areas where it is found. The talk was well received and many questions were discussed. We are fortunate to get such quality speakers to enhance our intelligence and curiosities. Stay tuned to the Bulletin for future talks and short courses.

The big election is upon us, please go out and vote. I have a saying: if you do not exercise your right to vote, then you do not have a right to complain about the outcome. Please do your part and VOTE.

Reminder? It is time to renew your CCGS and CBGS membership. This is a good time to add a little extra donation for the scholarship fund. Students please remember: student membership (which is free) is a MUST for students to receive the luncheon meeting meal at no cost.

It is an honor for me to be back as president. Please feel free to contact me with questions and/or concerns. Leave a message, and I will return your calls or emails. Remember, the future is now, so please volunteer.

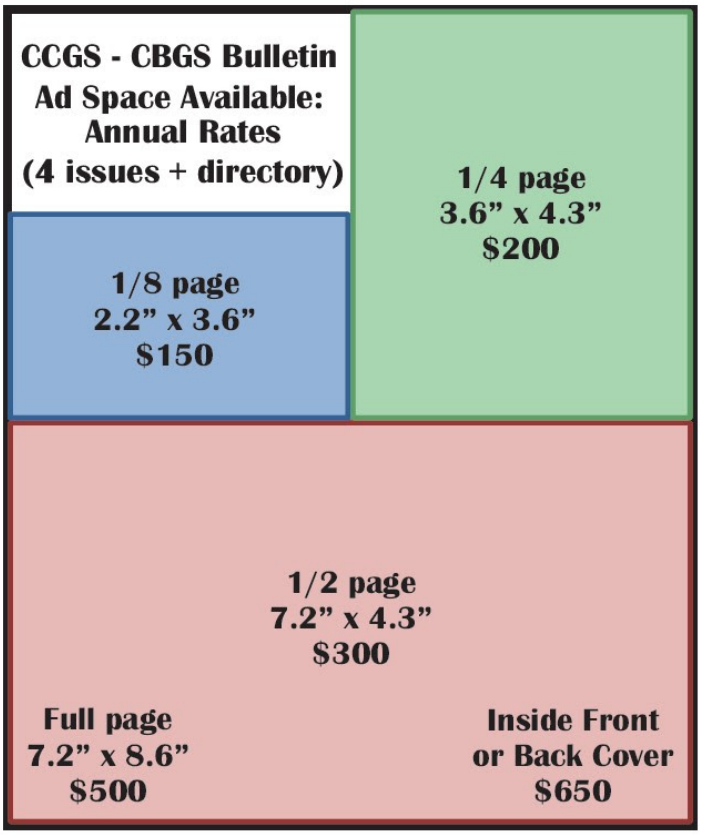
Dennis O. Moore
President CCGS 2023-25
Moore.dennis24@ yahoo.com

SUPPORT YOUR SOCIETY

Advertise !!!

with the CCGS - CBGS

MONTHLY BULLETIN ADS



FOR MORE DETAILS:

EMAIL LDEVINE@SUEMAUR.COM OR CALL (361) 510-8872

The 2024-2025 season is underway, and we would like to offer very inexpensive advertising opportunities to our members and industry partners. The CCGS has four bulletins distributed to all our members each year. Ads defray the cost of producing and distributing print and PDF Bulletins.

We have lots of space available for various-sized ads, and we run business card ads at the back of each bulletin. If you have started a new business or have recently moved offices this is a great opportunity to introduce yourself. Business cards are $30 annually. Send me a scan of your card or contact me for more information on our ad program.

CBGS President's Letter

CBGS Board 2024-2025

- President- Dr. Mohammed Ahmed
- Vice President- Dr. Subbarao Yelisetti
- Secretary/Treasurer-Charles Benson

CBGS Scholarships

The board met to award student scholarships in for the Fall 2024 semester. The board awarded scholarships as follows:

- Mohamed Mousa, Texas A&M-CC ($1,000)
- Ndeshihafela Kafidi, Texas A&M-K ($1,000)
- Frida Gonzalez-Saenz, Del Mar ($500)
- Olivia Ramirez, Del Mar ($500).

CBGS Business

- CBGS currently has 28 active members, 2 honorary members, and 40 student members.

