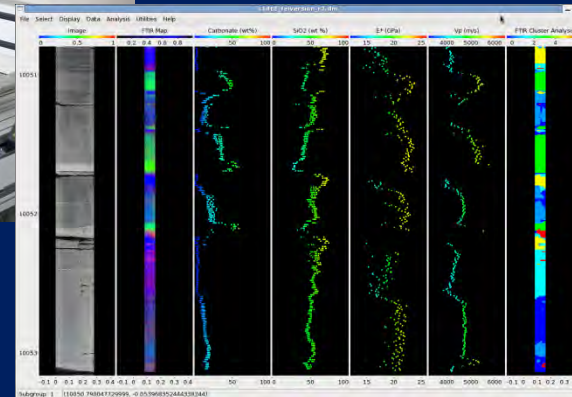


Mechanical properties imaging using petrophysical core scanning

Gregory Boitnott, Laurent Louis
New England Research Inc.



Outline

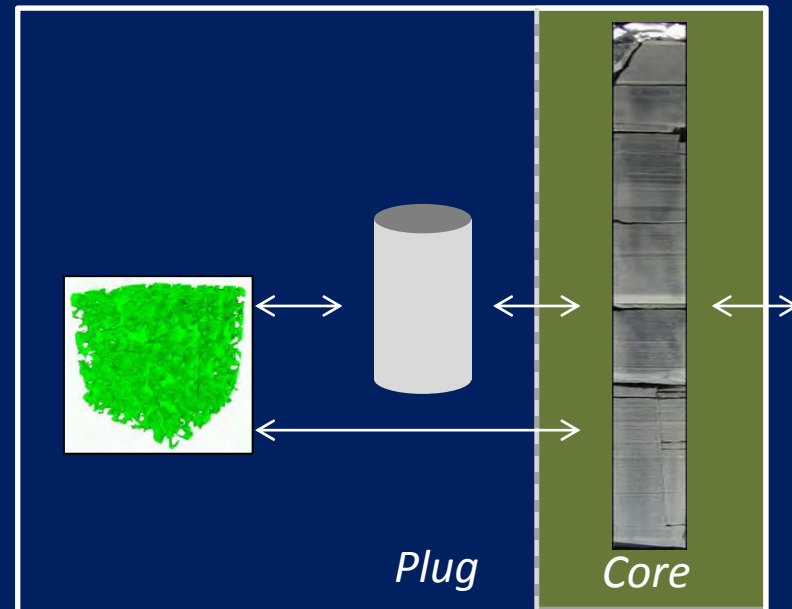
- ❑ Introduction
- ❑ Petrophysical core scanning
- ❑ Ultrasonic and impulse hammer probes
- ❑ Rock typing in Wolfcamp shale
- ❑ Impulse hammer in Boise sandstone
- ❑ Summary



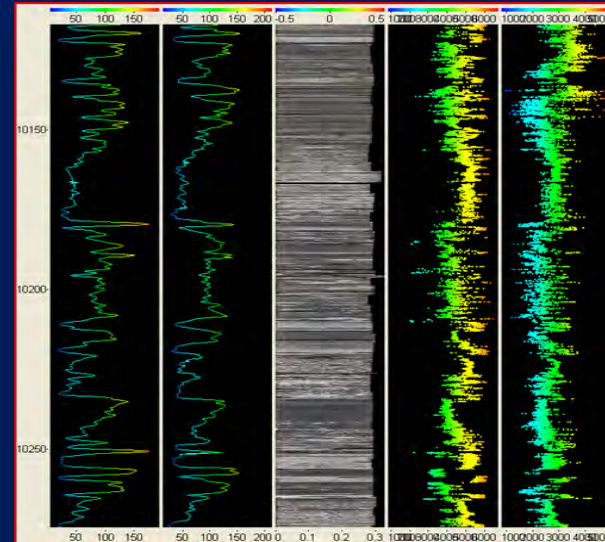
Introduction

Petrophysical core scanning

- Whole core DRP benchmarking
- Core to log integration
- Screening/Sampling strategy
- Rock typing
- Direct mini-core DRP benchmark



