

Welcome



Carl H. Sondergeld
Mewbourne School
Of Petroleum and
Geological Engineering

New Perspectives on Shales

July 28-29, 2010



Oklahoma
Geological
Survey

G. Randy Keller, Director

The University of Oklahoma
MEWBOURNE COLLEGE OF EARTH & ENERGY

George Phydias Mitchell



Barnett Shale

“It took George Mitchell 18 years to make it work, He is the father of the Barnett Shale. He was tenacious. He started in 1981 and it really didn’t take off until 1999. And even then, it took a long time to develop it.”

Larry Brogdon, Four Sevens Oil Co.

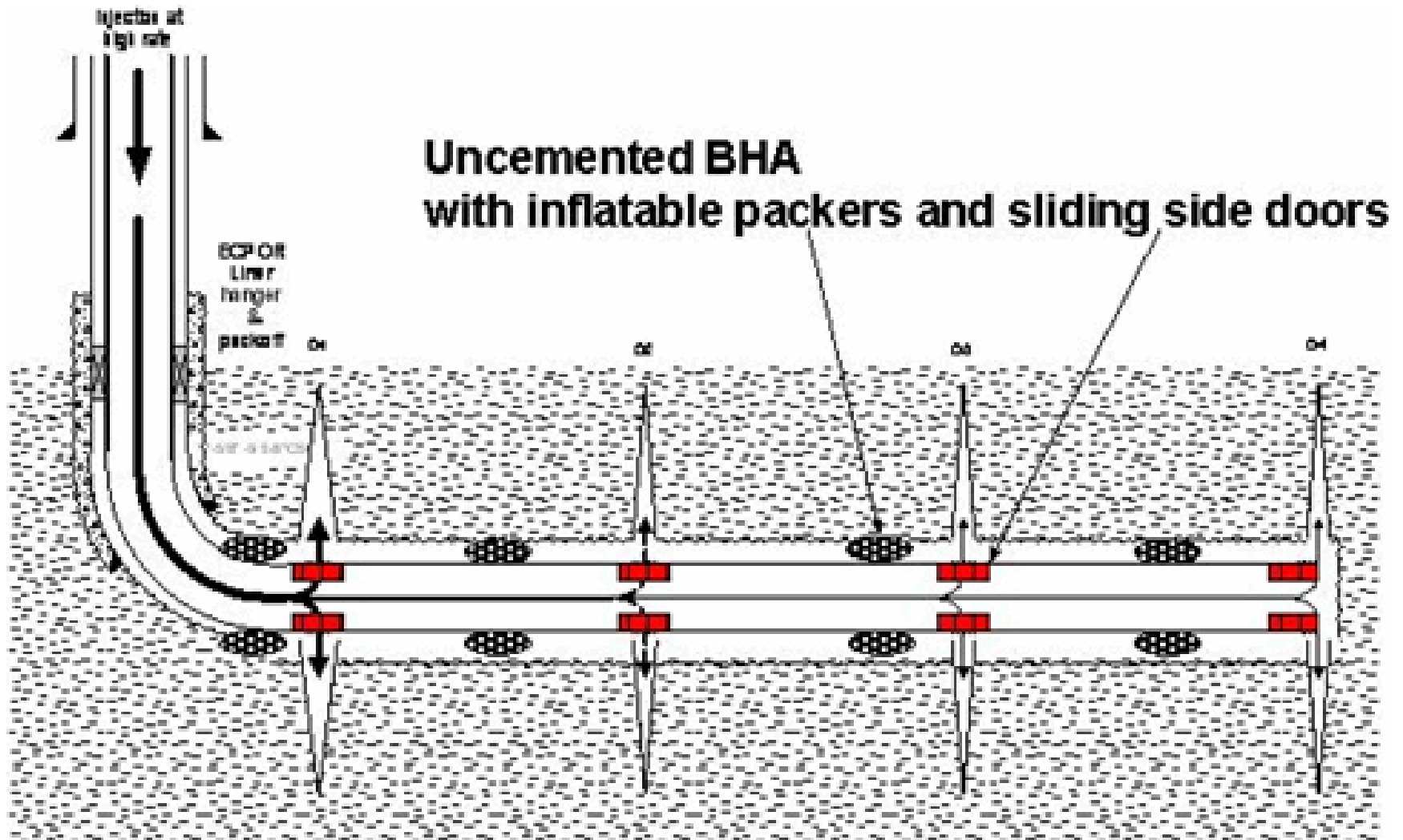
Vertical wells: hydraulic fracture stimulation



