

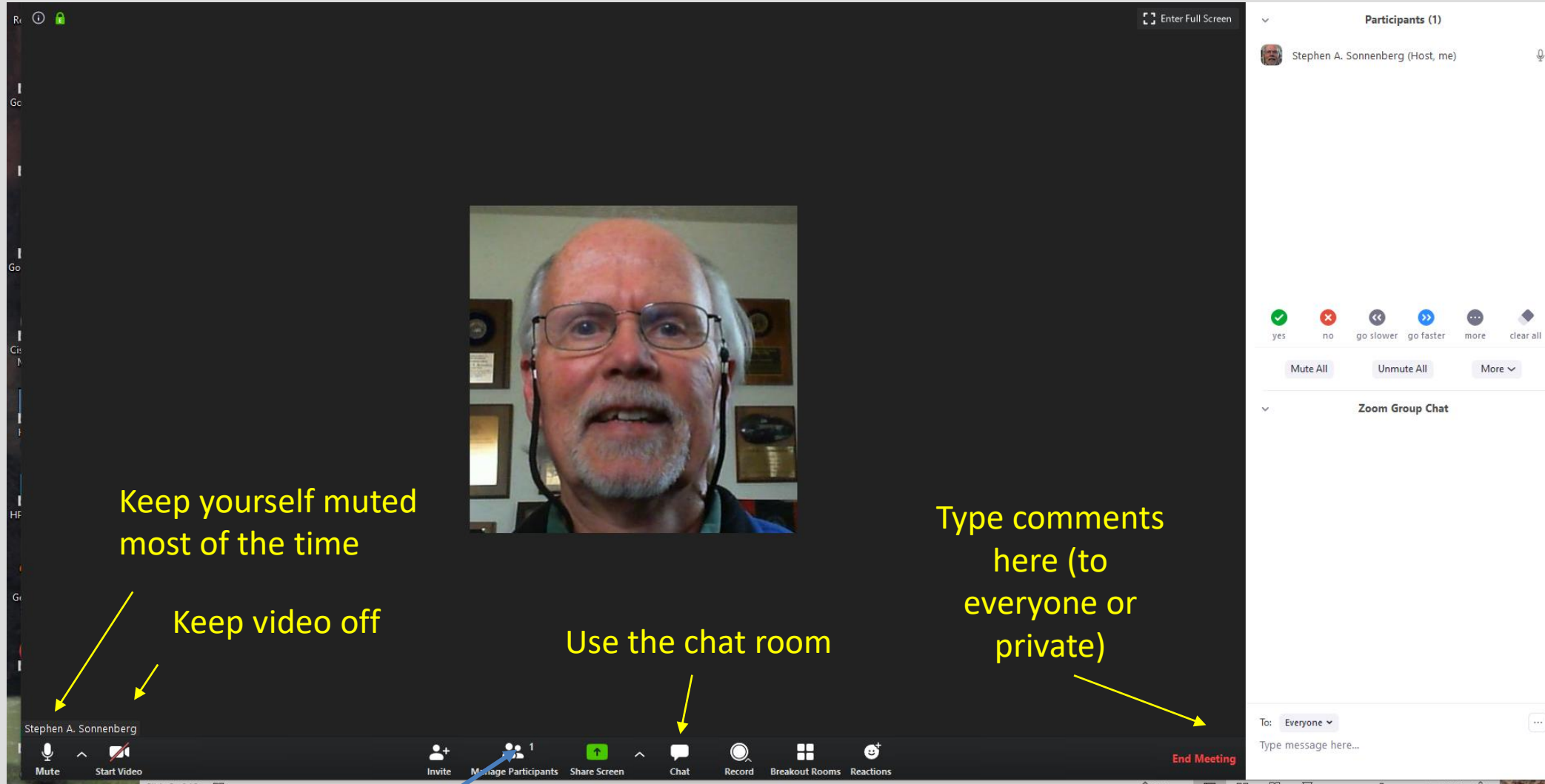
**Spring 2023
MUDTOC MEETING**



**COLORADO SCHOOL OF
MINES[®]
MUDTOC**

**Steve Sonnenberg
PI/Director
MUDTOC**

Zoom Suggestions



Keep yourself muted most of the time

Keep video off

Use the chat room

Type comments here (to everyone or private)