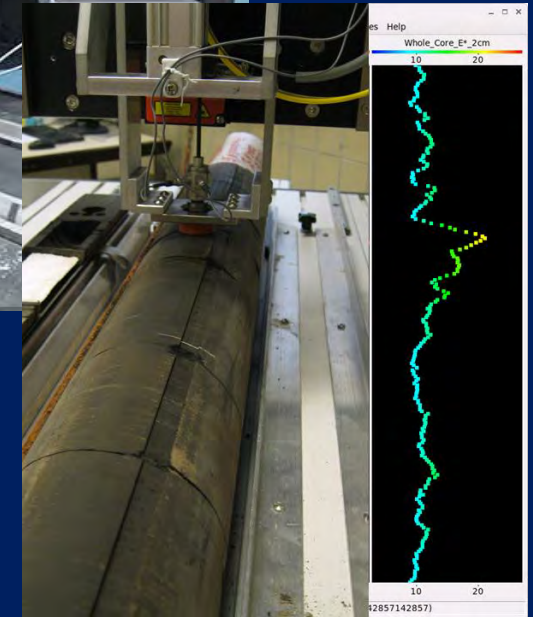
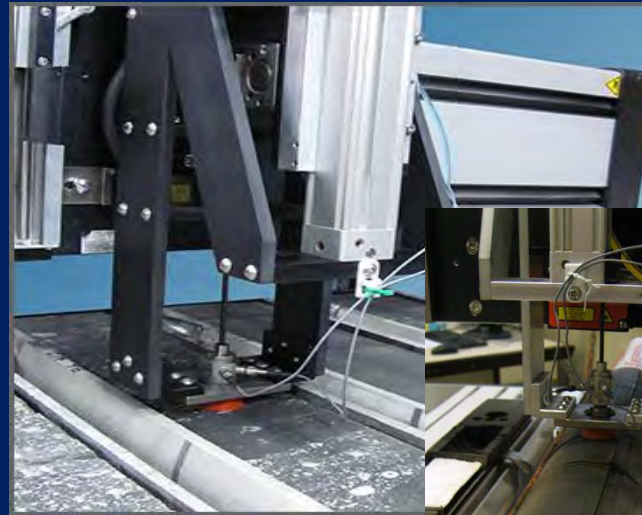
Petrophysical core scanning



mm to cm scale core scanning & mapping

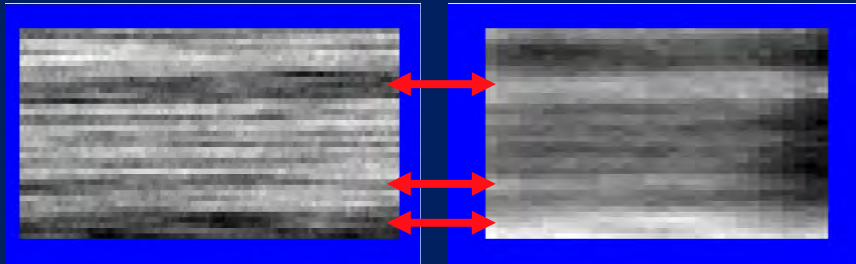
- *Permeability*
- *P- and S-wave velocity*
- *Electrical resistivity*
- *FTIR response*
- *Impulse Hammer*
- *Core photography*
- *XRF, Custom Probes*