Academic Programs and Research Activities at TAMU-CC and TAMUK

- TAMU-CC's geology curriculum is constantly being refreshed with new courses but this academic year we are looking to add additional tracks such as Marine and Climate Geosciences, Planetary Geosciences and Biogeosciences. For additional information contact Dr. Valeriu Murgulet (Valeriu.Murgulet@tamucc.edu) at TAMU-CC.
- Dr. Mohamed Ahmed at TAMU-CC will be offering two Geophysics classes in Spring 2025. He uses equipment from his Geophysics Lab to teach these classes. Dr. Ahmed's lab includes the Geometrics G-858 magnetometer and gradiometer system, LaCoste & Romberg gravimeter, AGI SuperSting 1D, 2D, and 3D land resistivity system, GSSI SIR-4000 GPR system with 200 MHz and 350 MHz antennae, Geonics EM-31 frequency domain ground conductivity system, Geonics G-TEM time-domain system, Geometrics stratagem EH-4 magnetotelluric imaging system, Geometrics ES-3000 24-channel seismograph, Tromino passive seismic system, Trimble differential GPS system. The Geophysics Test Site (GTS) is being used in teaching this class (see https://library.seg.org/doi/abs/10.1190/tle40030208.1). Interested, contact Dr. Mohamed Ahmed (Mohamed.ahmed@tamucc.edu) at TAMU-CC.
- Texas A&M University-Kingsville (TAMU-K) started its first cohort of MS Petrophysics program in Fall 2024. If you are interested in joining this program, please contact the graduate coordinator for MS in Petrophysics, Dr. Subbarao Yelisetti at Subbarao.Yelisetti@tamuk.edu.

Student News:

- Graduate student Alan Innes at TAMU-CC recently received an award of $6,000 from the SIPES Society of Independent Professional Earth Scientists (SIPES) Foundation in honor of SIPES member Bobby M. Greenwood. Alan earned his B.S. in Geology from TAMU-CC and is currently a graduate student in the Environmental Science M.S. Program at TAMU-CC. His major professor is Dr. Mohamed Ahmed.
- Ramadan Abdelrehim, a PhD student working with Dr. Mohamed Ahmed at TANU-CC, has been accepted for EarthScope Magnetotelluric Instrumentation and Data Processing short course with Travel support to attend the course in New Mexico-2024 ($1,100).

Meetings & Events

- The 2024 AGU meeting: https://www.agu.org/annual-meeting

Mohamed Ahmed
President, CBGS
Mohamed.ahmed@tamucc.edu

GEOGULF2025

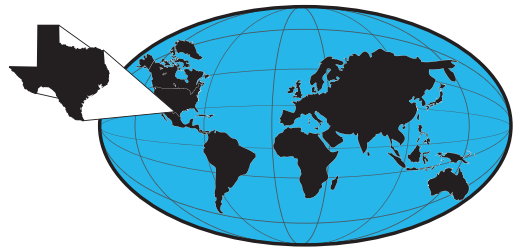
NACOGDOCHES
6-8 APRIL 2025

Abstract Submission Through Dec 1

Sessions Include:

- *Gulf Coast Geology*
- *Lithium and Critical Minerals*
- *Haynesville, Eagle Ford & Other Shale Plays*
- *Deepwater GOM*
- *CCUS, Geothermal*
- ***Special Session:** East Texas Basin*
- *ML, AI & Data Analysis*
- *And more*

For more information visit www.geogulf2025.org
Or email Kurt.Ley@kingwoodexploration.com



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Celebrating 40+ years of prospect generation and exploration in the following South Texas plays and trends.

Frio	San Miguel	Edwards
Jackson	Austin Chalk	Pearsall
Yegua	Eagle Ford	Sligo
Wilcox	Buda	Cotton Valley
Olmos	Georgetown	Smackover

Thunder continues to seek non-operated working interest participation in projects and prospects.

Thunder has participated in more than 100 new drills in the last seven years.

Walter S. Light Jr.
President/Geologist
713.823.8288
EMAIL: wthunderx@aol.com

CORPUS CHRISTI GEOLOGICAL SOCIETY
COASTAL BEND GEOPHYSICAL SOCIETY

LUNCHEON MEETING ANNOUNCEMENT

November 20th, 2024

Location:	**Joe's Crab Shack, 444 North Shoreline Dr., Corpus Christi, TX 78401**
Student Sponsors:	**Viper Exploration, Imagine Resources, Mary DeMis. Thank you!**
Time:	**11:30 AM Social, Lunch follows at 11:45 AM, Speaker at 12:00 PM**
Cost:	**$35.00 (additional $10.00 surcharge without reservation: NO SHOW may be billed.)**
Reservations:	**Please RSVP by 11:00 AM on Monday, November 18th before the meeting!**
	Email: arrangements@ccgeo.org

Please note that luncheon RSVPs are a commitment to Joe's Crab Shack (Shoreline Drive) and must be paid even if you can't attend the luncheon.

