

# geoLOGIC

A publication of Subsurface Consultants & Associates, LLC NEWS

## A Bright Future for SCA

### A Message From Our President



We recently announced new organizational changes at SCA. I'd like to congratulate Hal Miller on his ascension to the role of Chairman of SCA after serving as SCA President for 10 years from 2012 to 2022. The recent years have been tumultuous with the industry downturn and the COVID19 pandemic, so we appreciate Hal's steady hand on the tiller in steering SCA through these stormy waters. As I take over the role of SCA President

in 2023, I'm glad to have Hal's continued guidance as SCA Chairman as we can execute a smooth succession plan for SCA's future.

What's new for SCA? We're celebrating 35 years in business during 2023 since our founding in 1988 by Daniel J. Tearpock. We still offer four primary services including geoscience and engineering consulting, upstream projects and studies, training services, and direct hire recruitment.

The consulting business has continued to be strong during the industry downturn and the pandemic, and we've established several new consulting alliances.

- Subsurface Alliance consists of a network of subsurface specialists, led by Ewerton Araujo, PhD, Fermin Fernandez-Ibanez, PhD and Jorge Pastor, PhD as Managing Partners, that uses a Team-of-Teams approach to efficiently solve problems that have a direct business impact in today's fast-paced and evolving energy industry.
- Business Advisory Services is led by Amalia Olivera Riley, PhD with a focus on Asset Value Optimization, Organizational Efficiency, Non-Operator Influence, Strategy and Transformation.
- Texas Intercontinental Energy Resources is led by PK Pande, PE, providing services that are designed to significantly accelerate the capability to understand and formulate CCUS market participation opportunities.
- Dynamic Data Services, Rob Pascoe, Managing Director, offers screening of potential offshore carbon storage in the Gulf of Mexico. The project will deliver a geological and commercial ranking of potential carbon storage sites in the federal waters of Texas and Louisiana.

We've been curating our training catalog at SCA, and several of our newest courses cover various energy transition topics. Many of our classes are available either In-Person or in Live Online format, and you can select public or in-house courses if you prefer. We continue to offer free webinars to introduce SCA's instructors and independent consultants, and you can access recordings of past webinars on demand.

Look to SCA for your contract and full-time needs for technical expertise. Whether you're looking for an expert or a team of experts for 3 days, 3 weeks or 3 months, contact us and we can source well qualified candidates to fit the bill.

**C. Susan Howes, PE, PHR**  
President

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Stay Connected With SCA

# Business Advisory Services



## Dr. Amalia Olivera Riley

SCA's business advisory services are led by Amalia, a business leader with over 30 years of experience in the oil and gas industry. She has held leadership and executive level positions with companies including ExxonMobil, Repsol, and Tullow Oil. Her experience across the globe includes projects worked on five continents covering 40+ countries in deep water, onshore, and unconventional environments.

Amalia's strengths include her strategic vision, technical and organizational leadership, and designing and implementing change. Amalia has a PhD in Geoscience from Purdue University, Indiana, and has worked and lived in Houston, TX; London, UK; and Madrid, Spain. She grew up in Argentina, and is fully bilingual in Spanish and English.

### Why choose SCA's business advisory services:

- Impacts company performance and bottom-line delivery.
- Combines extensive hands-on experience and direct access to high-quality technical experts and training.
- Led by high-profile oil & gas executives and managers.
- Tried and tested experience across a broad range of majors, mid-size and independent companies in the US, UK, and Europe in line with SCA's "Excellence That Runs Deep" principle.
- Brings multicultural viewpoints and insights.
- Leverages SCA's track record of effective technical consulting.



#### Asset Value Optimization

A "must" in the current environment, as much from the economic point of view, as from the carbon footprint standpoint.

Our experience covers a variety of asset types and operating environments.



#### Organizational Efficiency

Flexible organizations can quickly adapt to up and down cycles while keeping clear accountability.

Skill gap evaluation, training and access to experts underpin the design for these types or organizations.



#### Non-Operator Influence

Specific tactics applied to focus the influence and provide unique value to the operator.

Get the most out of your investment and ensure ESG is in line with company requirements.



#### Strategy

Navigating volatile context to improve performance in specific areas of the business.

Our experts have led and been involved in strategic design, implementation, and delivery of targets.



#### Transformation

Addressing the engagement of the workforce is a continuous process.

Hands-on experience through mergers, organizational changes, and crisis management.



## A Message from Amalia:

World events have significantly changed the business landscape over the last 3 years. Particularly, the energy sector has been shaken with rapid demand and supply changes, a radical move to reduce emissions, and a stark realization that energy security and affordability remain as critical priorities for economic stability and welfare. In this context, companies need to move to cleaner solutions, create a more adaptable business model and matching flexible organization, while maintaining resilience to volatility. In the past, this would have been an internal “task force” effort. Today, most companies don’t have the spare capacity for task forces, and additionally, they need an external “cold eyes” view to broaden the considerations as they design a new path. In this context, SCA’s newly launched Business Advisory Services were born to help energy companies with business performance, organizational efficiency and transformation, combining SCA’s legacy of Excellence that Runs Deep, and my personal, hands-on business experience in the oil and gas industry.

Working at ExxonMobil, Repsol and Tullow Oil, exposed me to multiple styles of management, leadership, solutions, and business cultures. I have worked and lived across the globe, leveraging diversity and motivating teams. SCA’s leadership and network provide additional access to consultants with first-hand experience in operational business areas, operator influence and asset optimization at operators around the world. SCA’s training offerings and network of consultants has the depth of expertise needed to tackle any technical issue identified during the business analysis.

SCA’s Business Advisory Services are an attractive alternative to traditional consulting outfits, given our combined technical depth and first-hand management experience in the upstream industry. Our seasoned team of executives has real-life experience navigating the cycles, mergers, organizational changes, and volatility within the industry. We have been part of executive leadership through these critical times, and now we are there for you. [Contact us](#) to see how we can help!