Ultrasonic and impulse hammer probes



Permeability

Velocity



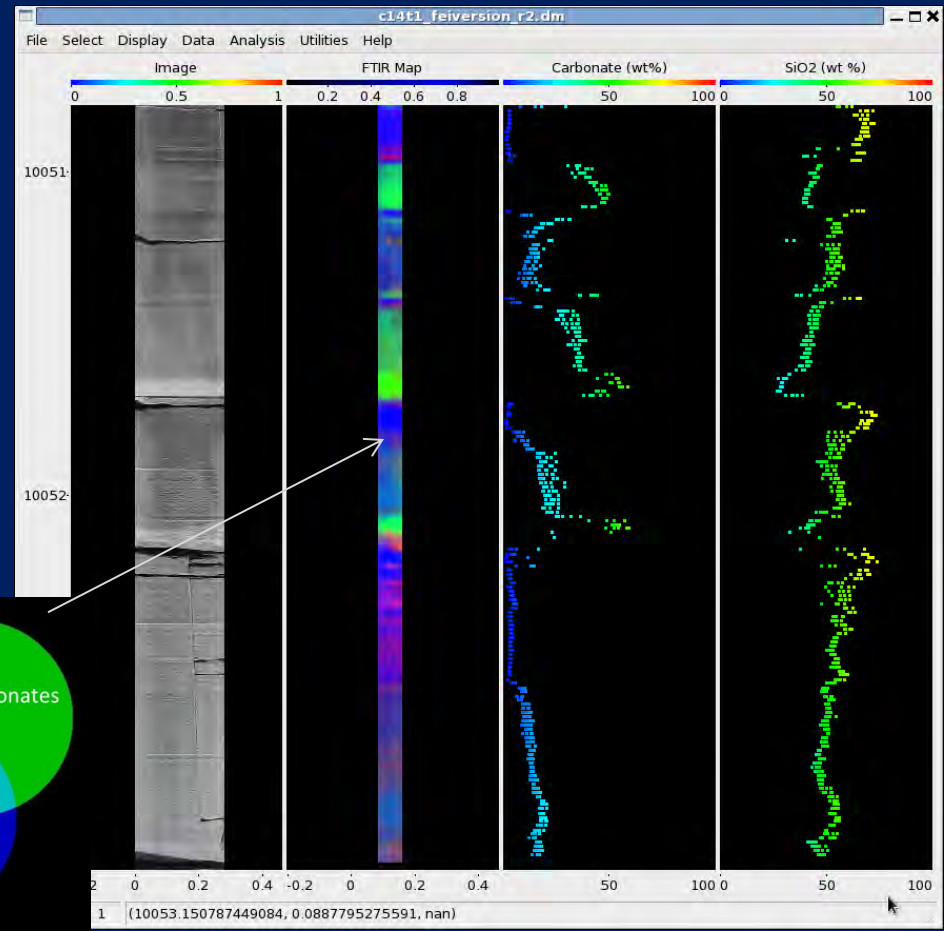
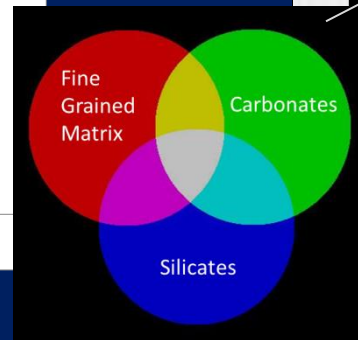
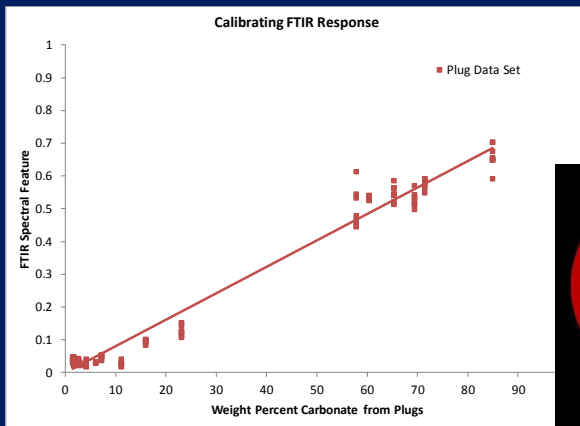
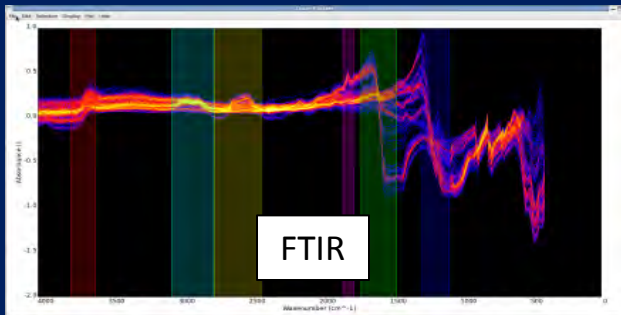
Rock typing in Wolfcamp shale