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Mark Morford: Geophysicist (Technical Sales), Lumina

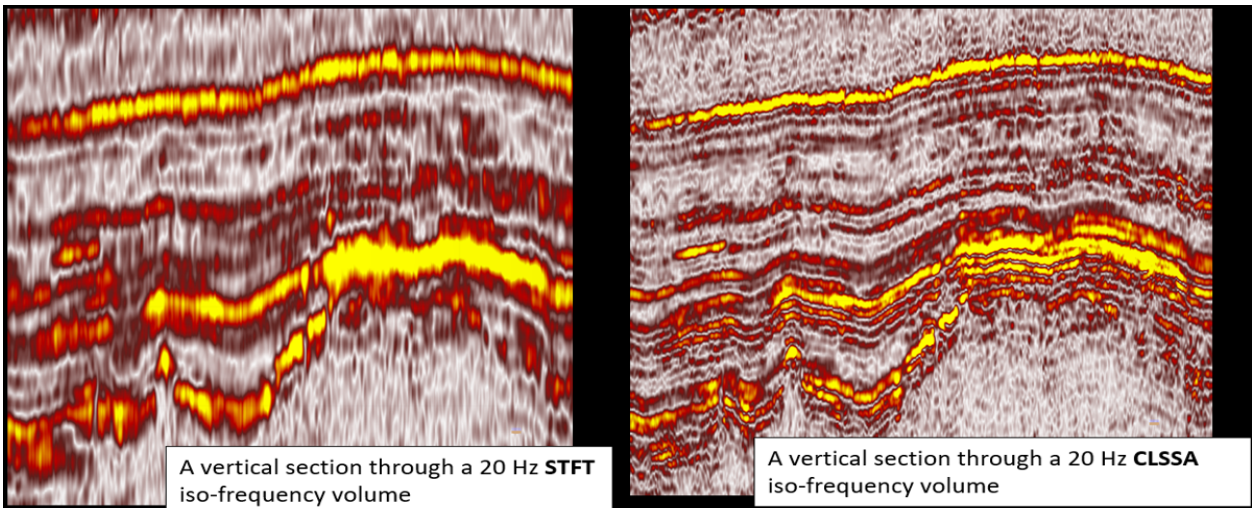
Using Bandwidth Extension and Phase Information as an Added Tool in Seismic Interpretation

Seismic data contains information that is not always used in the interpretation and Characterization. Using seismic spectral analysis techniques as a foundation, it is possible to delve deep into seismic data, extracting valuable insights about subsurface structures and properties. This proves invaluable in oil and gas exploration reservoir characterization, and geological studies.

Abstract

Two techniques will be discussed in this presentation. Sparse layer inversion uses the spectral decomposition results to enhance the seismic bandwidth in order to resolve thin beds and reservoir variations not visible in conventionally processed data. Phase decomposition, which is not a phase rotation but more similar to the spectral decomposition, produces results that will identify anomalous amplitudes due to porosity or fluid changes specifically in thin beds.

These processed can be applied pre or post stack and on 2d or 3d data.



High definition Spectral Decomposition can aid in interpretation

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COASTAL BEND GEOPHYSICAL SOCIETY

LUNCHEON MEETING ANNOUNCEMENT

January 15th, 2025

Location:	**Joe's Crab Shack, 444 North Shoreline Dr., Corpus Christi, TX 78401**
Student Sponsors:	**Viper Exploration, Imagine Resources, Mary DeMis. Thank you!**
Time:	**11:30 AM Social, Lunch follows at 11:45 AM, Speaker at 12:00 PM**
Cost:	**$35.00 (additional $10.00 surcharge without reservation: NO SHOW may be billed.)**
Reservations:	**Please RSVP by 11:00 AM on Monday, January 13th before the meeting!**
	Email: arrangements@ccgeo.org

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ABSTRACT: HURRICANES OF THE COASTAL BEND

Chuck Benson, USAF Meteorologist (Retired)

Hurricanes are a serious threat to public safety and to industries in the Coastal Bend. On average, hurricanes make landfall on the Texas coast about once every other year. Major hurricanes (Category 3 or higher) directly affect this area about once every 50 years. The six necessary factors for hurricane formation will be presented. Next, the hurricane forecast production cycle will be explained. Then…through a lens of case studies, some commonalities become apparent for storms that pose the gravest threat to the Coastal Bend.