Website: [scacompanies.com](http://scacompanies.com)

Office: (713)789-2444

Email: [info@scacompanies.com](mailto:info@scacompanies.com)

## SCA - Serving the Upstream Industry Since 1988



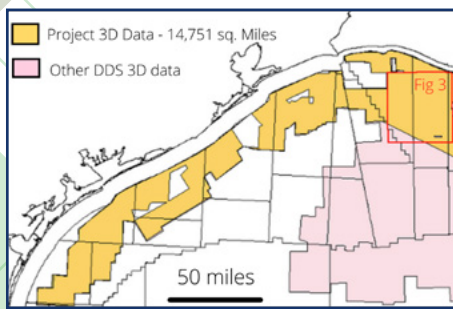
# Carbon Capture Utilization and Storage Consulting

## Our CCUS Services

We provide geoscience and engineering experts to handle all technical aspects of the CCUS storage project workflow including subsurface storage site selection, injectivity, seal integrity, capacity, and modeling. Our consultants can also audit and certify ongoing CO<sub>2</sub> sequestration projects.

- Carry out a 3<sup>rd</sup> party review of the technical work performed by the client's subsurface teams to assure its accuracy.
- Complete a detailed QAQC of well log analysis, subsurface mapping techniques and geologic model building workflows.
- Provide final certification and sign off that the work was sufficient to meet and/or exceed the Monitoring, Reporting and Verification Plan (MRV Plan) regulatory requirements.

## Business Partners

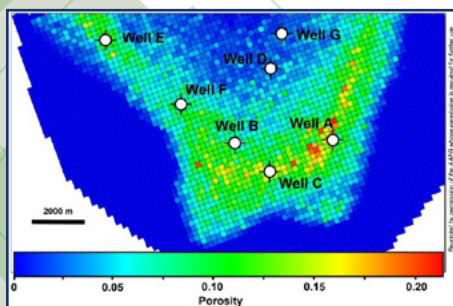


### Dynamic Data Services

Provides screening of potential offshore carbon storage in the Gulf of Mexico. The project delivers a geological and commercial ranking of potential carbon storage sites in the federal waters of Texas and Louisiana. The analysis is based on detailed structural and stratigraphic interpretation of regional 3D seismic within 50 miles of the coastline and incorporates economic criteria that ranks potential sites on size and cost of storage.



Rob Pascoe, MSc is the Managing Director of DDS with previous work experience at Conoco and BHP Billiton.

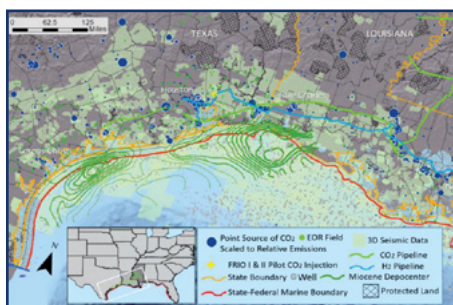


### Subsurface Alliance

Offers comprehensive subsurface services to mitigate risks at every stage of a CO<sub>2</sub> project. These services include characterization and assessment of faults and fractures, full subsurface stress and pore pressure characterization to assess integrity, well operability limits, assessing seal integrity to evaluate the likelihood of fluid migrations across or along faults, and estimation of storage and flow capacity of injection zones using reservoir simulations coupled with geomechanics.



Ewerton Araujo, PhD, Jorge Pastor, PhD, and Fermin Fernandez-Ibañez, PhD comprise Subsurface Alliance's team.



### Texas Intercontinental Energy Resources

Provides a Gulf of Mexico CO<sub>2</sub> sequestration market study with the aim to significantly accelerate the capability to understand and formulate CCUS market participation opportunities. The approach is a holistic, integrated geo-technical, petroleum system based and field development commercial framework. The entire value chain and system has been accounted for, from emissions to subsurface to the additional system components of pipelines and wells.

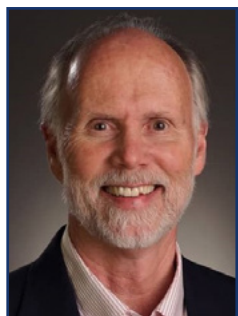


PK Pande, PE is the founder and Principal Consultant of Texas Intercontinental Energy Resources (TIER).



# CCUS Training Courses

In addition to our consulting services, we offer training courses specific to CCUS and the energy transition. To view full descriptions and instructor bios, click [here](#) or visit [scacompanies.com/training/course-listing](https://scacompanies.com/training/course-listing).



## Carbon Capture Utilization and Storage – A Geological Perspective

Stephen A. Sonnenberg, PhD

Students will discuss geologic considerations of CCUS in addition to: CO<sub>2</sub> storage in depleted oil and gas reservoirs, enhanced oil and gas recovery, gas storage fields and CO<sub>2</sub> options, enhanced coalbed methane and CO<sub>2</sub> storage in deep coal seams, enhanced shale gas and CO<sub>2</sub> storage, CO<sub>2</sub> injection in saline aquifers, CO<sub>2</sub> fields, enhanced geothermal options, and CO<sub>2</sub> and carbonation options.

### Learning Outcomes:

- CCUS options
- Screening criteria for CCU
- Screening criteria for CCS
- Relevant mineral reactions to consider
- Monitoring of projects
- Induced seismicity



## Carbon Capture Utilization and Storage – An Engineering Perspective

Christine Ehlig-Economides, PhD & Dimitrios Hatzignatiou, PhD

The primary topics of discussion during this course are (1) Methane leak avoidance and CO<sub>2</sub> emissions capture, (2) CO<sub>2</sub> EOR, (3) Blue hydrogen and CO<sub>2</sub> transport and storage, (4) Saline aquifer storage with Monitoring, Reporting and Verification (MRV), and (5) Economics.