- Reconcile petrology and rock physics observations for rock types (e.g. how many 'mudstones')
- Optimize sampling over a large depth and facies range
- FTIR + Velocity + Impulse hammer

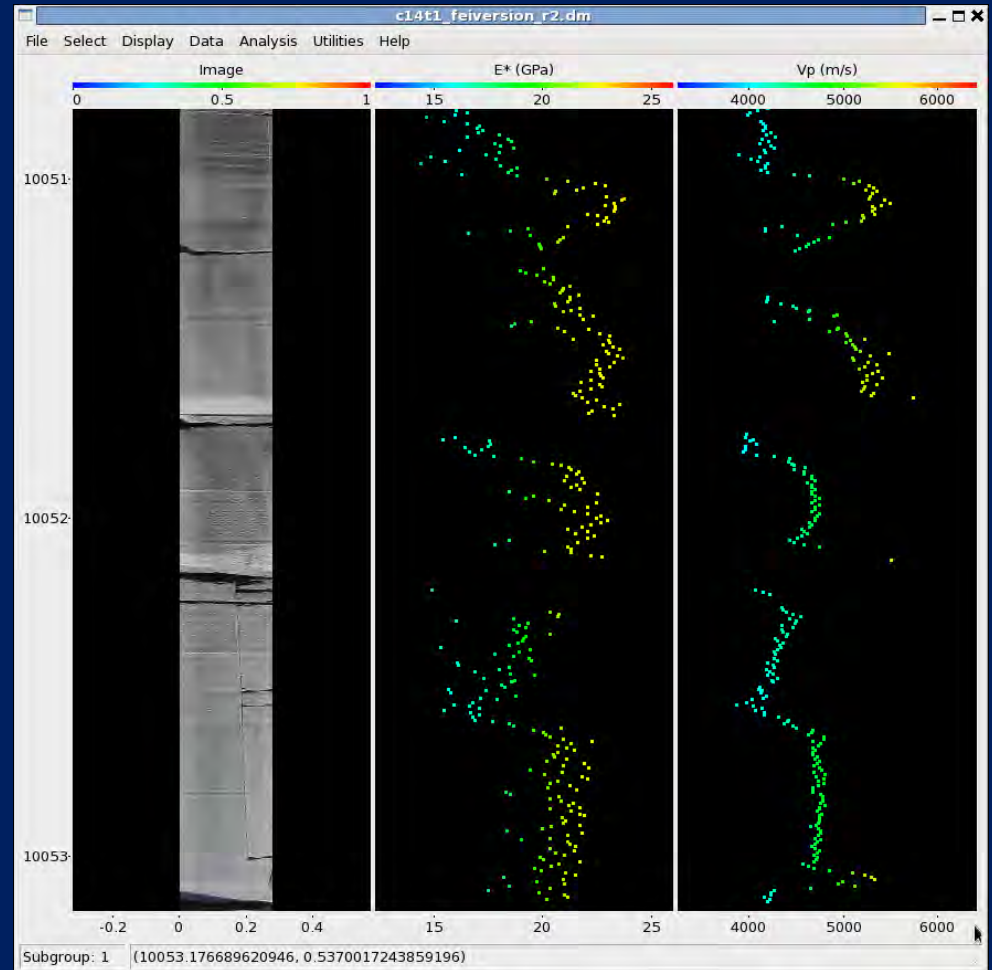
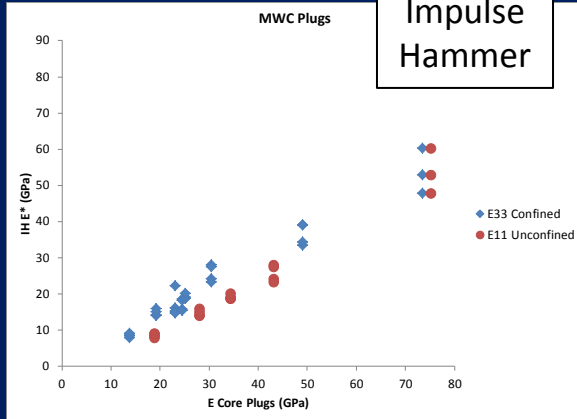