Participant's list

MUDTOC Advisors, Faculty & Committee Members

- Steve Sonnenberg, PI
- Chris Matson, RC

Advisors:

- John Curtis
- Jim Emme
- Matt Bauer
- Bill Zogg

Recent Committee Members

- Marsha French
- Donna Anderson
- Mary Carr
- Zane Jobe
- James Hagadorn
- Hossein Kazemi
- Jennifer Miskimins
- Keith Shanley
- Jeff May
- Ali Tura

MUDTOC Research

Mudrock and Tight Oil Characterization Consortium (includes Carrier Bed / Halo Plays)

- Denver Basin:
 - Skull Creek, Niobrara, Codell
- Powder River Basin:
 - Mowry, Niobrara, Frontier/Turner, Shannon
- Permian Basin (Midland & Delaware):
 - Wolfcamp
 - Avalon, Bone Springs
- Appalachian Basin:
 - Marcellus
 - Utica
- Williston Basin:
 - Bakken Petroleum System (Bakken & Three Forks)
 - **Deadwood Sandstone**
- GGRB
 - Lewis Shale
- San Juan Basin:
 - Niobrara & Semilla SS
- Neuquén Basin
 - Vaca Muerta
- **CCUS: Niobrara, Bakken, Muddy SS**
- **Geothermal: Rockies and Gulf Coast**

MUDTOC Characterization

- Outcrop & Core descriptions
- Basin Modeling
- 3D seismic
- Petrographic thin sections
- FE SEM, EDS, EDS mineral maps
- QEMSCAN
- XRD
- XRF + mineral models
- SRA
- Bambino
- MICP, Nitrogen adsorption, water (kerosene) immersion, etc.
- TinyPerm3 & other permeability measurements
- Petrophysics + NMR + ECS + FMI
- Core Scanning
- Carbon & oxygen isotope analysis
- CCUS
- Geothermal