### Learning Outcomes:

- Estimate CO<sub>2</sub> storage capacity, well injectivity, a suitable Monitoring, Reporting, and Verification plan, and storage cost in \$/tonne
- Quantitative evidence for sustainable CO<sub>2</sub> storage
- Locate information essential to storage asset evaluation



## Energy Transition for Petroleum Professionals

D. Nathan Meehan, PhD, PE

Designed for energy professionals with an understanding of oil and gas operations and activities but not necessarily any background in climate change, energy transition, life cycle analysis or alternative fuels. Emphasis on the role of fossil fuels in a world with increasing drivers away from such fuels. Practical approaches to minimize the carbon impact of oil and gas operations are presented.

### Learning Outcomes:

- Key drivers for alternative energy
- Quantitative ways to evaluate carbon intensity of oil and gas operations and to lower that impact
- Key policy issues
- Major opportunities to profit from the energy transition



## Navigating CCUS In the Gulf Coast Region – Opportunities and Participation

PK Pande, PE

Accelerates and elevates understanding of the landscape, foundational elements and historical context of carbon capture and sequestration in the Gulf Coast Region. Students will learn about the wide range of issues encompassing the “CCUS Maze” and develop an understanding of both commercial and technical aspects of sequestration during this energy transition.

### Learning Outcomes:

- Understand a wide range of CCUS issues
- Drivers behind recently announced major projects in the Gulf Coast Region
- Historical context
- Key areas of North America for CO<sub>2</sub> flooding and miscible gas injection
- Characterization of emissions for the Gulf Coast Region



# Subsurface Alliance

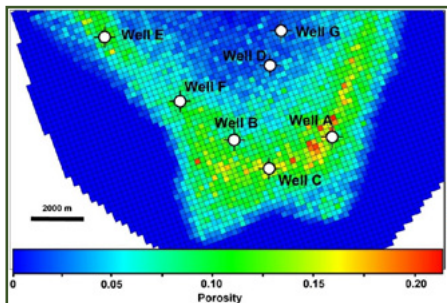
## Who We Are

We are a network of subsurface specialists using a Team-of-Teams approach to efficiently solve problems that have a direct business impact in today's fast-paced and evolving energy industry.

We offer comprehensive subsurface services to help mitigate risks at every stage of a project. We use state-of-the-art geoscience and engineering tools together with specialized workflows to deliver world-class models and superior consulting and training services.

*“ We strive to provide high quality subsurface solutions for the energy industry by bridging the gap between geoscience and engineering. ”*

## Geoscience



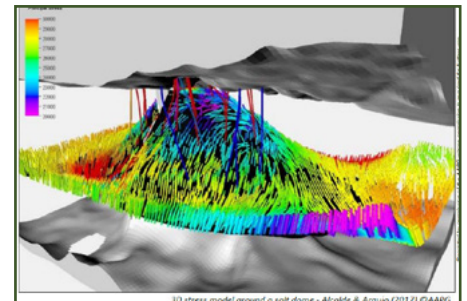
We use a process-based approach to develop geologic concepts. We integrate core, wireline, drilling, well tests, and production data to characterize and model permeability architecture in complex reservoirs.

- Core Description
- Image Log Interpretation
- Integration of Core and Image Logs
- Cap Rock Integrity
- Fault Seal and Connectivity
- Fractures and Karst
- Analogs
- Petrophysics
- Rock Typing
- Geocellular Models
- DFN Models
- Well Test Integration
- Field Trips and Training

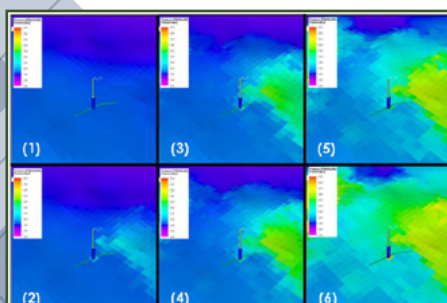
## Geomechanics

Our approach is robust and effective: we honor the data, select the best constitutive models, and apply scientific workflows to maximize the reliability of our rock mechanics predictions.

- Pore Pressure & Fracture Gradient
- Wellbore Stability
- Solids Production Prediction
- Fault Stability
- Natural Fractures
- Connectivity
- Mechanical Skin Assessment
- Well Integrity Analysis
- Reservoir Compaction
- Laboratory Tests Design & Interpretation
- Subsidence



## Reservoir Engineering

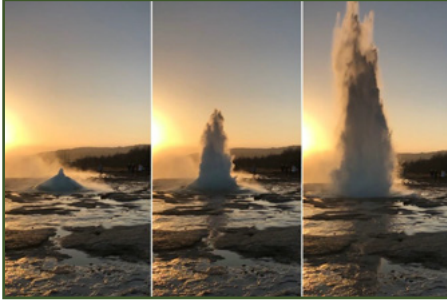


We use state-of-the-art fully integrated black-oil/compositional, geomechanics and hydraulic fracturing reservoir simulators to assess plausible scenarios that can result in project under-performance.

- Black Oil/Compositional
- Dual Porosity
- Coupled Geomechanics
- Rock-Fluid Interactions
- Thermal / Chemical EOR
- CCUS and Geothermal
- Hydraulic Fracturing
- Flexibility and Integration
- Uncertainty Analysis
- Optimization Workflows
- Streamlines
- Exploration-to-Production Simulation
- Experience with Main 3D Numerical Simulators



## Geothermal Solutions



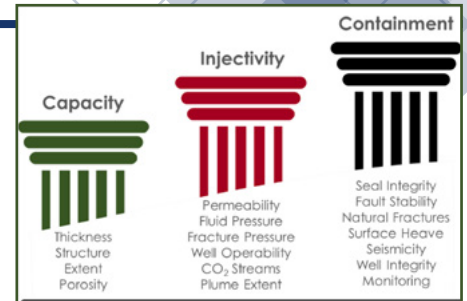
Geothermal developments, where fluids are injected and then produced, induce temperature and pressure changes that modify the in-situ stress field. Permeability and connectivity across the hot formation, and how they might change under an evolving stress field, is key for the economic success of a project.