Massive Hydraulic Fractures



Horizontal wells: multistage fractures



More Horsepower, More Sand

© Schlumberger



Stimulation-Stimulation-Stimulation

Vertical wells

massive frac treatments
all sorts of frac fluids

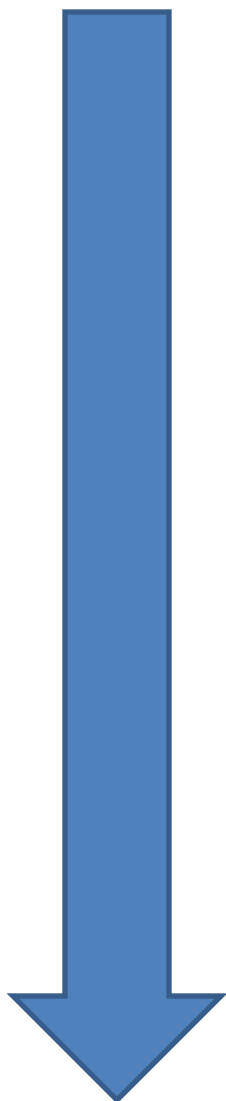
Horizontal Wells

slick water frac

extended reach 5000'-10000'
multistage fracs (5-32)
multilaterals

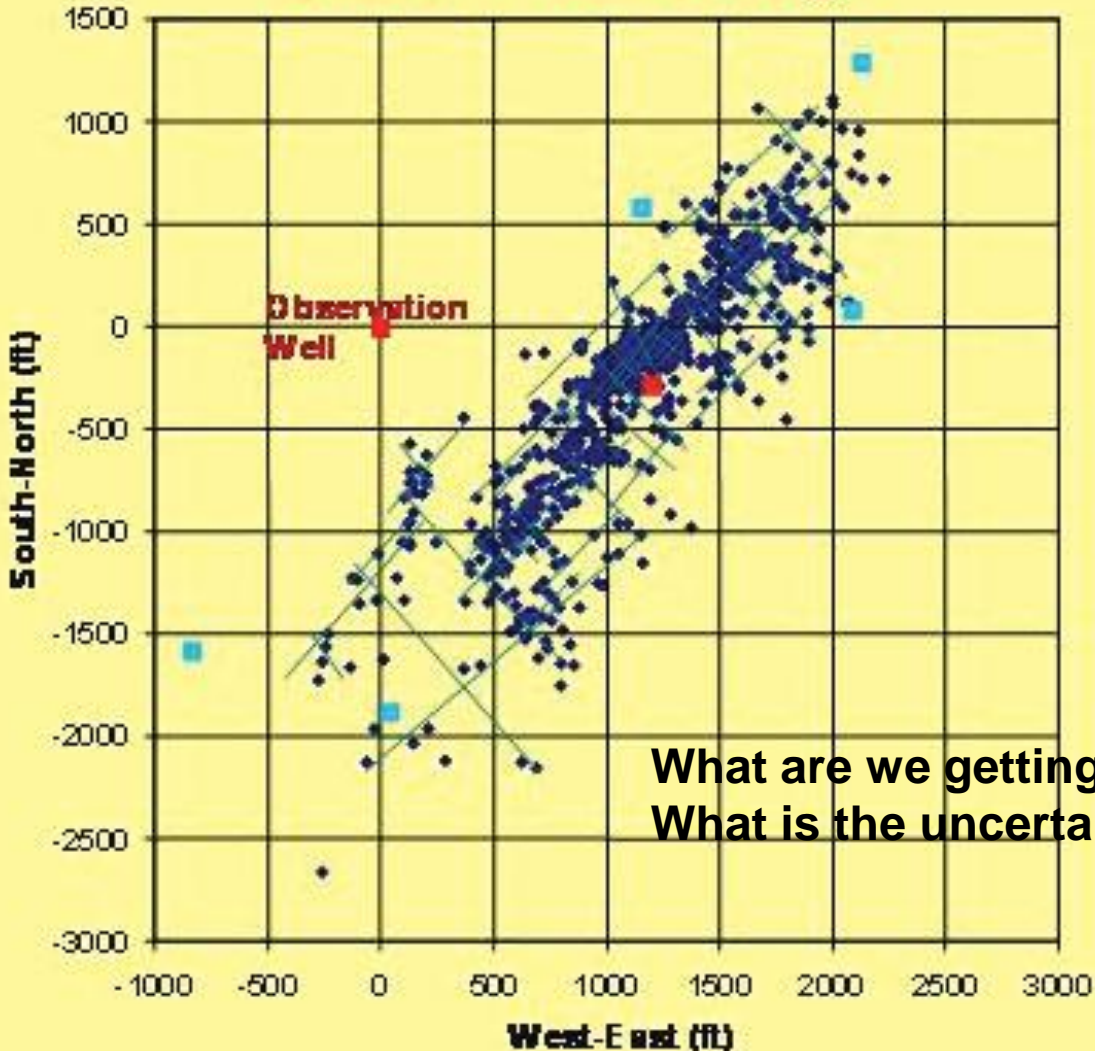
simul fracs
button frac
zipper fracs

More sand-More Horsepower?



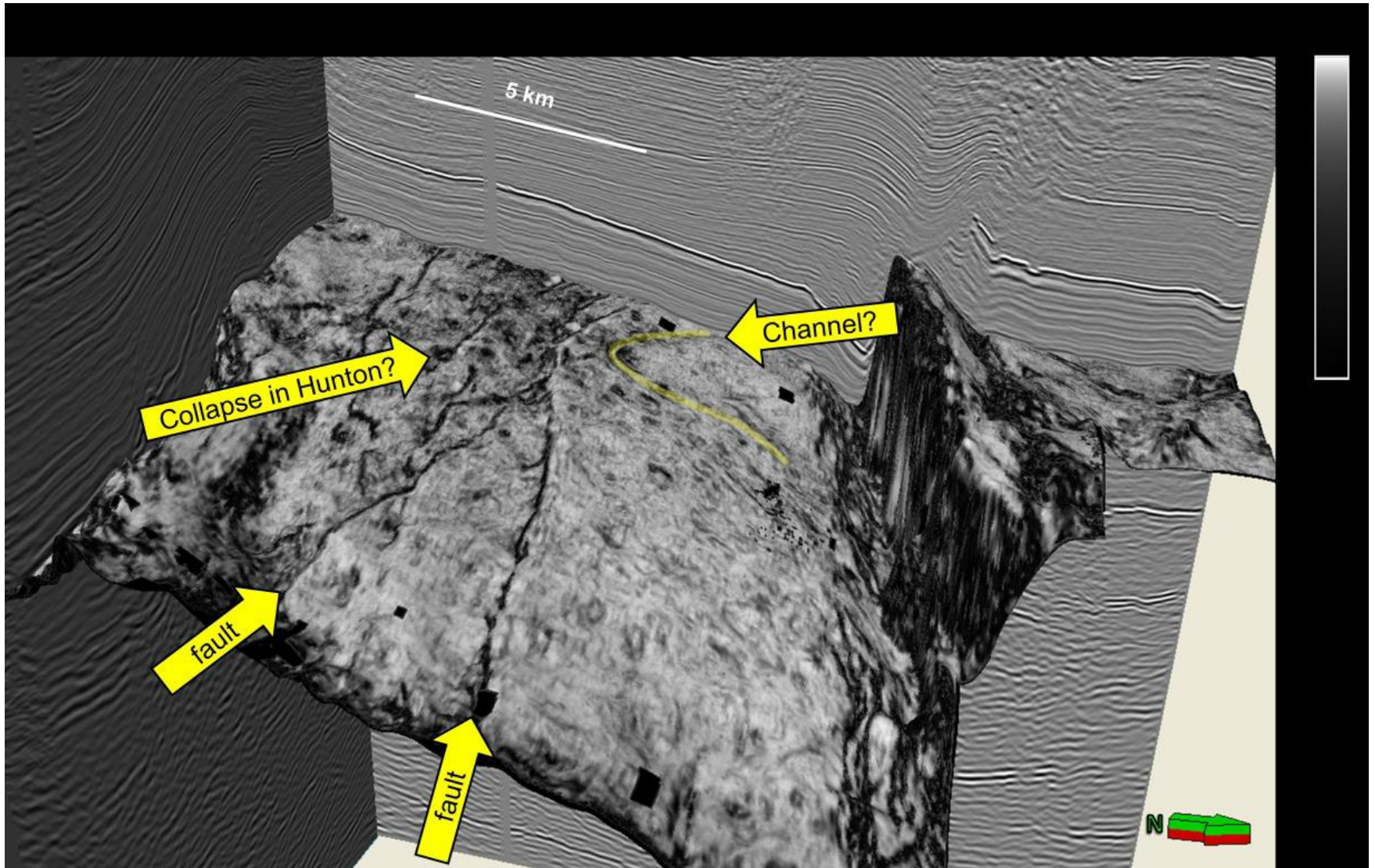
Microseismic Mapping of Hydraulic Fractures