The September 1919 Hurricane brought the highest storm surge during historic times to downtown Corpus Christi. Hurricane Celia (August 1970) delivered a direct hit to Corpus Christi as a Category 4 storm, and produced almost unimaginable wind damage. Hurricane Harvey (August 2017) devasted an area from Rockport to Port Arthur, but largely spared Corpus Christi. Harvey also caused historic flooding in the Houston metropolitan area. Hurricane Hanna (July 2017) was only a Category 1 storm, but caused considerable damage from Baffin Bay to Port Aransas from a quite significant storm surge.

The worst-case scenario for the Coastal Bend would be a “long track” hurricane that is intensifying as it makes landfall just south of Corpus Christi Bay.

BIOGRAPHICAL SKETCH: CHUCK BENSON

Chuck Benson grew up in Houston, and has studied hurricanes since childhood.
As a weather officer in the United State Air Force, he forecast the effects of hurricanes and typhoons in every ocean basin around the world.

After 26 years on active duty, Chuck became a public-school teacher.
For 14 years, he taught earth science to eighth graders in Bellevue, Nebraska.
Chuck and his wife moved to Corpus Christi during the summer of 2020…just in time for Hurricane Hanna! Since moving to the Coastal Bend, he has been an officer on the boards of both the CCGS and CBGS.

Chuck earned a bachelor of science (meteorology) from Texas A&M in 1977, a master of science (tropical meteorology) from St. Louis University in 1985,
a master of arts (national security) from the Naval War College in 1991, a bachelor of science (education) from Peru State College (Nebraska) in 2005, and
master of science (science education) from Montana State University in 2013.

CORPUS CHRISTI GEOLOGICAL SOCIETY
COASTAL BEND GEOPHYSICAL SOCIETY

LUNCHEON MEETING ANNOUNCEMENT

February 19th, 2025

Location:	**Joe's Crab Shack, 444 North Shoreline Dr., Corpus Christi, TX 78401**
Student Sponsors:	**Viper Exploration, Imagine Resources, Mary DeMis. Thank you!**
Time:	**11:30 AM Social, Lunch follows at 11:45 AM, Speaker at 12:00 PM**
Cost:	**$35.00 (additional $10.00 surcharge without reservation: NO SHOW may be billed.)**
Reservations:	**Please RSVP by 11:00 AM on Monday, February 17th before the meeting!**
	Email: arrangements@ccgeo.org

Please note that luncheon RSVPs are a commitment to Joe's Crab Shack (Shoreline Drive) and must be paid even if you can't attend the luncheon.

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Speaker: Jason Ashby. "Hydrogen As a Future Alternative Source of Energy."

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Understanding the Lithium Content Trends in the Smackover Formation: Potential Influencing Factors in the Ark-La-Tex Region

Julie Bloxson

Stephen F. Austin State University

Introduction

Lithium is a soft, silver-white metal and the lightest of all metals, making it highly desirable for use in a wide range of modern technologies. With an atomic number of 3, lithium is known for its high electrochemical potential, low density, and significant reactivity. It has a melting point of 180.54°C and a boiling point of 1,342°C, and it reacts strongly with water, producing hydrogen gas and lithium hydroxide. Because of its high reactivity, lithium must be stored under oil or in an inert atmosphere to prevent oxidation. These unique properties have propelled lithium into an essential role in energy storage systems, electronics, and other industrial applications, particularly with the global shift toward electric vehicles and alternative energy resources. Lithium-ion batteries are essential for energy storage at multiple scales: from our cell phones through electric vehicles, and will be integral to large-scale alternative energy solutions. Lithium-ion batteries are favored because of their high energy density, long lifespan, and lightweight nature (Clean Energy Institute, 2020).

Lithium occurs naturally in several types of geological resources (Figure 1). The most significant are surface brines, which are pools of highly saline water containing dissolved lithium and other minerals. These brines are typically found in salt flats or salars in arid regions, such as those in Chile, Argentina, and Bolivia. These countries hold some of the world's largest lithium reserves; it is estimated that about 58% of the world's lithium reserves are located in this region. Chile alone is home to around 40% of the world's lithium reserves. Another major source of lithium is hard rock deposits, primarily composed of the mineral spodumene, found in countries like Australia, Canada, and China. Australia dominates global lithium production through its hard rock mining of spodumene, accounting for 52% of global lithium production. Lastly, lithium can also be found in certain clay deposits, such as hectorite, with prominent reserves in Nevada, U.S (Natural Resources Canada 2024).