- In-Situ Stress
- Natural Fractures
- Thermal Stress
- Simulation

## CO<sub>2</sub> Storage Solutions

We offer comprehensive subsurface services to help mitigate risks at every stage of a CO<sub>2</sub> storage project. Subsurface Alliance can also provide technical expertise and help customers expedite their permitting process.

- Faults and Fractures
- Geomechanics
- Well Operability Limits
- Seal Integrity
- Storage Capacity



## Fractured Reservoir Solutions



The occurrence of natural fractures in reservoirs provides high permeability pathways that can be several orders of magnitude higher than the background matrix. In low matrix permeability rocks, fractures are critical for economic production of oil and gas and geothermal projects.

- Core Characterization
- Borehole Images
- Modeling: Geomechanics & DFNs
- Well Tests & Simulation

## Our People



Ewerton Araujo, PhD



Jorge Pastor, PhD



Fermin Fernandez-Ibañez, PhD

## Brochures:

- [All Services](#)
- [CO<sub>2</sub> Storage Solutions](#)
- [Geothermal Solutions](#)
- [Fractured Reservoir Solutions](#)



View more information about the services that Subsurface Alliance offers [here](#).

# Geomechanics: Geoscience or Engineering?

Technical Discussion, vol. 1, Jan 2023

Authored by: Ewerton Araujo, PhD, Jorge Pastor, PhD, and Fermin Fernandez-Ibañez, PhD

Over the last two decades, Geomechanics has become well known across the Earth disciplines applied to subsurface energy related matters, like oil and gas, carbon capture and storage, and geothermal. In a simplified way, a Geomechanical Model, sometimes referred as a Mechanical Earth Model, is a quantitative mathematical description of the relationship between the in situ stresses and the mechanical properties of the rocks in the subsurface.

Across different companies, and even in academia, it is common to see a debate over whether geomechanics is either a geoscience or an engineering discipline. Intuitively, the name Geo-Mechanics brings a bit of both worlds. The Geo part comes from Earth materials like soils and rocks, while the Mechanics derives from traditional engineering problems of quantifying the stress-strain-failure behavior of materials in a specific geometry (wellbore, fault plane, 3D reservoir).

Perhaps a good way to define geomechanics is as an integrator discipline with four individual pillars: in situ stresses (magnitude and orientation), formation fluid pressure, rock mechanical properties and geometry. This provides a good perspective on what building a geomechanical model entitles, but also what does not constitute a robust geomechanical analysis.

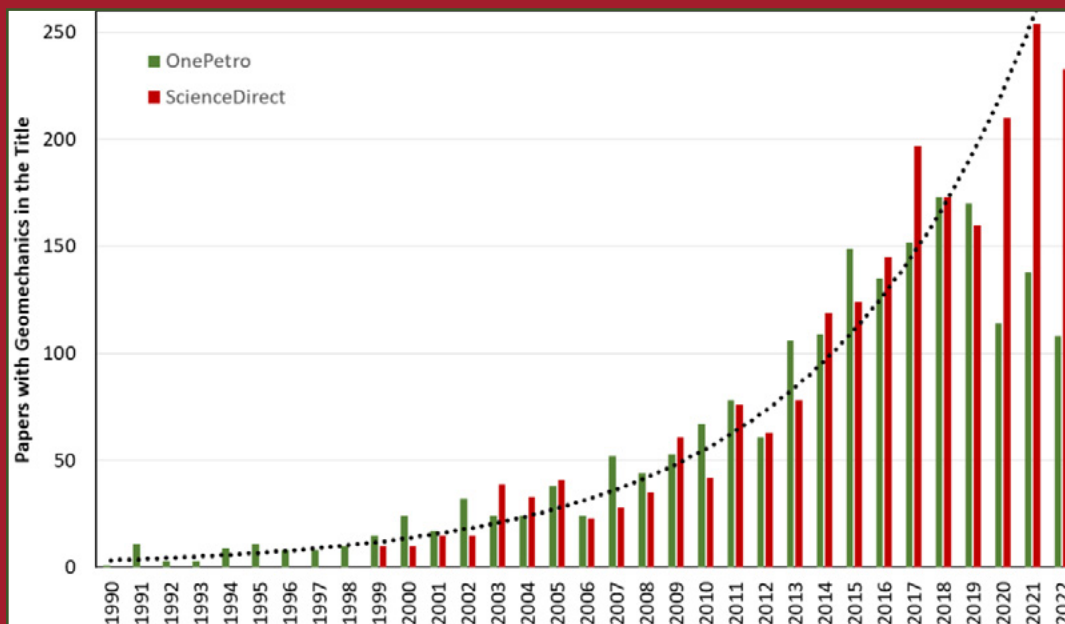


Figure 1: Number of papers with the words “Geomechanics” or “Geomechanical” in the title.

Despite being difficult to accurately infer the adoption of geomechanics across the energy industry, a good proxy could be the number of papers listed in the OnePetro digital library maintained by the Society of Petroleum Engineers in collaboration with other technical societies such as the American Rock Mechanics Association, the International Society for Rock Mechanics and Rock Engineering, the Society of Exploration Geophysicists among others. Another reliable database is the library *Elsevier ScienceDirect* of peer-reviewed journals. Figure 1 shows the number of papers per year with the words Geomechanics or Geomechanical in their title in both platforms. At a glance, it stands out how over the last three decades there has been an exponential growth.

Perhaps the most well-known geomechanics database is the *World Stress Map* project (Figure 2), which is a collaboration between academia and industry that started in 1986 and compiles in situ stress information from around the world. The data is nicely presented in maps showing the orientation of the maximum horizontal stress



direction and, when available, the predominant stress regime (Heidbach et al., 2016). This database continues to grow as more in situ stress information becomes available. In recent years, a large amount of data resulted from the intensive industry activity in the unconventional reservoirs in North America (Lund Snee & Zoback, 2021).