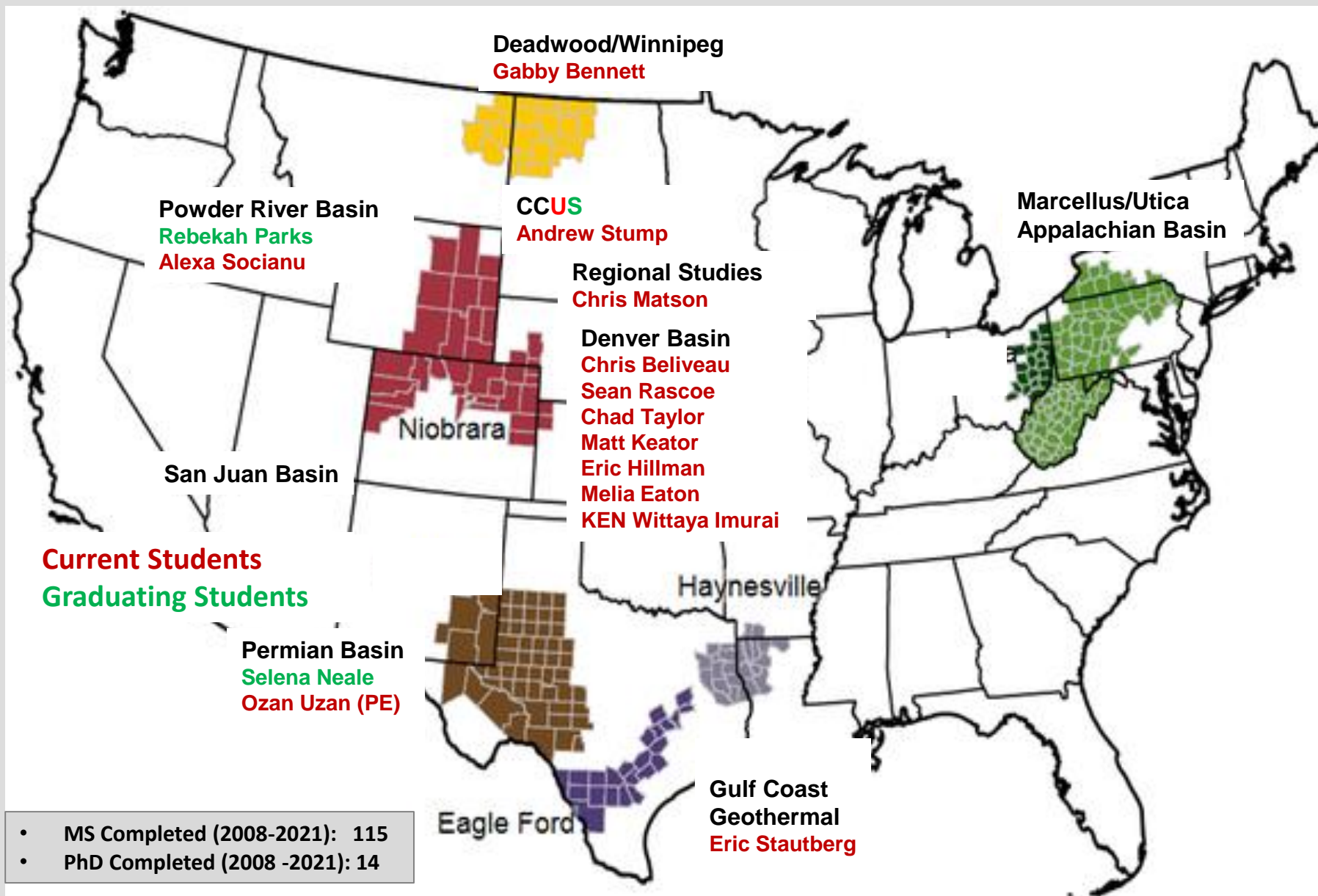
MUDTOC Project Ideas

- NMR & ECS - Permian, Bakken, Niobrara, Mowry, etc.
- Niobrara & Greenhorn Regional
 - Ash beds, biostratigraphy, OAEs, etc.
- Niobrara Redtail area
- Niobrara Newatt area
- Fort Hays UV fluorescence
- Niobrara/Codell Postle Wattenberg area
- Codell Redtail area
- Codell Silo area
- Pyrobitumen in Niobrara (Wattenberg)
- Denver basin-Skull Creek
- Biogenic/authigenic silica-Bakken, Mowry
- Three Forks Deposition model, Petrophysics, Dolomite, etc.
- Basin Modeling: Permian
 - Pressure & Temperature Anomalies
- Permian continued
 - Comparison of Wolfcamp from gas, gas-condensate, oil windows
 - Water occurrences in Wolfcamp
 - Machine Learning
- Faults & fractures, FMI logs
- Carrier-Bed Plays (Turner and Codell)
- CCUS Wolfcamp, Niobrara, Muddy Sandstone
- Lewis Shale, GGRB
- Geothermal

Advisory Board Suggestions

- Silo area Codell study ✓
- Wettability studies ✓
- Fluid & rock interactions ✓
- OAE II & III ✓
- PRB & DJB – burial history & maturity studies northern part of basin ✓
- Regional stratigraphic study Frontier to Turner ✓
- Austin Chalk study
- Geothermal studies ✓
- CCUS (HC gas & CO₂) ✓

MUDTOC Project Areas



Thank you to our Sponsors!

Sponsoring Member Companies



HELIS OIL & GAS, L.L.C.



HALLIBURTON



In-Kind Supporting Companies

GEOMARK



Mike Johnson & Associates



MUDTOC Research 2010 - 2021

Powder River Basin

- James Taylor
- Armagan Kaykun
- Andrew Heger
- Cankut Kondacki
- Courtney Bone
- Brian Hankins
- Corey Milar
- Lisa Reeves
- Rebekah Parks
- ❖ Drew Stump
- ❖ Patrick Sullivan

Niobrara Regional Studies

- Evan Allred
- Julia Wood
- Michael Harty
- Cankut Kondacki (PhD)