Rock typing in Wolfcamp shale

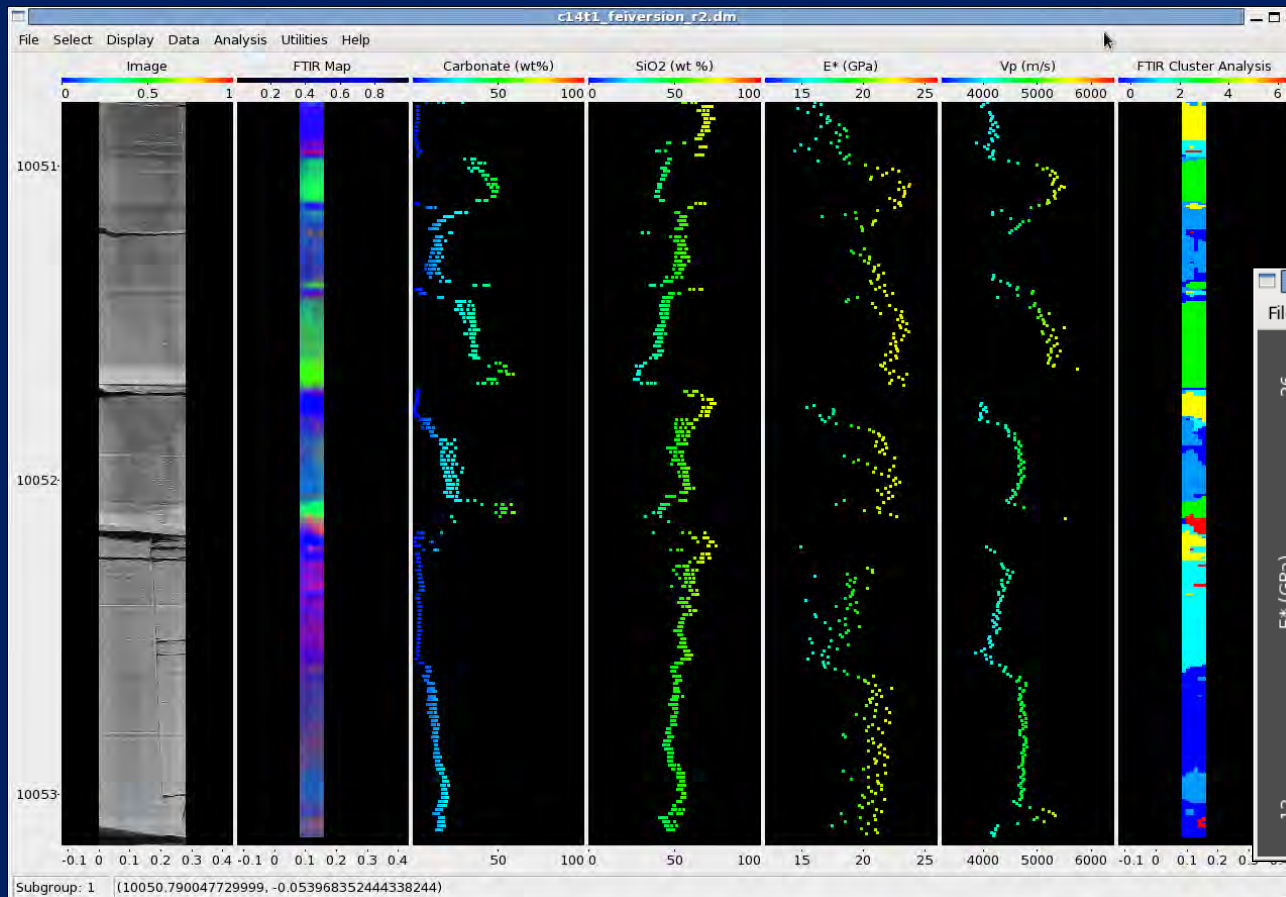
Calibration to core plugs



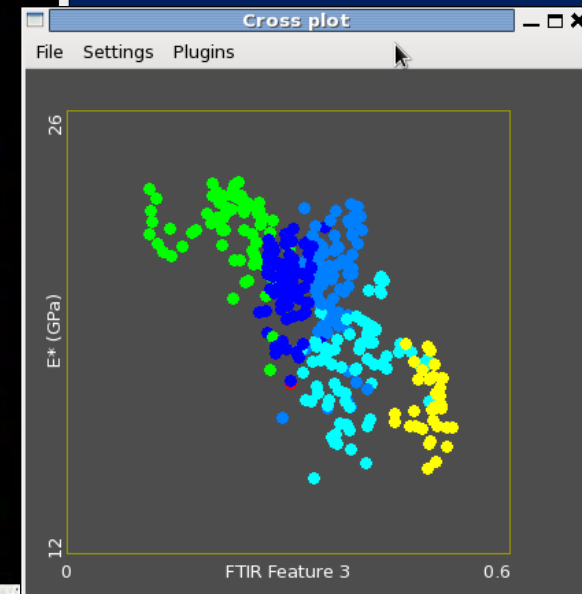
Rock typing in Wolfcamp shale



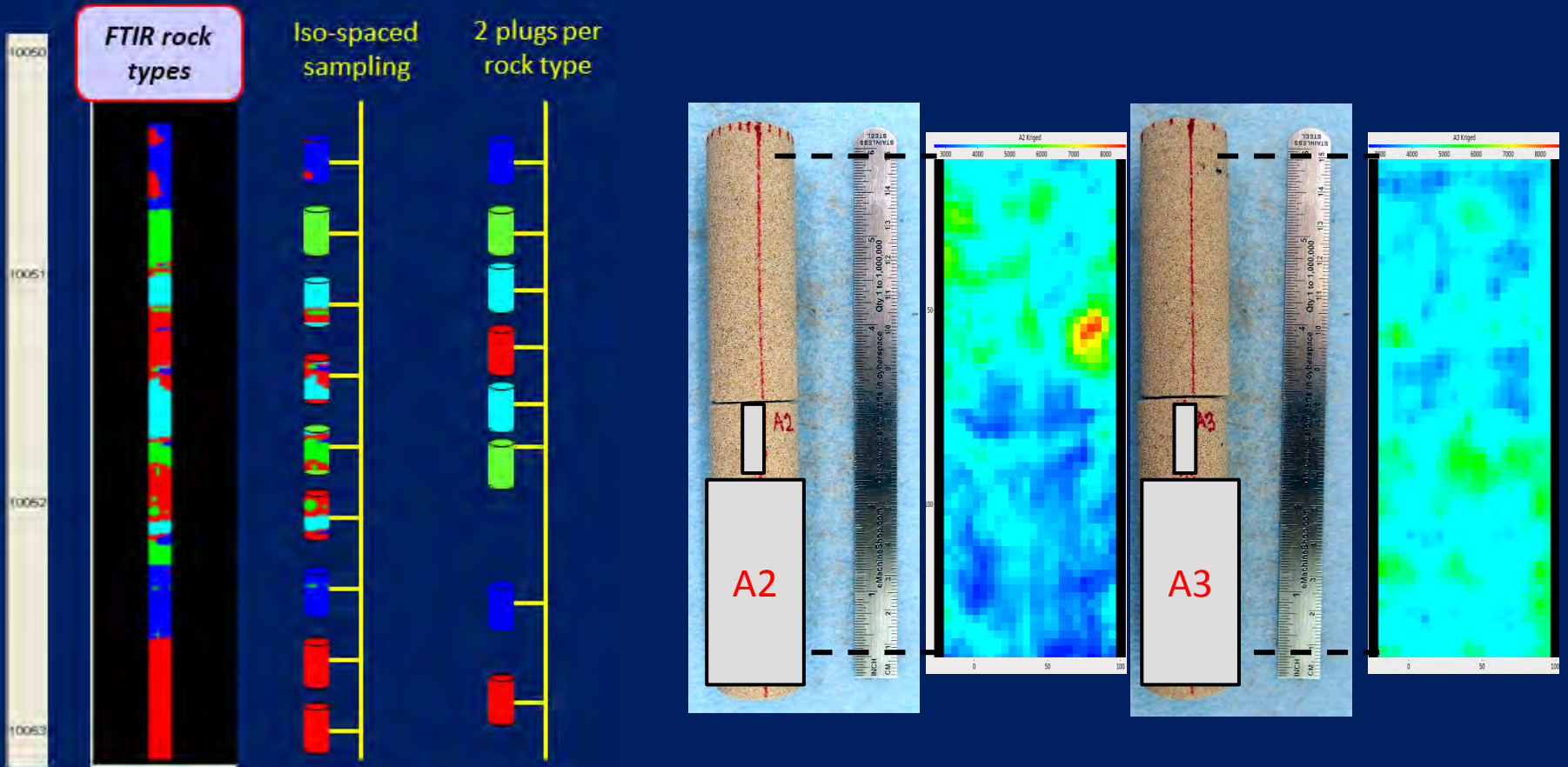
Rock typing in Wolfcamp shale



Mudstone Types