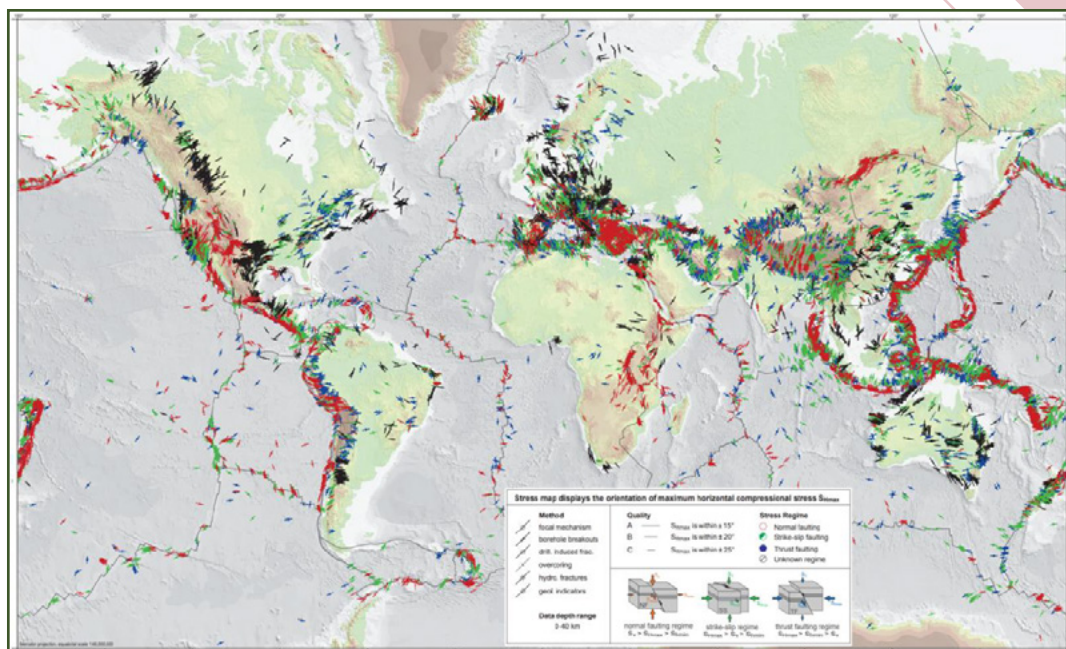


Figure 2: World Stress Map (Heidbach et al., 2016). Licensed under CC BY 4.0

However, geomechanical applications to the petroleum industry date much earlier than the period covered in Figure 1. Subsurface-related challenges such as compaction and subsidence, wellbore stability and hydraulic fracturing have been known to the industry for a long time. Compaction received a lot of attention after the massive subsidence (40–50 cm/year) experienced in the platforms of the Ekofisk field (North Sea) in the mid-80s. On the other hand, wellbore stability and sand production prediction have been a focus since the late 70s when a few key papers (Bradley, 1979a; Bradley, 1979b; Hottman et al., 1979) were published providing field observations tied to new mathematical models for stresses around boreholes and related failure mechanisms. These studies helped the advancement of drilling inclined and high angle wells both onshore (e.g., Austin Chalk in Texas), and offshore (e.g., Alaska, North Sea, and Gulf of Mexico) during the 80s and 90s.

During the 90s and 2000s, excellent books (Charlez, 1991; Fjaer et al., 1992; Charlez, 1997; Wang, 2000; Zoback, 2007; Nauroy, 2011; Aadnoy & Looyeh, 2011) helped to boost the interest of many students in the geomechanics discipline and helped to shape the greater community of specialists, users and enthusiasts that we have today. Figure 3 shows a timeline of some developments that became widely adopted solutions in geomechanics and its applications.

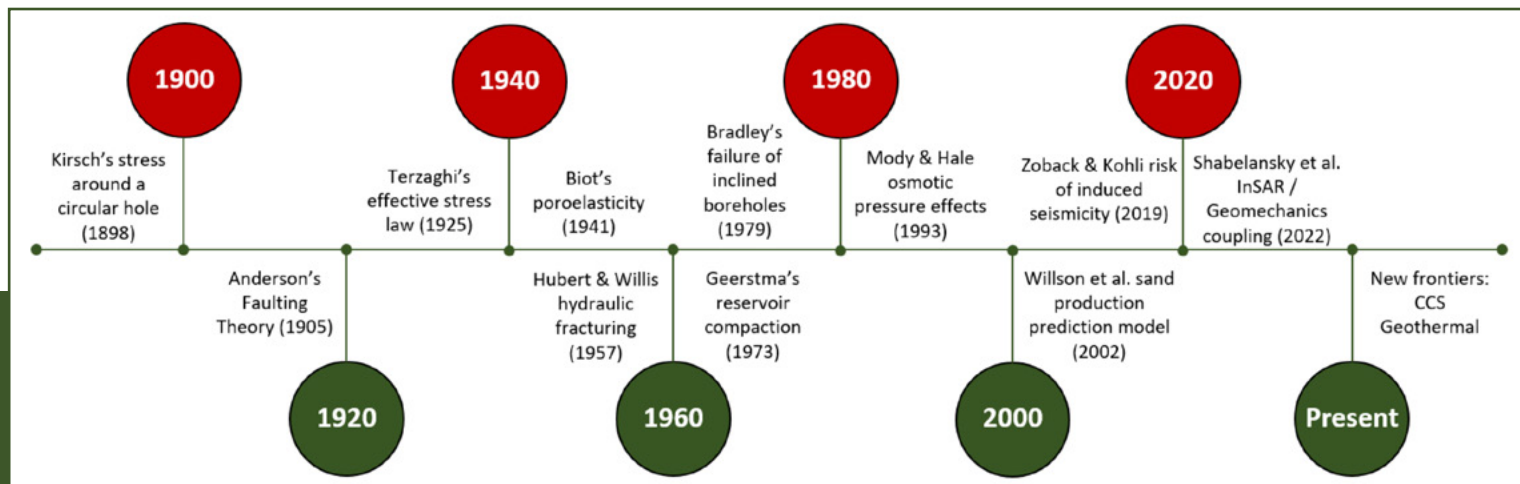


Figure 3: Main geomechanics developments over time.

