USDA Summer Intern Meeting: Opening Presentation

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In collaboration with: Dr. Korzeniowski, Dr. Tolbert, Dr. Galina, Dr. Kravetski (USDA-ARS)

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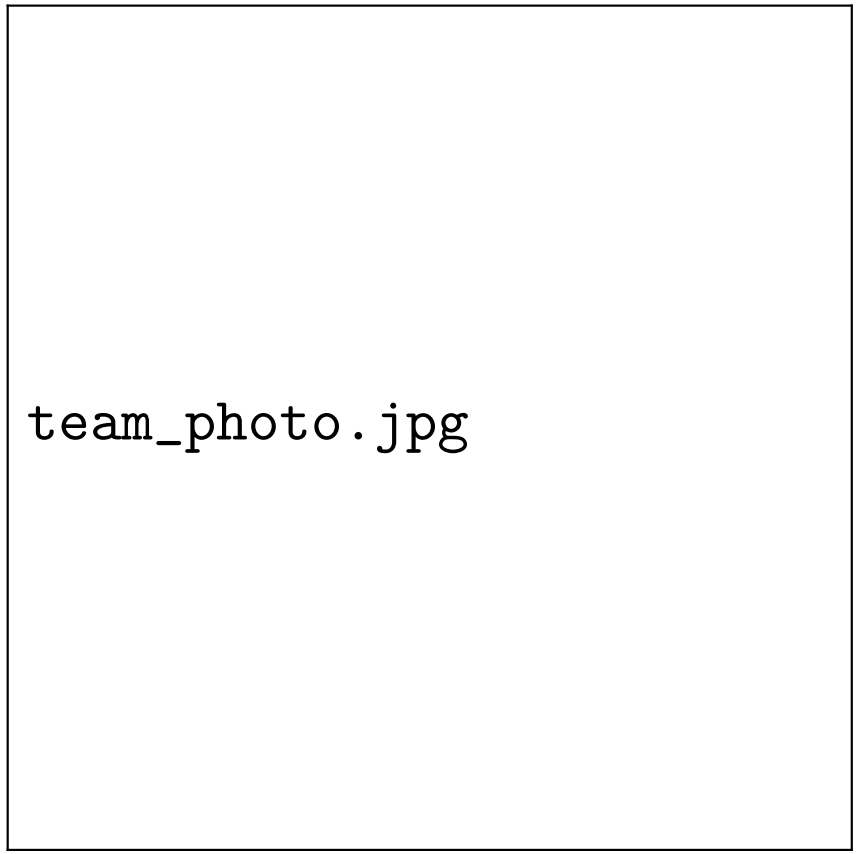
Outline

Outline

Meet the Team

- Dr. Korzeniowski (UTA)
- Dr. Tolbert (USDA-ARS)
- Dr. Galina (USDA-ARS)
- Dr. Kravetski (USDA-ARS)

We are working on the MINS project, using gamma spectroscopy to measure soil carbon content in the field.



The MINS Project

auburn_visit.jpg

This is the machine we're working on. This is me next to the machine during my visit to the lab in Auburn, Alabama. The machine is called **MINS** *(Mobile In Situ Spectroscopy).*