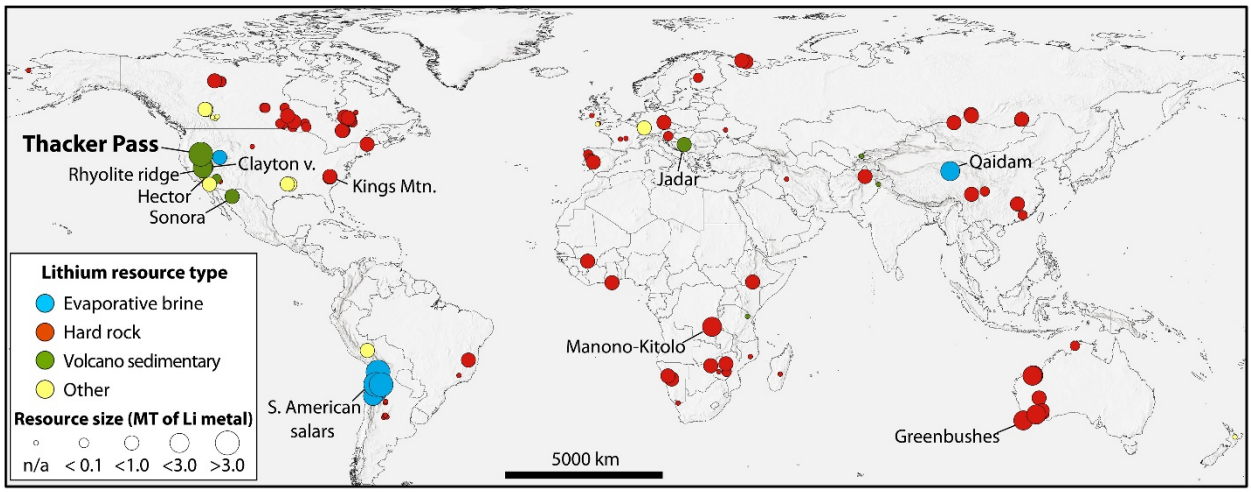

Figure 1. Global lithium localities and types of resources. Traditionally, lithium is mine from hard rocks (often alkali, peraluminous igneous deposits), but as of late, resources have been diversifying to include brines, clay minerals, and other resources. From Benson et al. (2023).

In addition to natural salars, oil field brines and geothermal brines contain lithium and are being explored for extraction, such as the Jurassic Smackover Formation in the Ark-La-Tex region (Dugamin et al., 2023). The concentration of lithium in the Smackover Formation can vary depending on the specific location and geological conditions. However, reports indicate that lithium concentrations in the formation typically range from 100 to 700 parts per million (ppm). This high variability coupled with a lack of understanding of the source of lithium in the Smackover has prompted extensive research of the region.

Smackover Formation

The Upper Jurassic Smackover Formation extends from South Texas to western Florida. It conformably overlies the Norphlet, and where the Norphlet is not present, uncomfortably overlies the Louann Salt (Figure 2). It comfortably underlies the Buckner Anhdyrite and the Haynesville Shale, depending on location. The Smackover consists primarily of carbonates deposited on a shallow marine carbonate ramp. Its environment is characterized by a variety of depositional facies formed under fluctuating energy conditions, sea-level changes, and salinity gradients. Nearshore facies include peritidal mudstones and wackestones, which developed in restricted tidal flat and lagoon settings where hypersaline conditions were prevalent (Ridgway, 2010). As energy levels increased toward the seaward side of the ramp, shoal complexes composed of peloidal and oolitic grainstones accumulated, representing high-energy depositional environments shaped by wave and tidal action. These grainstones serve as significant reservoir facies due to their favorable porosity and permeability characteristics (Heydari & Baria, 2006).

Further offshore, in low-energy conditions, microbial thrombolite boundstones developed, often on subtle topographic highs in hypersaline environments. These boundstones indicate the growth of microbial communities, particularly during sea-level rise, and are found in areas such as the Conecuh Embayment in Alabama (Ridgway, 2010). Dolomitization, which commonly occurred in more distal sections of the carbonate ramp, further enhanced reservoir potential by increasing porosity in limestone facies, though it also introduced significant heterogeneity (Mancini et al., 2004).

The Smackover Formation's depositional complexity is further amplified by the input of siliciclastic sediments in areas influenced by fluvial systems, particularly in the East-Central Gulf Coast. These sediments are interbedded with carbonates, forming mixed siliciclastic-carbonate systems that add to the

heterogeneity of the formation's reservoir potential (Budd & Loucks, 1981). This combination of shoal grainstones, microbial boundstones, and dolomitized carbonates creates a diverse and highly prospective hydrocarbon reservoir system across the Gulf Coast region.