To gain a better appreciation for which are the main areas where geomechanics has being applied in the energy industry, we have interrogated OnePetro digital database over the 1990 to 2022 period. Results are shown in Figure 4a. Wellbore geomechanics (wellbore stability, sanding, fracturing, well integrity) is clearly the main application, followed by reservoir geomechanics (3D models, compaction, subsidence, stress-dependent permeability, natural fractures). In third place comes geohazards assessment (i.e. fault stability and induced seismicity). Last, the emerging applications to the energy transition are already represented by applications to carbon and hydrogen storage, and geothermal. The fine print of individual applications within the four main categories described above is shown in Figure 4b.

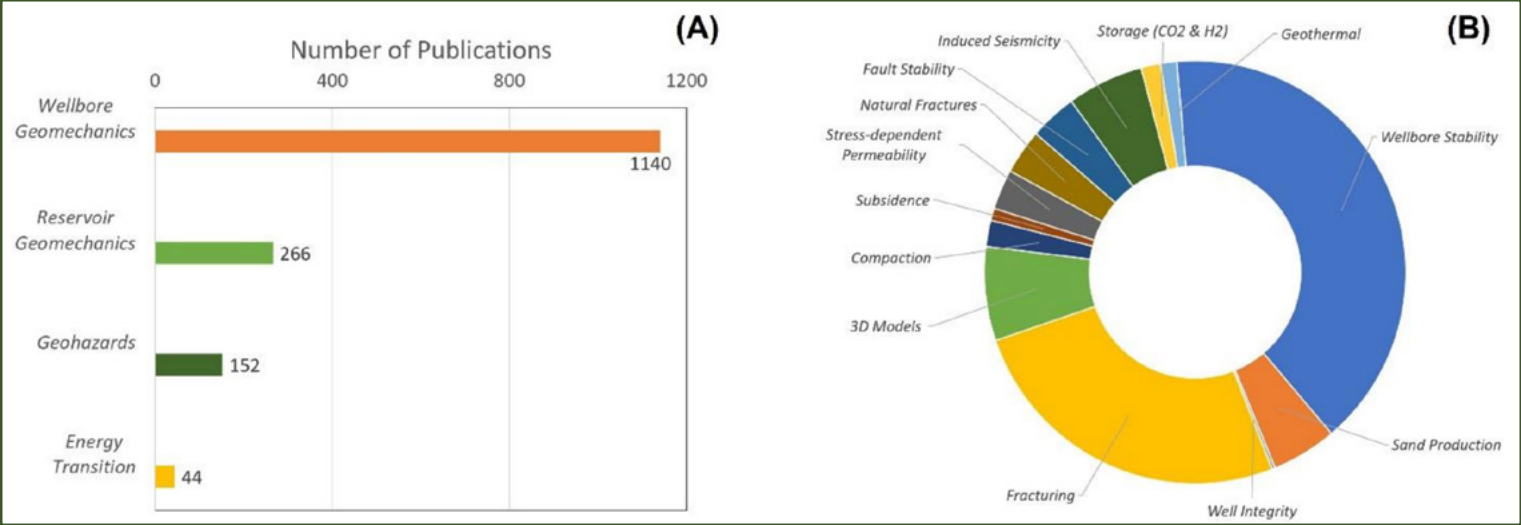


Figure 4: (A) Number of publications by major topics in the last 32 years.  
(B) Proportion of geomechanics related papers by individual topics in the 1990 to 2022 period.

Closing Remarks

Coming back to the opening question of this article: is geomechanics a geoscience or an engineering discipline? Perhaps an appropriate answer is that it is a discipline that uses engineering first principles to quantitatively describe the mechanical behavior of geological formations. Over the last 100 years, geomechanics has become a must have Earth Science discipline integrated into subsurface characterization and engineering problems. While many of the solutions and applications were developed to meet the demands of a growing oil and gas industry, the physical principles remain the same and are transferable to the emerging areas within the energy transition, such as carbon capture and storage, hydrogen storage, and geothermal energy, with the number of applications expected to keep growing at a considerable rate.

Subsurface Alliance experts have extensive experience in advanced geomechanical applications and are well-positioned to provide best-in-class support to the energy industry including oil and gas, carbon capture and storage, and geothermal. In future editions, we will explore key aspects of geomechanics applications to solve common subsurface energy challenges.

SUBSURFACE ALLIANCE

DATA DRIVEN | SCIENCE BASED | FIT-FOR-PURPOSE

Technical Discussion, vol. 1, Jan 2023

Geomechanics: Geoscience or Engineering?

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Across different companies, and even in academia, it is common to see a debate over whether geomechanics is either a geoscience or an engineering discipline. Initially, the name Geo-Mechanics brings a bit of both worlds. The Geo part comes from Earth materials like soils and rocks, while the Mechanics derives from traditional engineering problems of quantifying the stress-strain behavior of materials in a specific geometry (wellbore, fault plane, 3D reservoir).

Perhaps a good way to define geomechanics is as an integrator discipline with four individual pillars: in situ stresses (magnitude and orientation), formation fluid pressure, rock mechanical properties and geometry. This provides a good perspective on what building a geomechanical model entails, but also what does not constitute a robust geomechanical analysis.

For example, the individual evaluation of earth stresses or formation pressure should not be called geomechanics. Indeed, both stresses and formation pressure are two pillars of geomechanics, but the sole analysis of either cannot be defined as geomechanics. Similarly, one cannot claim doing geomechanics characterization by analyzing rock samples in a laboratory facility and measuring Young's Modulus and Poisson's ratio or estimating such properties from well logs or seismic velocities. The key to a successful and robust geomechanical model is the integration of the four pillars in a quantitative subsurface 1D, 2D or 3D model.

Timeline and Adoption of Geomechanics

Despite being difficult to accurately infer the adoption of geomechanics across the energy industry, a good proxy could be the number of papers listed in the OnePetro digital library maintained by the Society of Petroleum Engineers in collaboration with other technical societies, such as the American Rock Mechanics Association, the International Society for Rock Mechanics and Rock Engineering, the Society of Exploration Geophysicists among others. Another reliable database is the Energy Research Center of peer-reviewed journals. Figure 1 shows the number of papers per year with the words Geomechanics or Geomechanical in their title in both platforms. At its inception, it stands out how over the last three decades there has been an exponential growth.

