



CPS: Medium: Collaborative Research: High resolution 3D soil mapping system

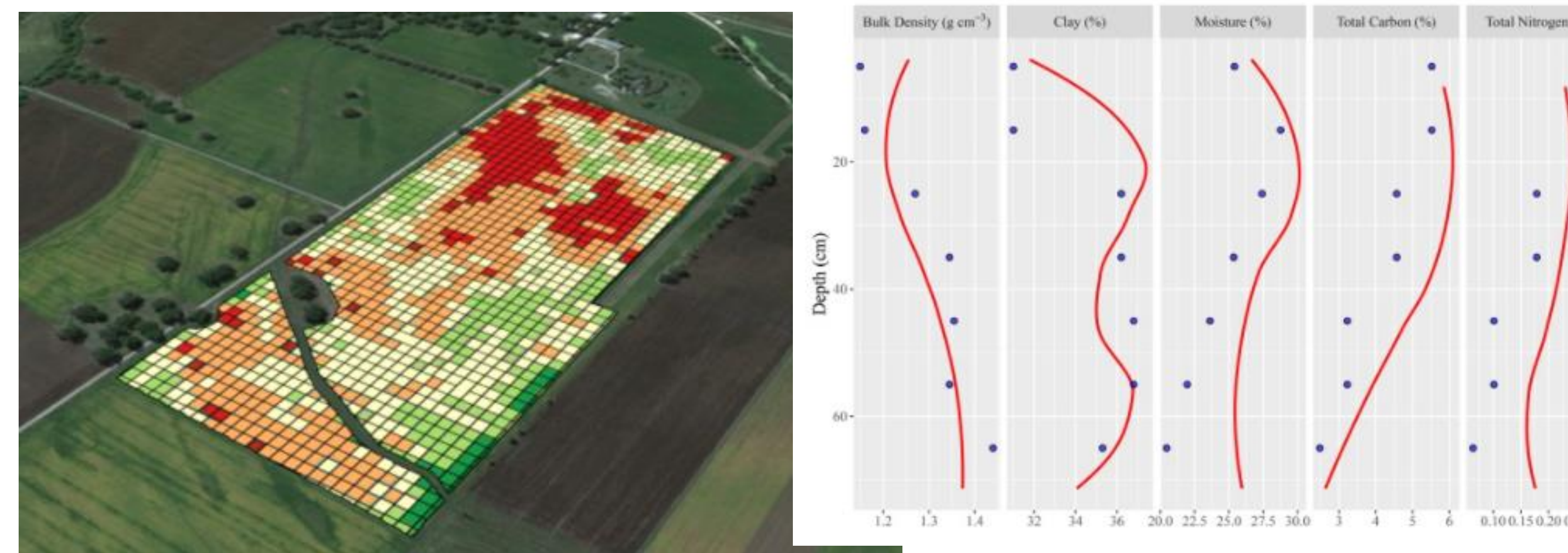
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Challenge:

- Soil plays critical roles in global food production, climate mitigation, and ecosystems service.
- Obtaining dense 3D soil data is extremely challenging, to support advanced technologies to enhance agricultural productivity.

Solution:

- UAV imaging and LiDAR to obtain surface soil data.
- Novel multi-sensing soil penetrometer to obtain deep layer soil data.
- Combined mechanistic and data-driven modeling to develop 3D soil maps.
- Interactive soil 3D mapping and visualization cyber system for advanced agricultural applications.



Scientific Impact:

- A new physical system combining UAV and penetrometer sensing to acquire soil data in 3D.
- Hybrid mechanistic and data-driven models to improve the accuracy of 3D soil maps.
- First-of-its-kind cyber system for 3D soil map visualization and supporting real-time ag applications.

Broader Impact:

- Improved understanding of soil as a 3D entity
- Enhance long-term agricultural productivity and soil ecosystems service
- Training of students in ag engr., computer engr., and statistics. Training of USDA-NRCS personnel.