Shale Frac Design



What are we getting?
What is the uncertainty?

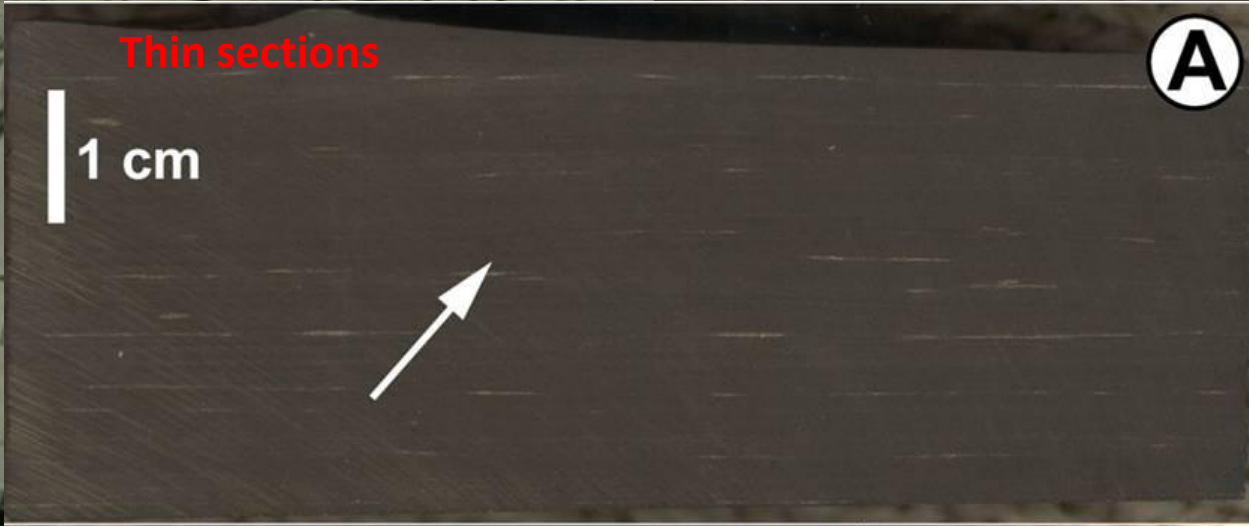
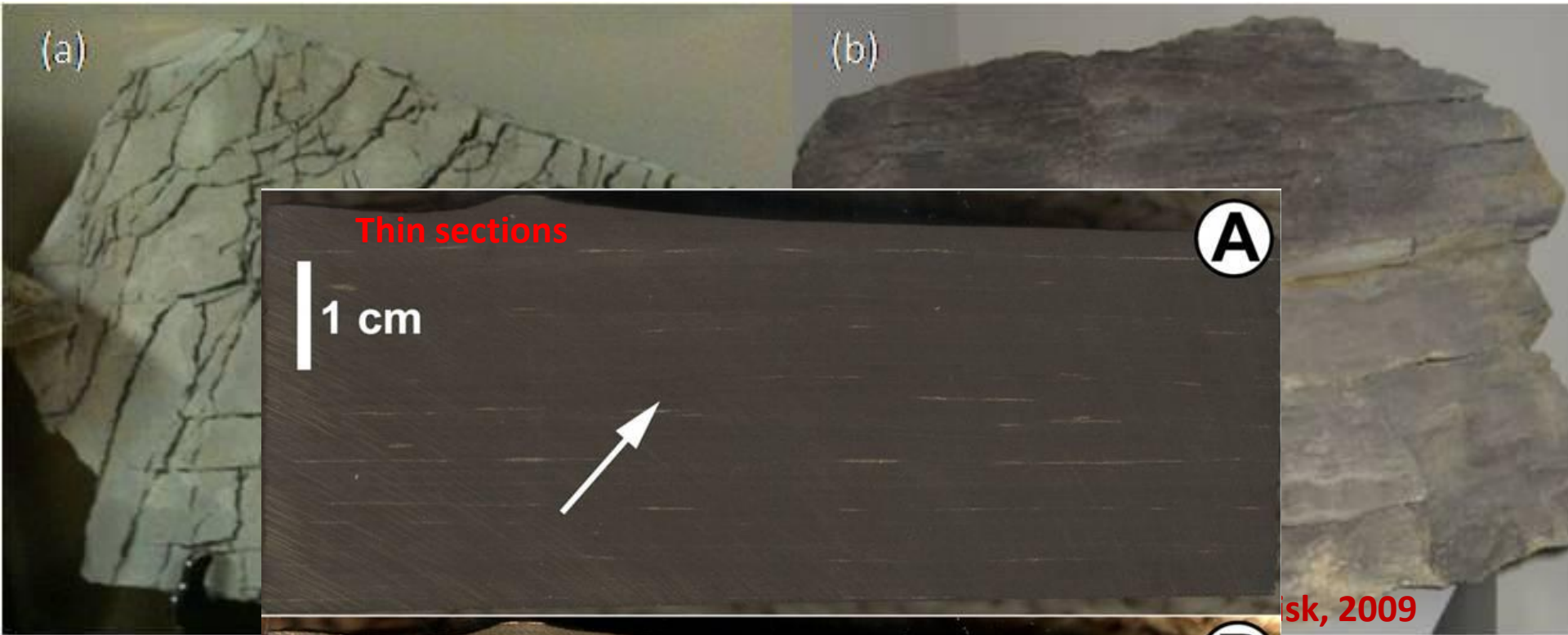
The Big Picture: Coherency on the Woodford