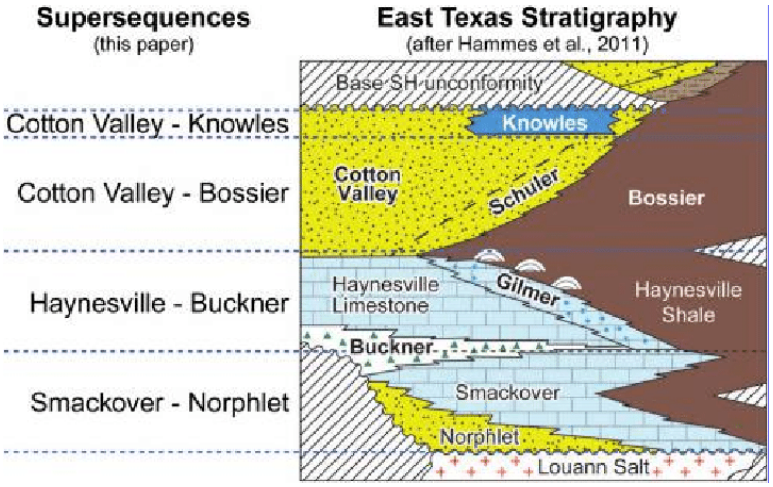

Figure 2. Generalized East Texas Middle – Upper Jurassic Stratigraphy, showing the relationships of formations in the region. From Olson et al. (2015).

Lithium enrichment in Brines

Lithium enrichment in oil field brines is a multifaceted process influenced by various geochemical and geological factors. Each oil field system is unique, with brine composition depending on the local lithology, water-rock interaction, temperature, and fluid migration pathways. In some systems, lithium may be leached from surrounding rocks through prolonged interaction with hot brines, while others may benefit from evaporative processes that concentrate lithium over time. Additionally, evaporites and impermeable layers can trap lithium-rich fluids, making the enrichment process complex and site-specific (Coffey et al., 2021). While we know that there are oil-field brines with lithium enrichment, it is highly variable, and we do not understand necessarily the enrichment factors or sources. Basic observations across the United States show a correlation of evaporites in sedimentary basins and lithium enrichment (Figure 3). Furthermore, there is a known correlation with TDS (total dissolved solids) and lithium enrichment; in other words, the saltier the solution, the more likely it will have lithium (but not necessarily) (Dugamin et al., 2023).