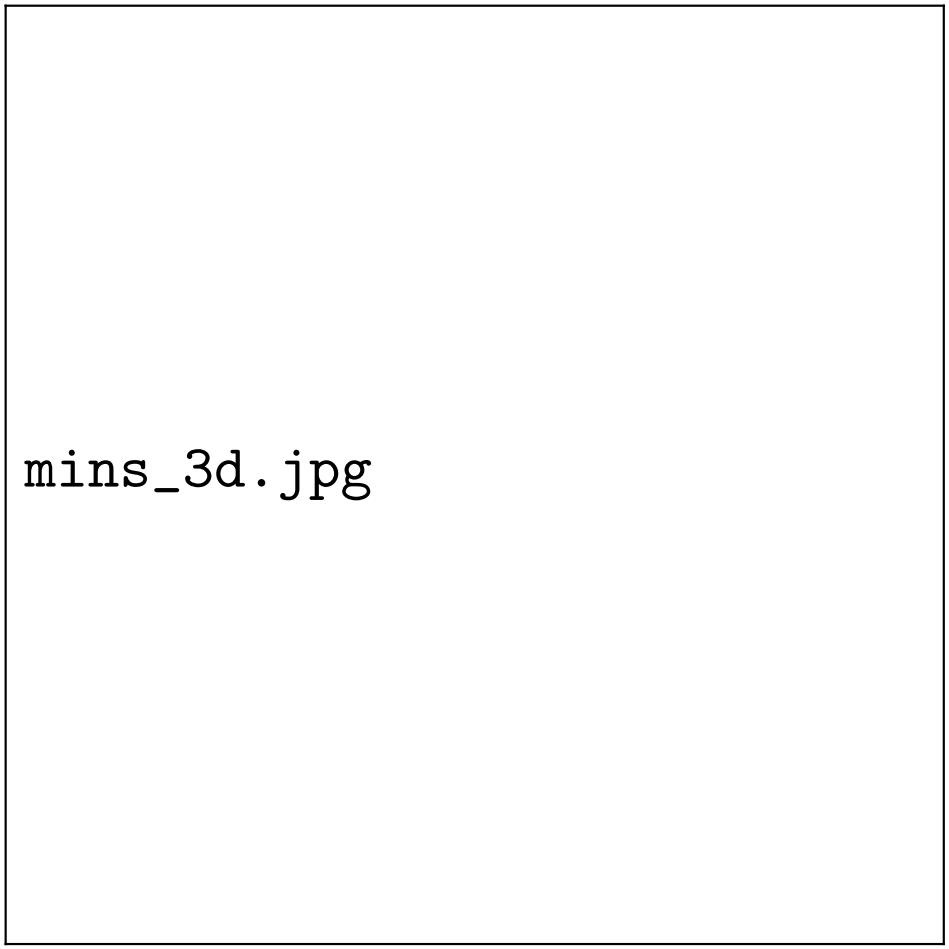
Outline

Project Development

- USDA develops and tests the physical MINS machine.
- **My role:** Mathematical and statistical support.
- Two main focus areas:
  - Simulation
  - Data Analysis

Outline

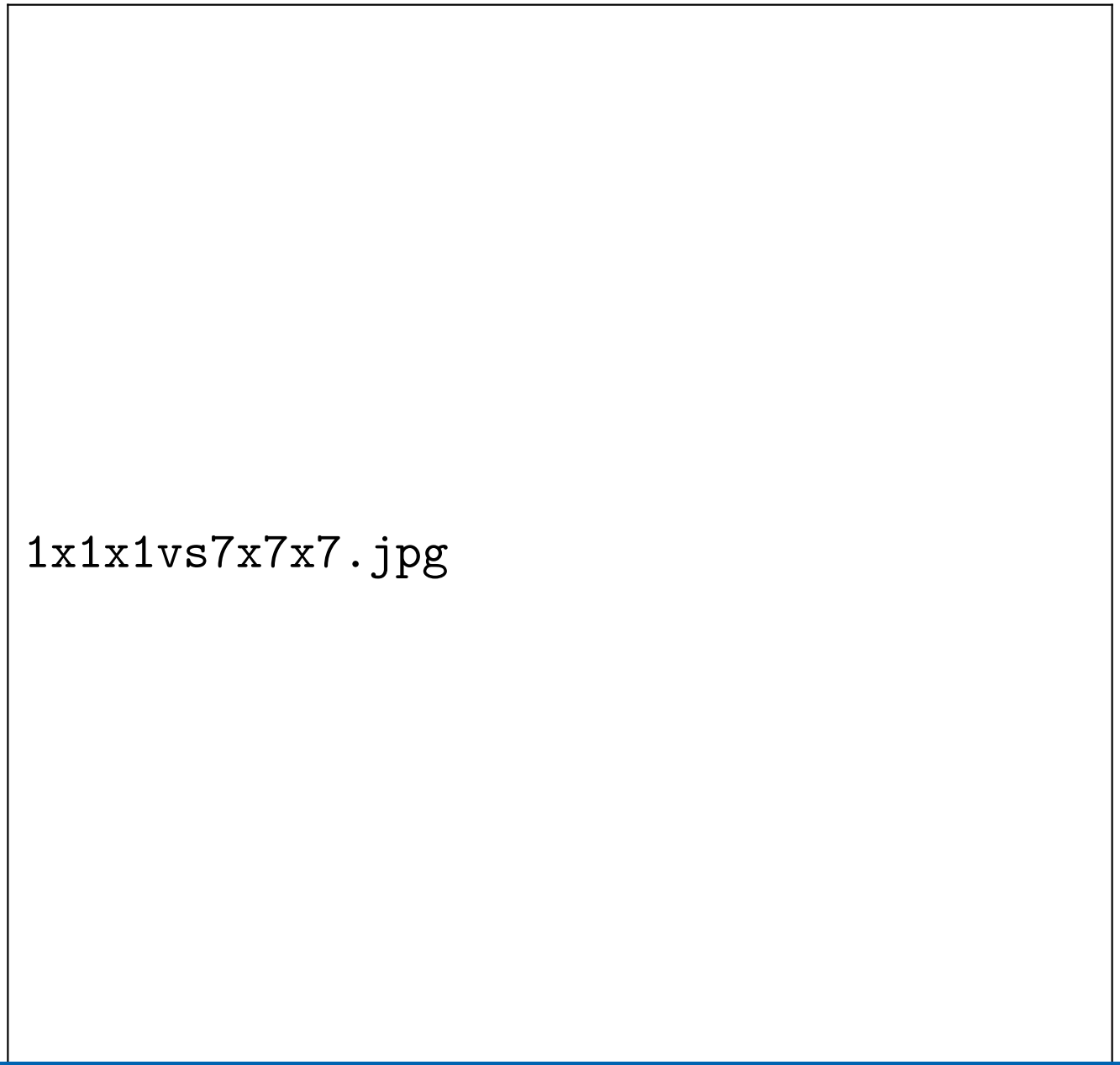
Simulation



- Simulate MINS using Monte Carlo particle methods (MCNP).
- Predict machine performance in various scenarios.