Outcrop Scale: Woodford, locally fractured, interbedded, rock quality variability



Hand Specimen: Woodford, pyrobitumen filled fractures

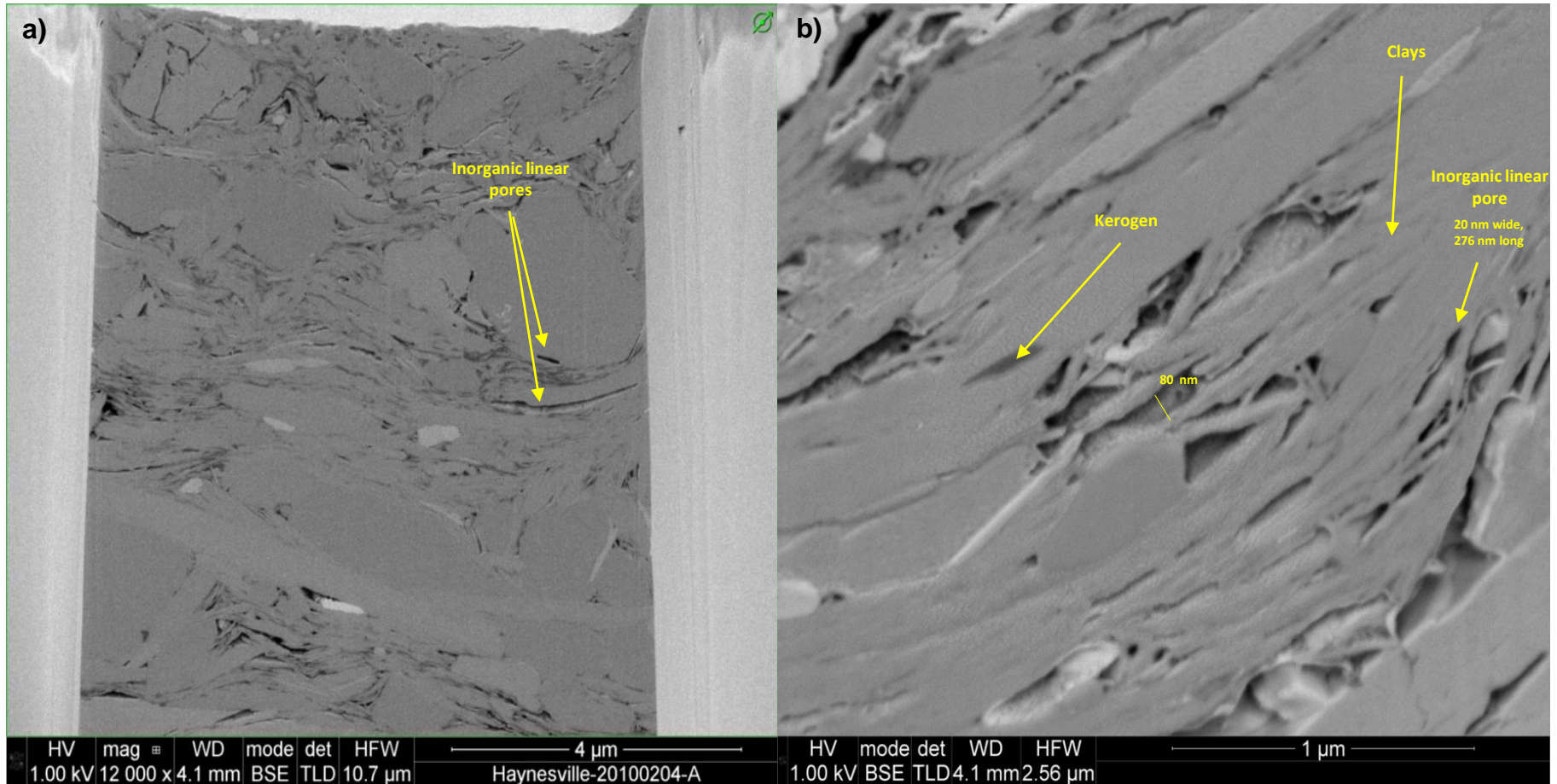


sk, 2009



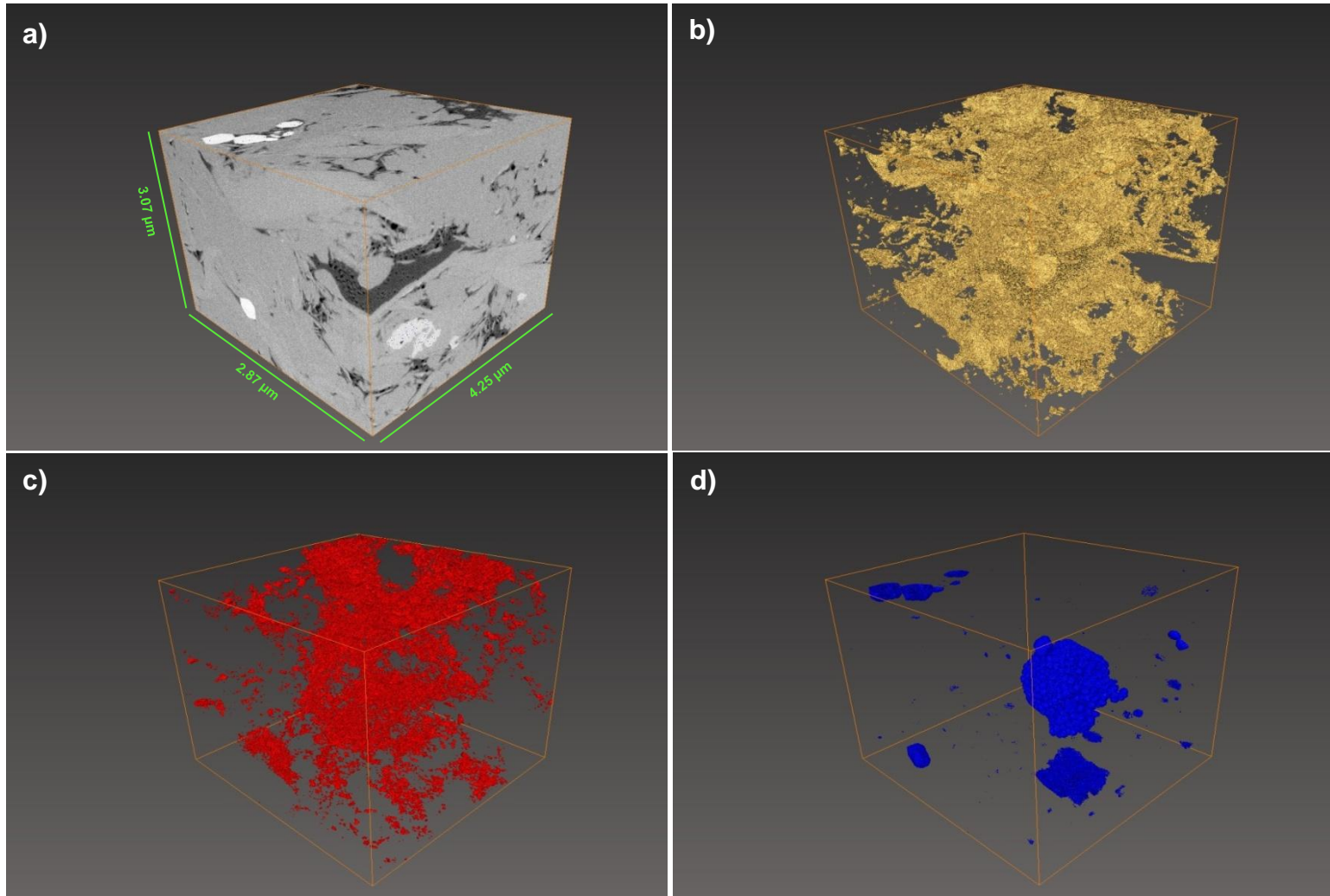
Ion Milled Scanning Electron Microscope Images:

Reveal microstructure in grains and kerogen which contains and delivers gas
Kerogen estimation from logs, kerogen density?



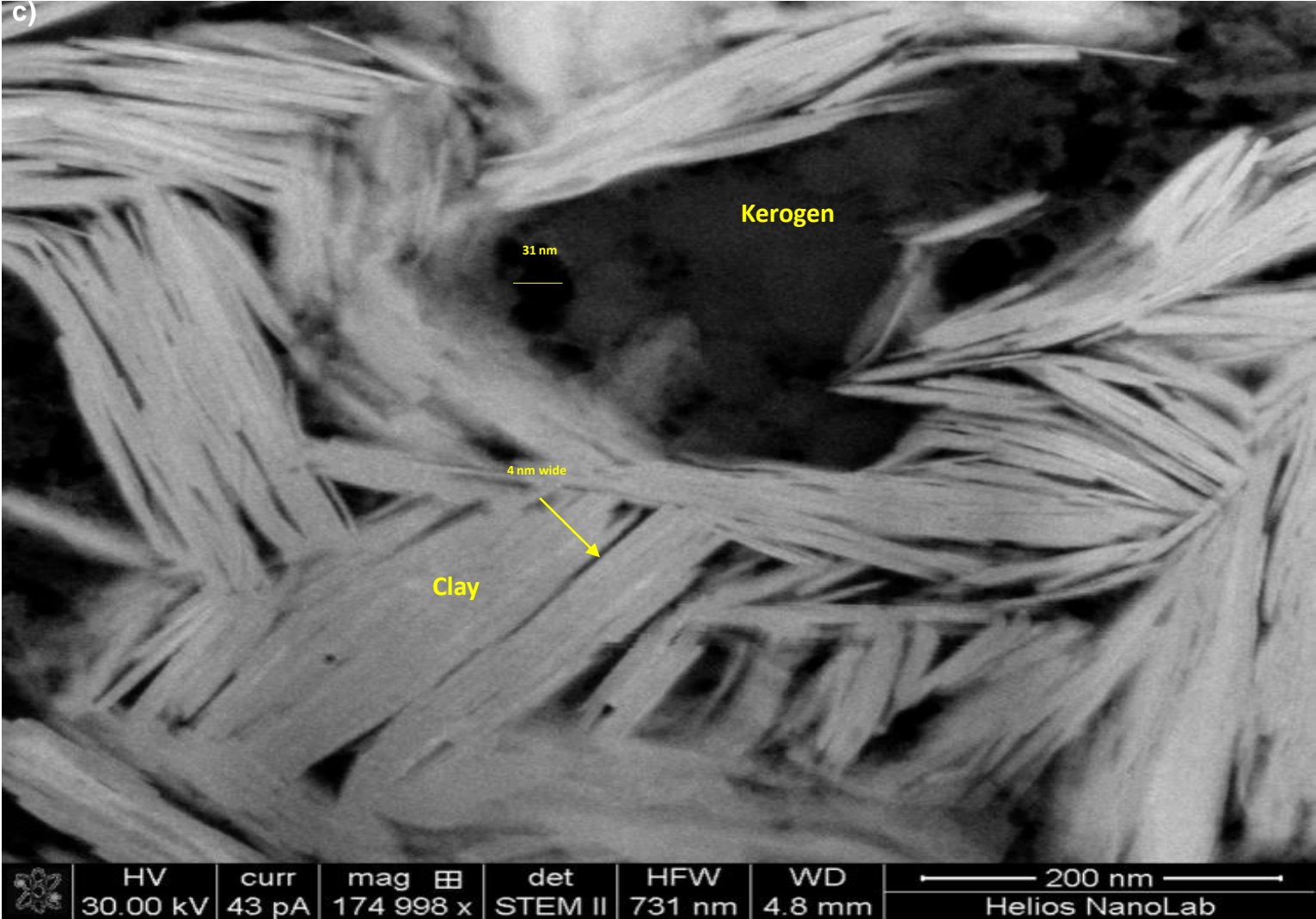
Slice and View Capabilities:

Renders volume from which organic and pore geometries can be extracted.



Scanning Transmission Electron Microscopy:

Reveals even finer details of phyllosilicate porosity



Posters:

Application of Vitrinite Reflection to Four Woodford Gas-Shale Plays in Oklahoma

*Brian Cardott
Oklahoma Geological Survey*

Microseismic Analysis of Fluid Induced Seismicity

*Yashwanth Chitrala, Camilo Moreno, Carl H. Sondergeld and Chandra S. Rai
Mewbourne School of Petroleum and Geological Engineering*

Investigations of Gas Shale Microstructure

*Mark E. Curtis, Carl H. Sondergeld, Ray J. Ambrose², and Chandra S. Rai
Mewbourne School of Petroleum and Geological Engineering
² Devon Energy*

NMR Imbibition Studies of Gas Shales

*Elijah Odusina, Carl H. Sondergeld, and Chandra S. Rai
Mewbourne School of Petroleum and Geological Engineering*

Seismic Anisotropy Study of the Barnett Shales

*Yanxia Guo and Kui Zhang
ConocoPhillips School of Geology and Geophysics*

Agenda:

9:15 a.m. Rock Typing in Gas Shales

Chandra Rai

OU Mewbourne School of Petroleum and Geologic Engineering

9:45 a.m. Gas Shale Evaluation Techniques—Things to Think About

Mike Miller

Cimarex Energy

10:15 a.m. Break

Posters available for viewing

OGS publications available

10:45 a.m. New Pore-scale Considerations for Shale Gas-in-place Calculations

Ray Ambrose

Devon Energy

11:15 a.m. From Oil-prone Source Rock to Gas-producing Shale Reservoir

Q. R. Passey

ExxonMobil

11:45 a.m. - 1:00 pm Lunch

Posters available for viewing

OGS publications available

Agenda contd:

1:00 p.m. Stimulating Shale Reservoirs—What Have We Learned from Fracture Mapping

Norm Warpinski

Pinnacle, a Halliburton Service

1:30 p.m. Static and Dynamic Rock Properties Relationships for the Bossier and Haynesville Formations

Amie Lucier

Shell International

2:00 p.m. Break ***Posters available for viewing***

OGS publications available

2:30 p.m. Gas Shale: Adsorbed Component Assessment

Jack Breig

Newfield Exploration

3:00 p.m. Bakken Oil Resource Play—Williston Basin (US) —Overview and Historical Perspective

Neil Olesen

Continental Resources

Special Thanks to Personnel from the
Oklahoma Geological Survey

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Jane Weber

Connie Smith

Sue Crites

Joyce Stiehler

Jennifer Veal

Sue Palmer

Richard Murray

Tom Sanders

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Jonathan Green, OU student & OGS

Ken Luza, OGS

Joyce Stiehler, OGS