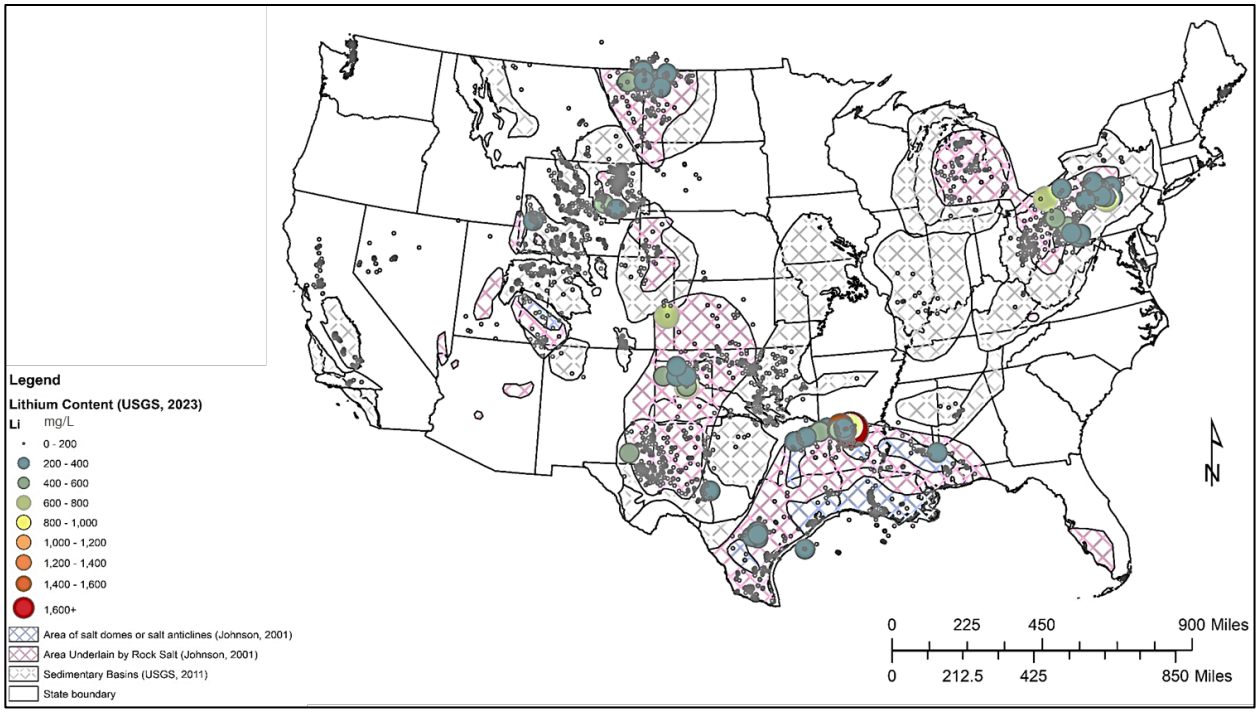

Figure 3. Map of the United States with areas of salt domes or anticlines, areas underlain by rock salt, outlines of sedimentary basins, and lithium in oil-field brines shown. Overall, there appears to be a correlation with lithium content in oil-field brines and areas underlain by rock salt. Data from USGS (2023), Johnson (2001) and USGS (2011).

However, just because a basin is underlain by salt, it doesn't necessarily indicate lithium enrichment. Looking closely at the data, there are several of these oil field brines that are not in contact with a salt body (for example, the Eagle Ford in southern Texas). There seems to be more influences that just evaporite bodies. The Smackover brines with lithium enrichment appear to be concentrated in southern Arkansas, with potential for continuation of the trend towards the west into East Texas (Figure 4). Proximity to salt features (diapirs and domes) does not seem to influence concentration, nor do local faults. Regional faults may play a role, as higher concentrations seem to be near the Mexia-Talco fault zone that transitions into the South Arkansas fault zone. However, there is a lack of data in areas that may illuminate some of these initial observations. Most of our data comes from old oil field brines, and we have many "blank spots" north of the fault zone and south into the coastal region.