NW Colorado

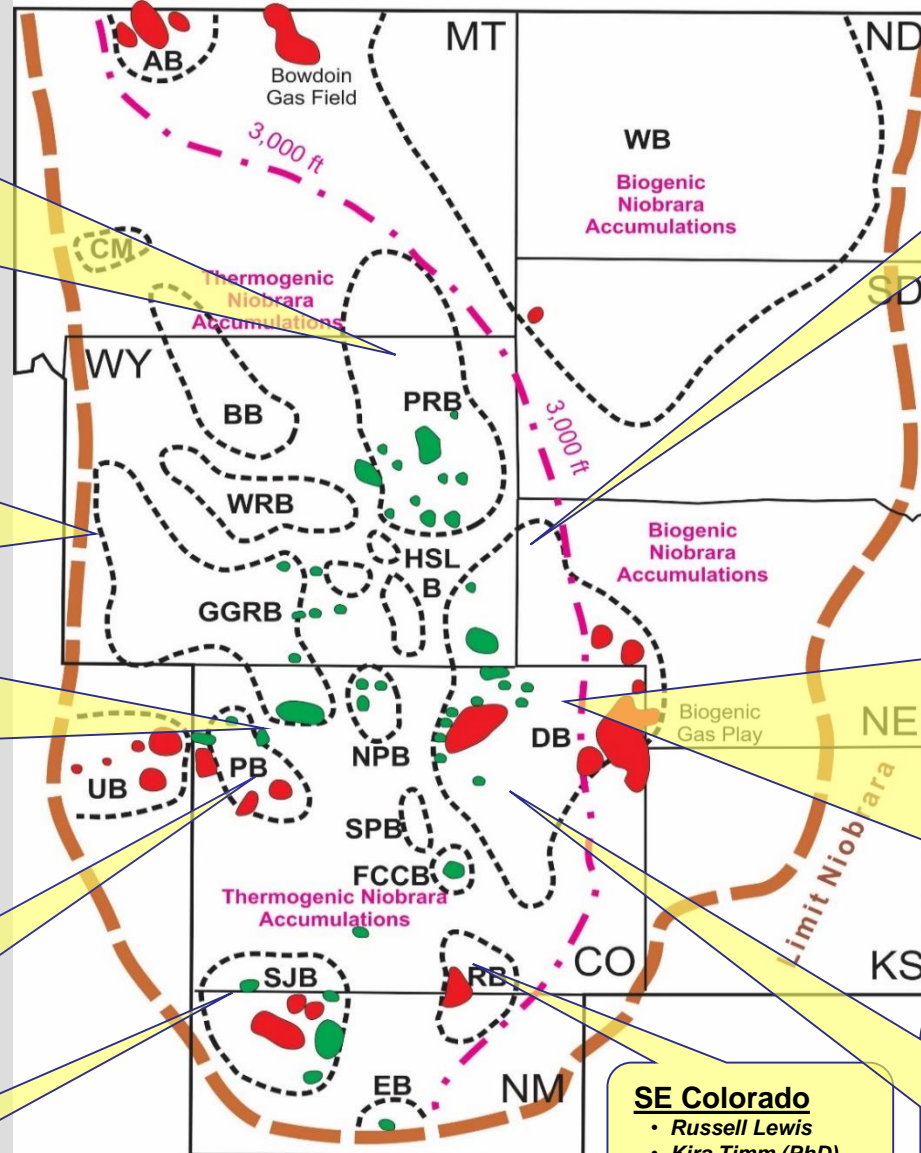
- Jon Charzynski
- Katarzyna Kuzniak
- Vivian Lin
- Kelly Bruchez
- Ben Dellenbach
- Michael Harty III
- Shawn Lopez

Piceance Basin

- Kasia Kuzniak
- Martin Krueger
- John Harper
- Marcus Hinricher

San Juan Basin

- Tom Arthur
- Walter Nelson
- Scott Kennedy



Codell SS

- Adam Anderson
- John Stamer
- Tofer Lewis
- Steve Crouch
- Nick Damon
- ❖ Matthew Keator

Denver Basin

- Mike Collins
- Melanie Peterson
- Teresa Malesardi
- Alejandra Maldonado
- Elena Finley
- Phylcia Saner
- Lauren Stout
- Denton O'Neal
- Nico Kernan
- David Thul
- Kazumi Nakamura (PhD)
- Devin Murray
- David Underwood
- Lindsay Hefton
- Hannah Durkee
- Isabel Gary
- David Thul
- Lauren Stout
- David Underwood
- Caleb Garbus
- Lauren Bane
- Scott Manwaring
- Adam Simonsen
- Adrienne Bryant
- ❖ Chris Beliveau
- ❖ Sean Rascoe
- ❖ Chris Matson (PhD)