We use the national code MCNP to simulate the MINS results and predict the performance of the machine in different scenarios.

Recent Work in Simulation



Outline

Analysis

analysis_methods.jpg

Outline

Goals for This Summer

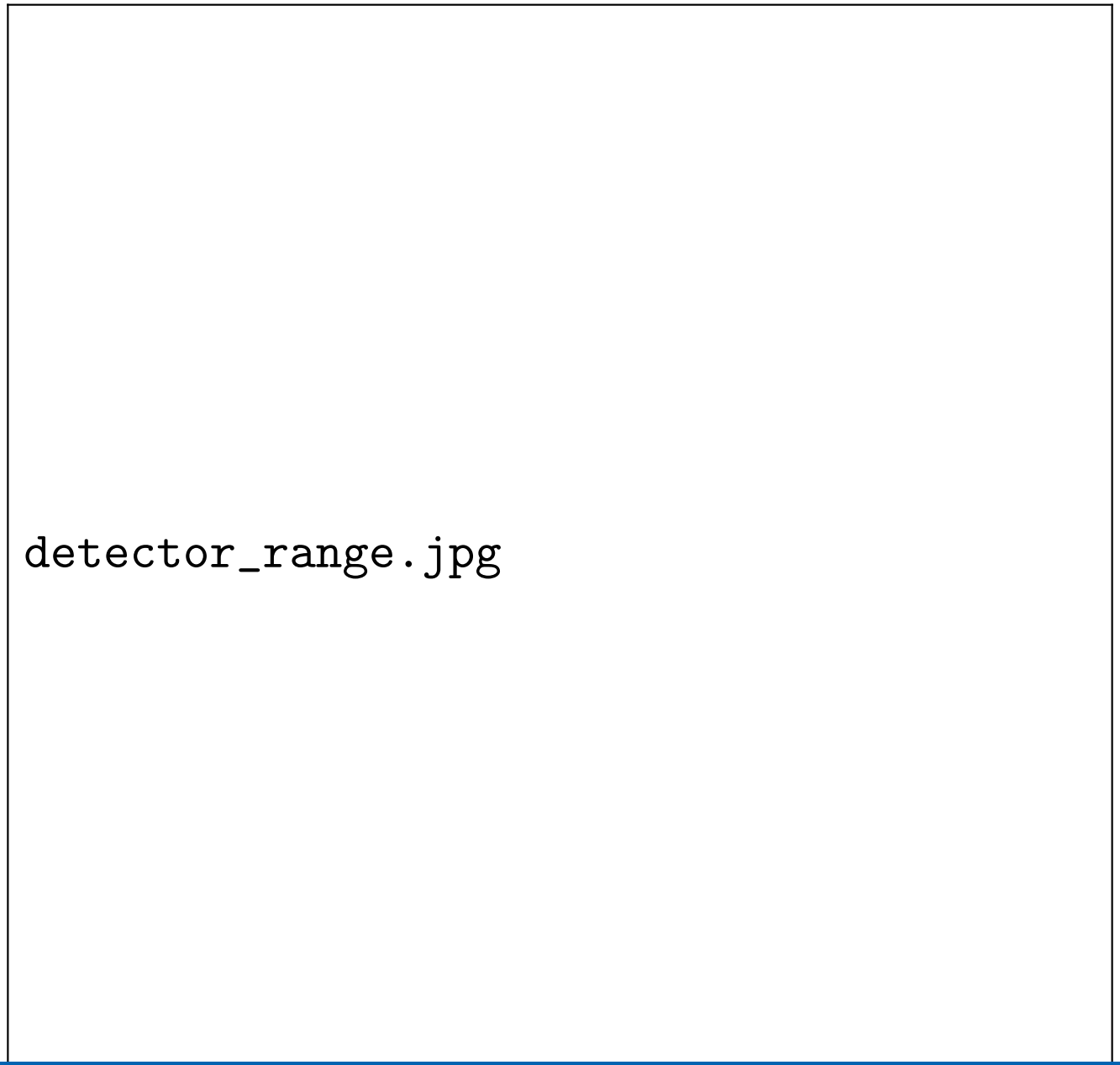
1. Develop and evaluate mathematical methods for new machine architecture.
2. Detection Range (Depth) study of the MINS machine.
3. Comparison of MINS and soil core measurements.
4. Mapping the results of the machine onto a field.
5. Estimation of the impact of the surface area sampled on field measurements.

Overall, these goals are about mathematically testing the capability of the machine.

Project Steps

1. Generate Pure Spectrums (Spectrum Generation)
2. Generate Effective Map (Associative Map)
3. Try Fast Spectrum Convolution (Spectrum Generation)
4. Compare Analysis Methods (Apply previous code to new data)
5. Variance Study
6. Depth Study
7. Core Harvesting Comparison (local)
8. Mapping Comparison
9. Field Coverage Study

First Steps Completed



Questions?

Any questions, comments, concerns?

Thank you!