Separated in chemistry
vs. mechanical
properties plot



...Screening for DRP



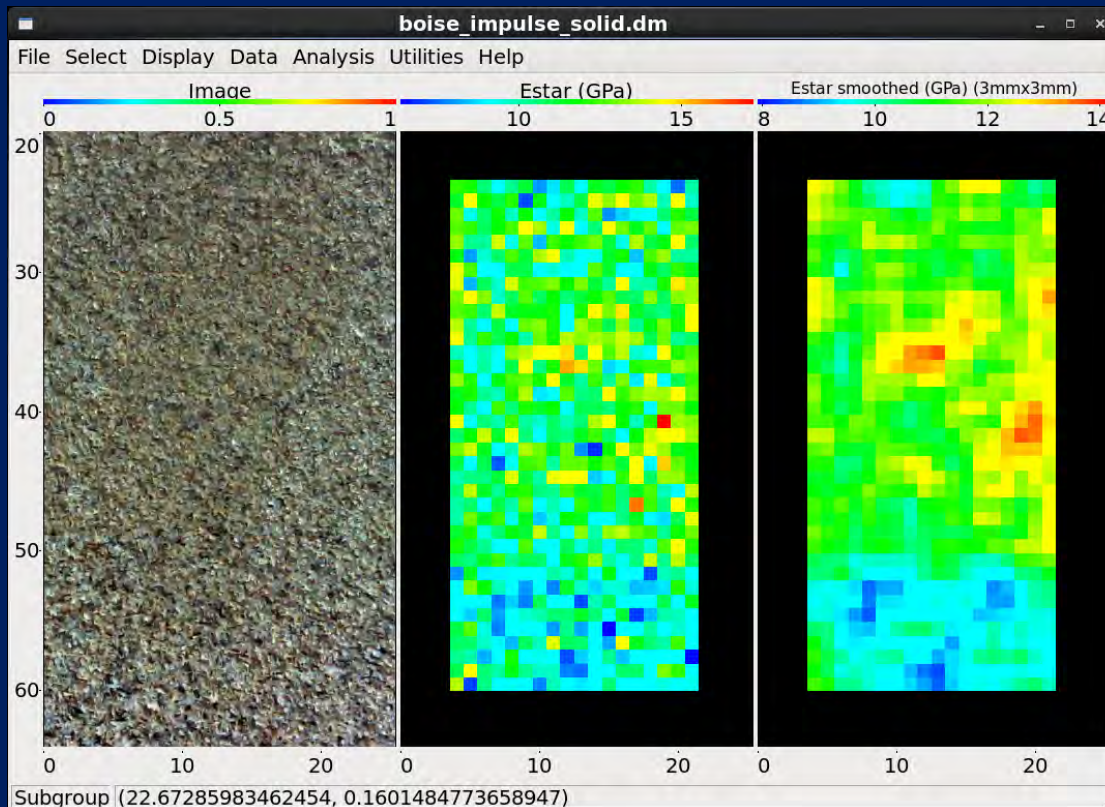
Impulse hammer in Boise sandstone

- Mechanical properties map at 1mm resolution
- Blunt 50mm radius tip (~100% elastic response)
- Sharper tip with 4 mm radius