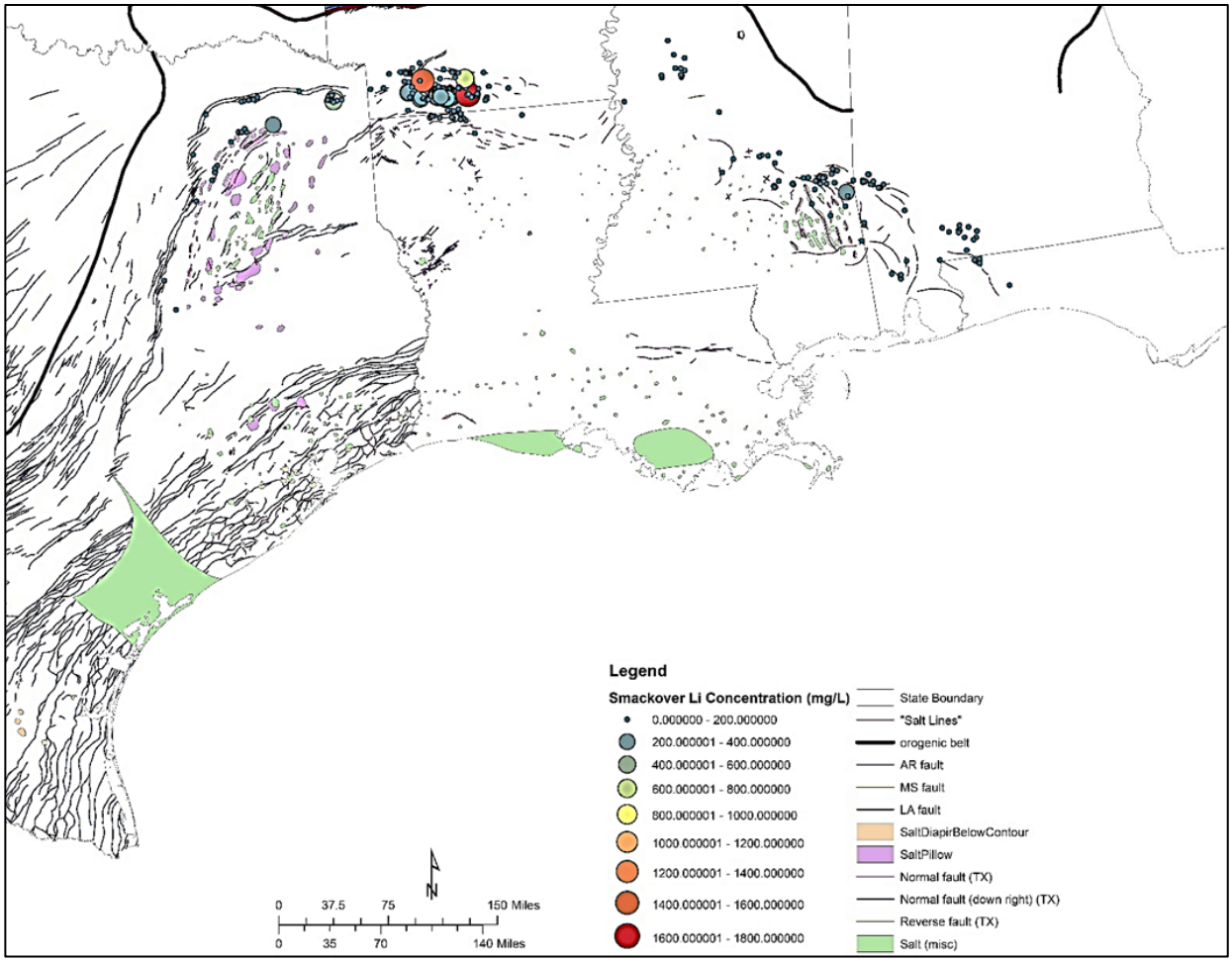

Figure 4. Map of the Ark-La-Tex with faults, salt features, and lithium in brine concentrations shown.

Next Steps

Lithium enrichment in oil field brines is influenced by various geological factors, including local lithology, water-rock interaction, temperature, and fluid migration. While evaporites and high TDS are often correlated with lithium, enrichment is not solely dependent on proximity to salt bodies. In the Smackover Formation, lithium-rich brines are concentrated in southern Arkansas, with potential extensions into East Texas. Regional faults, like the Mexia-Talco – Southern Arkansas fault zones, may play a role, though data gaps, particularly in the coastal region and north of fault zones, hinder a complete understanding of the enrichment process.

To better understand the sources of lithium in oil field brines, several research directions need to be pursued. Nationally, more comprehensive sampling across various basins is essential, especially in areas with limited data. Investigations into the role of fluid migration, particularly through regional faults, should be expanded to assess their impact on lithium concentrations. In the Smackover Formation, further studies are needed to clarify the relationship between lithium enrichment and proximity to salt features, while also exploring the potential influence of geothermal gradients and water-rock interactions at greater depth. Additionally, developing more advanced geochemical models to predict lithium distribution based on regional tectonic settings and fluid dynamics will be crucial for future exploration. Detailed brine chemistry and isotope measurements, lithologic mapping, and understanding surrounding strata are going to be key to understanding these dynamic systems.

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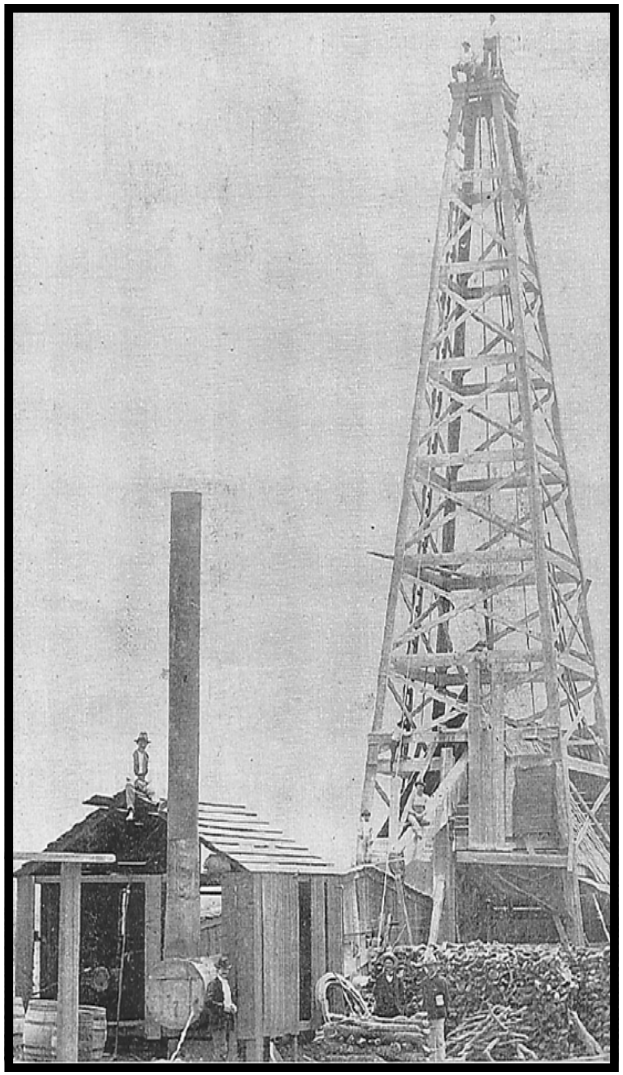

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