SE Colorado

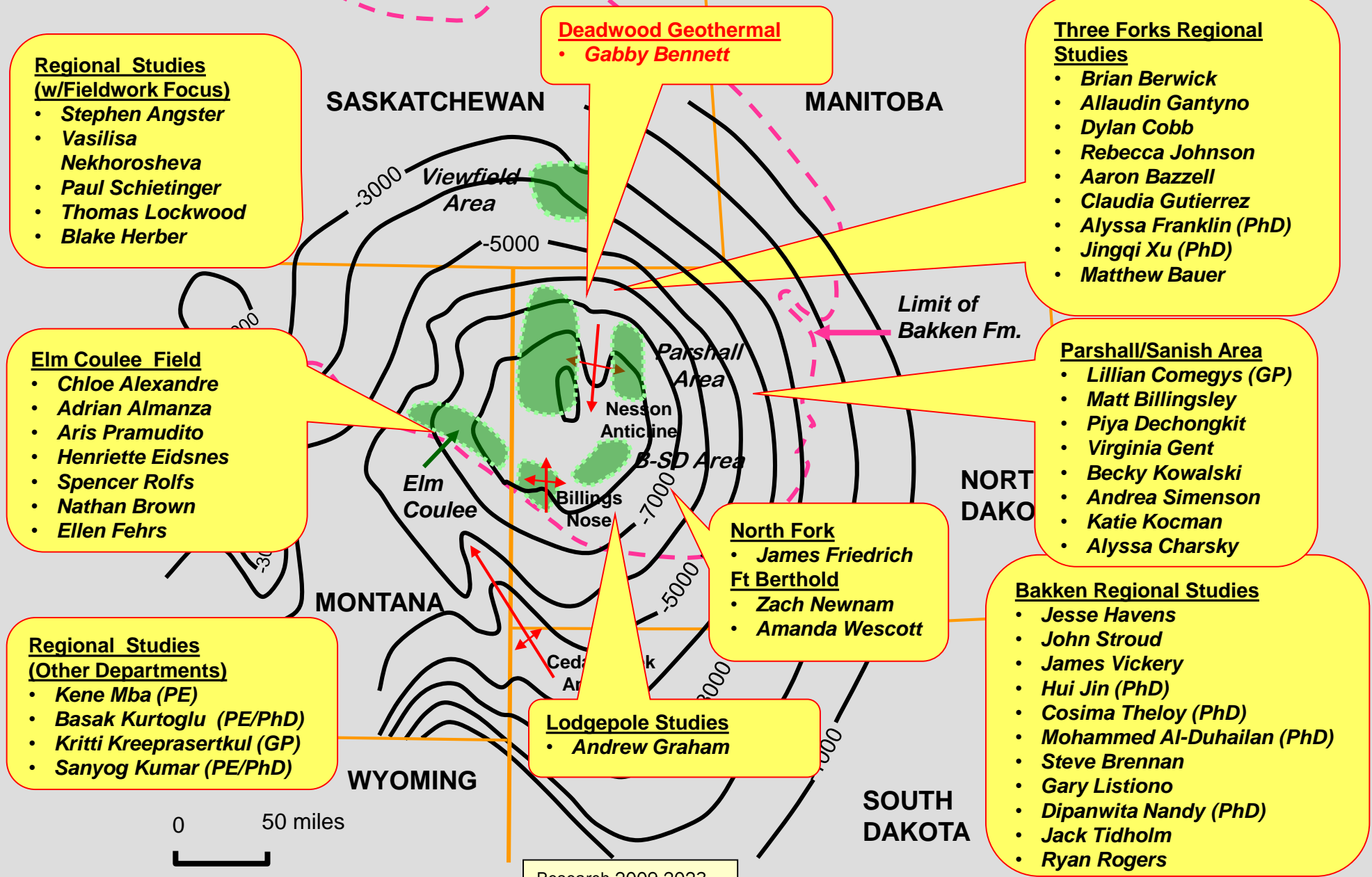
- Russell Lewis
- Kira Timm (PhD)
- Nick Matthies

Denver Basin: Wattenberg

- Craig Kaiser
- Nick Matthies
- Rana ElGhoniemy
- Jennie Rietman
- Elvan Aydin
- Daniel Brugioni
- Patrick Sullivan