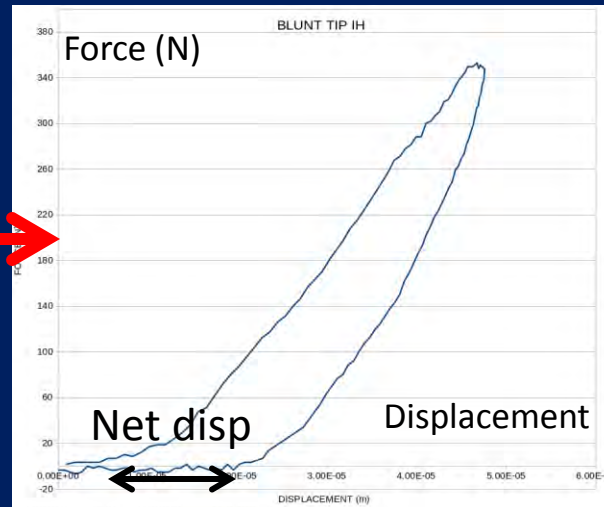
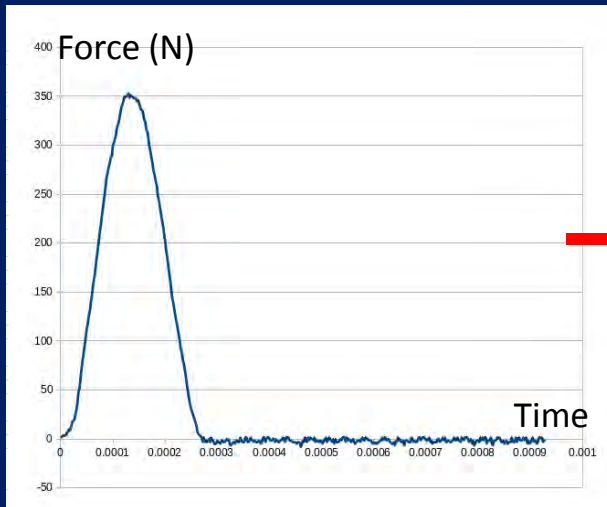
Impulse hammer in Boise sandstone

- Mechanical properties map at 1mm resolution
- **Blunt 50mm radius tip (~100% elastic response)**
- Sharper tip with 4 mm radius



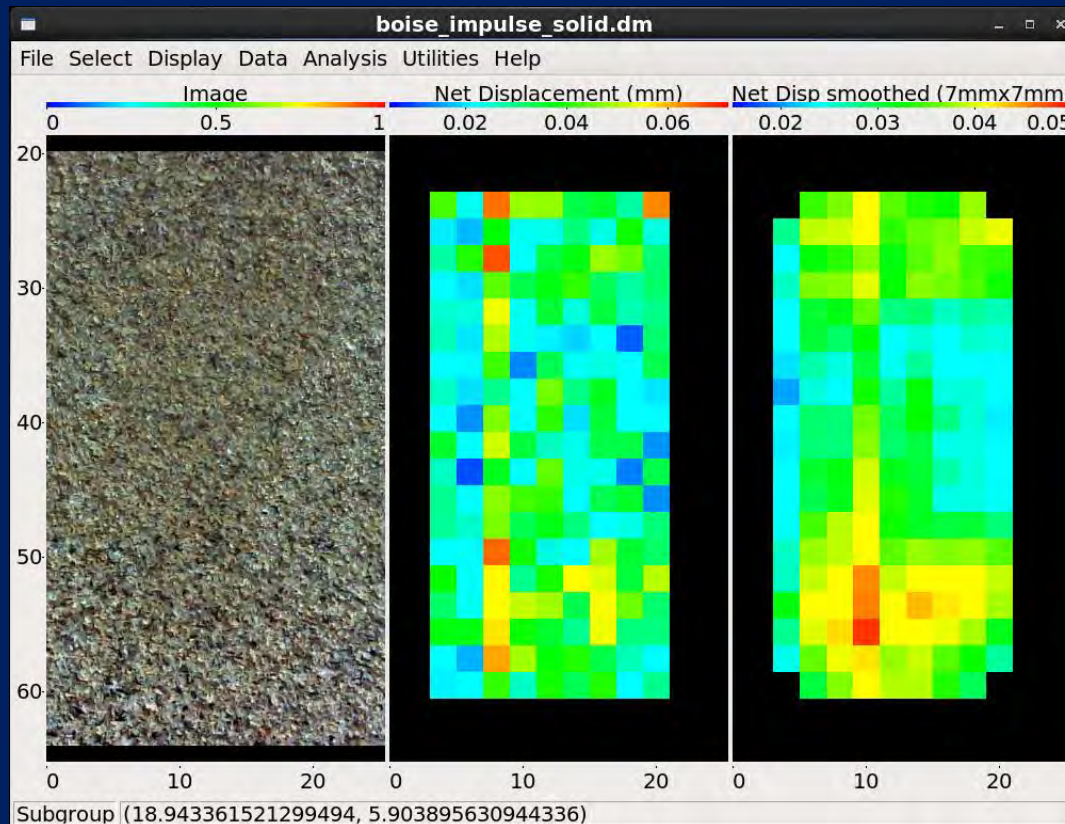
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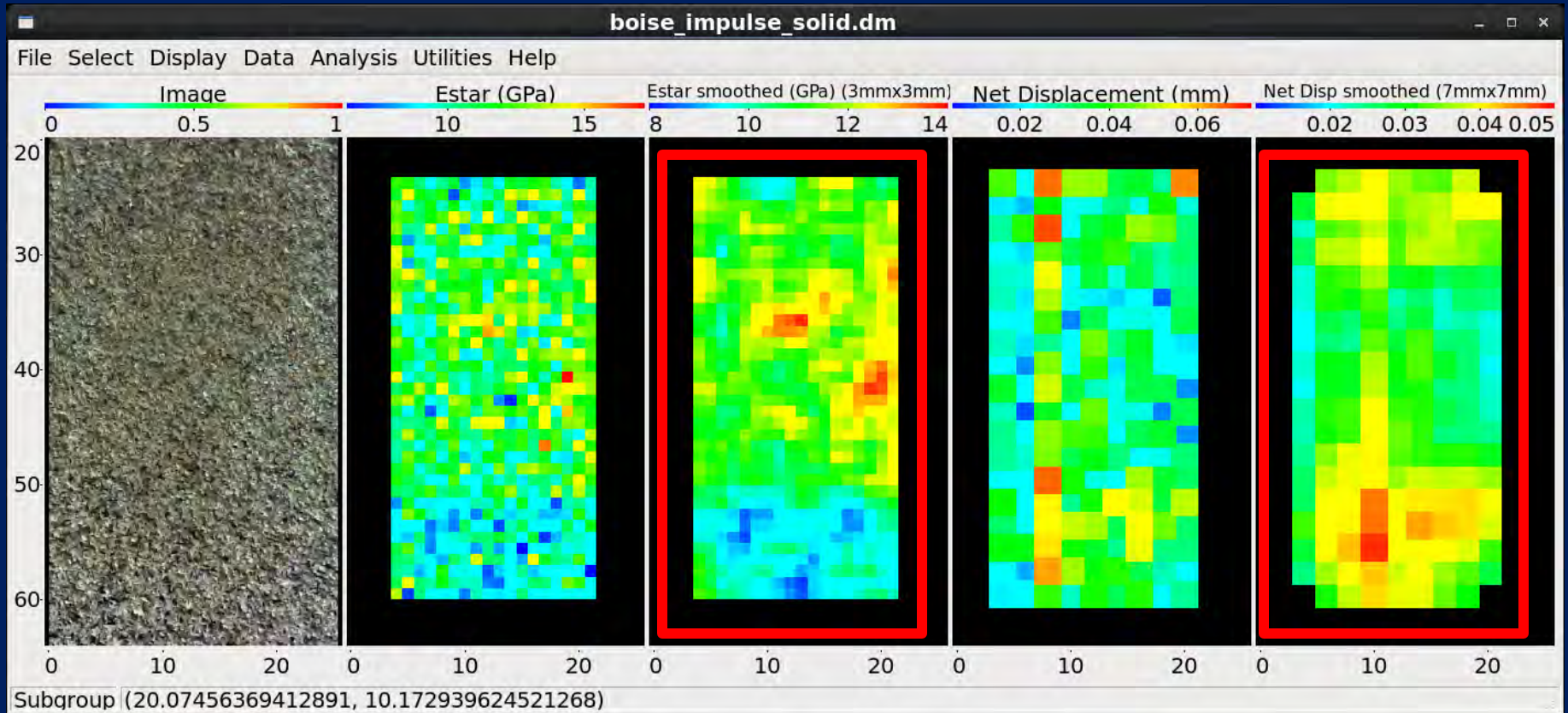