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02 Geomechanics

Our approach is robust and effective: we honor the data, select the best constitutive models, and apply scientific workflows to maximize the reliability of our predictions.

Figure 1: A 3D visualization of a subsurface reservoir model showing stress distribution. The model is a complex, irregular shape representing a reservoir, with a color gradient indicating stress levels. The colors range from blue (low stress) to red (high stress). The model is shown in a 3D perspective view, with axes labeled x, y, and z.

Figure 2: A 2D cross-section of a subsurface reservoir model showing stress distribution. The model is a rectangular shape representing a reservoir, with a color gradient indicating stress levels. The colors range from blue (low stress) to red (high stress). The model is shown in a 2D perspective view, with axes labeled x and y.

By applying state-of-the-art numerical methods and workflows, we can tackle geomechanics related issues at any scale, from well-centered to full-field models.

With a second to none track record, our solutions have added millions of dollars to the value chain of subsurface projects, from exploration to appraisal, drilling and completions, development, and abandonment.

Specialized services

- Pore Pressure
- Fracture Gradient
- Wellbore Stability
- Sand Production Prediction
- Reservoir Compaction
- Fault Stability
- Heave / Subsidence
- Laboratory Tests Design
- Mechanical Risk Assessment
- Well Integrity Analysis

To see a list of references for this article, view the full document [here](#).

Additionally, a summary of all of Subsurface Alliance's services, including their Geomechanics solutions, can be found in this [brochure](#) and on our website [here](#).

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## Live Online Training

In addition to In-Person training, we offer many of our courses in a Live Online format. Students will cover the same content at a fraction of the classroom cost and can enjoy the convenience of learning remotely.

Clients can also customize the content of an in-house course to fit work programs by incorporating your data when possible into exercises, examples, and workshops, or by simply modifying course content with the information that is most important to your company.

### Sample of Live Online Courses:

- Applied Biostratigraphy in Oil and Gas Exploration and Production – William N. Krebs, PhD
- Applied Deep-Water Sedimentology & Stratigraphy – Jon R. Rotzien, PhD
- Carbon Capture Utilization and Storage – A Geological Perspective – Stephen A. Sonnenberg, PhD
- Carbon Capture Utilization and Storage – An Engineering Perspective – Christine Ehlig-Economides, PhD and Dimitrios G. Hatzignatiou, PhD
- Carbonate Sedimentology and Sequence Stratigraphy – Oscar Lopez-Gamundi, PhD
- Energy Transition for Petroleum Professionals – D. Nathan Meehan, PhD, PE
- Introduction to Subsurface Machine Learning – Siddharth Misra, PhD, PE
- Pore Pressure, Fracture Pressure and Well-Bore Stability – Selim Shaker, PhD
- PRMS and SEC Reserves and Resources Regulations – W. John Lee, PhD
- Production Forecasting for Low Permeability Reservoirs – W. John Lee, PhD
- Reservoir Characterization for Mudrock Reservoirs – Stephen A. Sonnenberg, PhD
- Reservoir Geomechanics I & II – John T. Foster, PhD
- Seismic Geomorphology – Lesli J. Wood, PhD
- Sequence Stratigraphy Applied to O&G Exploration – Oscar Lopez-Gamundi, PhD
- Unconventional Resource Plays – Workshop – Stephen A. Sonnenberg, PhD
- Well Stimulation Workshop: Practical and Applied – Leo Roodhart, PhD and Gerrit Nitters

### On-Demand Webinars

We offer a library of free webinars that can be accessed on-demand under the Resources section of our website. These webinars are presented by SCA instructors and serve as samples of the topics that students will study in their courses.

Click [here](https://www.scacompanies.com/training/webinars) or visit [scacompanies.com/training/webinars](https://www.scacompanies.com/training/webinars) to register for upcoming live webinars!

### Upcoming Live Webinars:



*“Optimization as a Path to Lower Emissions - Myth or Reality?”*

Amalia Olivera Riley, PhD  
Tuesday, March 07, 2023 at 12PM CT



*“Steer Without Fear: Practical Geosteering Applications”*

Jamie Woolsey, MS & Sara Callner  
Tuesday, March 28, 2023 at 12PM CT



*“Why a No-Geology Model Helps Us Understand Geology”*

Larry Lake, PhD & Jerry Jensen, PhD  
Thursday, May 11, 2023 at 12PM CT





# THE DANIEL J. TEARPOCK Geoscience Certification Program ("Geoscience Boot Camp")

April 17 - July 07, 2023 in Houston, TX / September 25 - December 15, 2023 in Houston, TX

## What is Geoscience Boot Camp?

This intensive 12-week training program includes six weeks of classroom courses taught by SCA's top instructors, followed by a six-week interpretation and mapping project.

Participants learn fundamental interpretation, engineering, and mapping skills, and then put those skills to the test using seismic data, well logs, and production information from an actual development prospect. During the project phase, SCA engages a team of senior-level geoscientists to serve as mentors to the participants and help guide their interpretation and decision-making process. The program is designed to raise the competency level and knowledge of the participants in a short period of time.



Since its debut in 2008, SCA's Boot Camp has trained numerous participants from around the world. Many of our participants are employees of national oil companies that are seconded to major US-based oil and gas companies. Major oil companies have found our program valuable in meeting training obligations for foreign nationals.

Due to popular demand, we have started offering the program twice a year, and can also accommodate additional sessions upon special request with a minimum commitment of ten attendees.

## Who Should Register?

This program is recommended for new university graduates with up to three years of experience and entry-level employees from different disciplines such as mining, environmental geology, earthquake seismology, etc. It is highly recommended for employees of national oil companies that are seconded to major US-based oil and gas companies. New managers overseeing exploration and development programs will also benefit.