Research 2010 – 2021
 • Completed Theses
 ❖ In Progress

MUDTOC Research 2010 - 2023



VACA MUERTA RESEARCH TITLES/(OR DRAFT PROPOSAL TITLE)

Max Willis: MS, PE

Talgat Kosset: MS, PE

Anton Padin: PhD, PE

Matt Herzog: MS, PE

Eider Hernandez-Bilbao: PhD, Geology/GE

Ted Kernan: MS Student in Geology

Josefina D'Hiriart: PRMS Geology/GE

Jessica Franklin: MS Geology/GE

Sebastian Ramiro: MS, Geology/GE

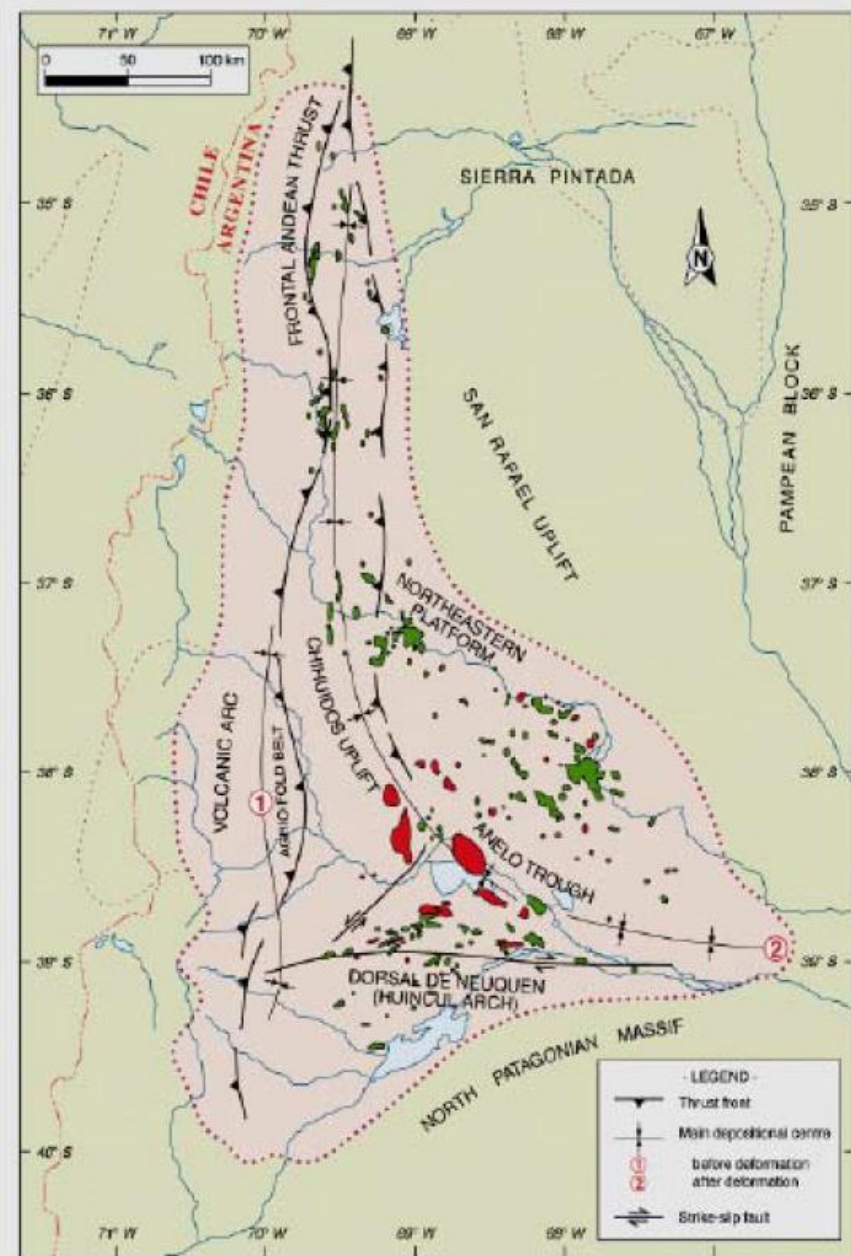
Dina Hegazy: MS PE

Darkhan Maulimgazy: MS, PE

Pablo Benitez: PRMS, Geology

Kyla Bishop: MS GP

Pedro Biscayart: PRMS Geology



Source: Americas Petrogas