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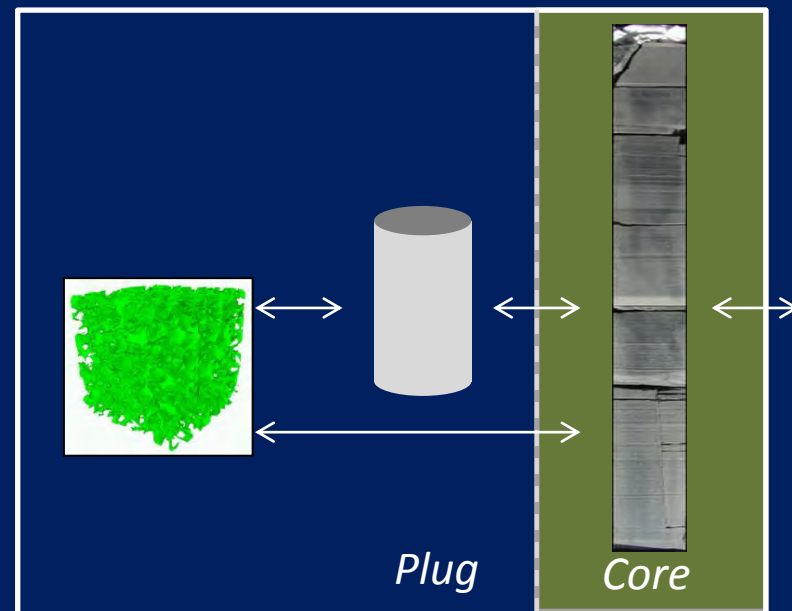
Impulse hammer in Boise sandstone



Summary

Petrophysical core scanning

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- Core to log integration
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- Rock typing
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