## 12-Week Schedule Overview

### Six-Week Classroom Phase:





















- Basics of the Petroleum Industry
- Structural Styles in Petroleum Exploration and Production
- Structural & Sequence Stratigraphy Field Course
- Applied Seismic Interpretation
- Applied Contouring Methods
- Practical Interpretation of Open Hole Logs
- Sequence Stratigraphy Applied to O&G Exploration
- Applied Subsurface Geological Mapping
- Mapping Seismic Data Workshop
- Basic Petroleum Engineering for Non-Engineers
- Modern Coastal Systems of Texas Field Course

### Six-Week Project Phase:

This exciting six (6) week project provides hands-on training that develops a strong foundation for participants in geological and geophysical interpretation and mapping. Students will also understand the application of reservoir engineering, log analysis, risk analysis, and probabilistic and deterministic resources estimation.



# Upcoming 2023 Training Calendar

	DATE	COURSE TITLE	LOCATION	INSTRUCTOR
APR	03-04	Applied Drilling Engineering Optimization for Drilling Engineers	Houston, TX	Samuel
	03-07	Carbonate Sedimentology and Sequence Stratigraphy	Houston, TX	Lopez-Gamundi
	04	Navigating CCUS in the Gulf Coast Region	Houston, TX	Pande
	05-06	Applied Drillstring Mechanics for Drilling Engineers	Houston, TX	Samuel
	07	Principles and Practices of Mud Motor	Houston, TX	Samuel
	10-11	"Best Practices" for New Well Fracs and Legacy Well Refracs	Houston, TX	Barba
	10-11	Geosteering: Best Practices, Pitfalls & Applied Solutions	Houston, TX	Woolsey & Callner
	10-14	Well Stimulation Workshop: Practical & Applied (Part 1) 	Live Online	Roodhart & Nitters
	04/17-07/07	The Daniel J. Tearpock Geoscience Certification Program ("Geoscience Boot Camp")  	Houston, TX	SCA Staff
	17	Basics of the Petroleum Industry 	Houston, TX	Howes
	17-21	Well Stimulation Workshop: Practical & Applied (Part 2) 	Live Online	Roodhart & Nitters
	18-21	Structural Styles in Petroleum Exploration and Production 	Houston, TX	Taylor
	22-23	Structural and Sequence Stratigraphic Field Course 	Hill Country, TX	Taylor
	24-26	Pore Pressure, Fracture Pressure, and Well-Bore Stability	Houston, TX	Shaker
MAY	24-27	Carbon Capture Utilization and Storage – A Geological Perspective 	Live Online	Sonnenberg
	24-28	Sequence Stratigraphy Applied to O&G Exploration 	Houston, TX	Lopez-Gamundi
	01-05	Practical Interpretation of Open Hole Logs 	Houston, TX	Barba
	08-10	Applied Seismic Interpretation Workshop 	Houston, TX	Willis
	10-12	Drilling Fluids	Houston, TX	Richards
	11-12	Applied Contouring Workshop  	Houston, TX	Agah
	15-19	Applied Subsurface Geological Mapping  	Houston, TX	Agah
	15-19	Cased Hole and Production Log Evaluation 	Houston, TX	Smolen
	15-19	Carbon Capture Utilization and Storage – An Engineering Perspective 	Live Online	Economides & Hatzignatiou
	15-19	The Book Cliffs Utah: A Case Study in Coastal Sequence Stratigraphy	Salt Lake City, UT	Little
	22-24	Mapping Seismic Data Workshop 	Houston, TX	Cherry
	22-26	Applied Subsurface Geological Mapping 	Bakersfield, CA	Shoup
	25-26	Basic Petroleum Engineering for Non-Engineers 	Houston, TX	Howes



Flagship Course



Boot Camp Course



Live Online Format

## 2023 Training Course Catalog

We offer Public, In-House, and Live Online courses that span across multiple disciplines including Geoscience, Engineering, Unconventional Reservoirs, Formation Evaluation, Multi-Disciplinary & Introductory, and Field Courses.

Click [here](https://scacompanies.com/training) or visit [scacompanies.com/training](https://scacompanies.com/training) to view our full catalog.



## About SCA



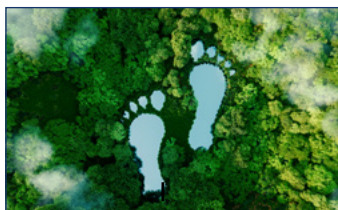
### *Primary Services*

Subsurface Consultants & Associates, LLC provides consultancy and training services to professionals in the upstream oil and gas industry. Founded in 1988 by Daniel J. Tearpock, SCA's primary services are consulting and direct-hire recruiting, training, upstream projects and studies, quality assurance, and oil and gas advisory.



### *Business Advisory Services*

Addresses asset value optimization, organizational efficiency, non-operator influence, strategy, and transformation. These advisory services can impact company performance and bottom-line delivery, combine extensive hands-on experience and direct access to high-quality technical experts, and are led by high-profile oil and gas executives and managers.



### *Carbon Capture Utilization and Storage (CCUS)*

Provision of geoscience and engineering experts to handle all technical aspects of the CCUS storage project workflow including site selection, injectivity, seal integrity, capacity, and modeling. We can also provide expertise to audit and certify ongoing CO<sub>2</sub> sequestration projects. SCA offers four training courses that emphasize CCUS.



### *Subsurface Alliance*

A network of subsurface specialists that uses a Team-of-Teams approach to efficiently solve problems that have a direct business impact in today's fast-paced and evolving energy industry. SA offers comprehensive subsurface services to help mitigate risks at every stage of a project. Through use of advanced geoscience and engineering tools, they deliver world-class models and superior consulting and training services.



### *Competency Development*

IHRDC is a Boston-based company that accelerates workforce development through customized solutions to fit client needs. Through our Joint Marketing and Sales Agreement, SCA and IHRDC offer the oil and gas industry a broad spectrum of high-quality training content and effective blended learning delivery options.

