Improving Soil Organic Carbon Mapping using Novel Scientific Machine Learning Methods

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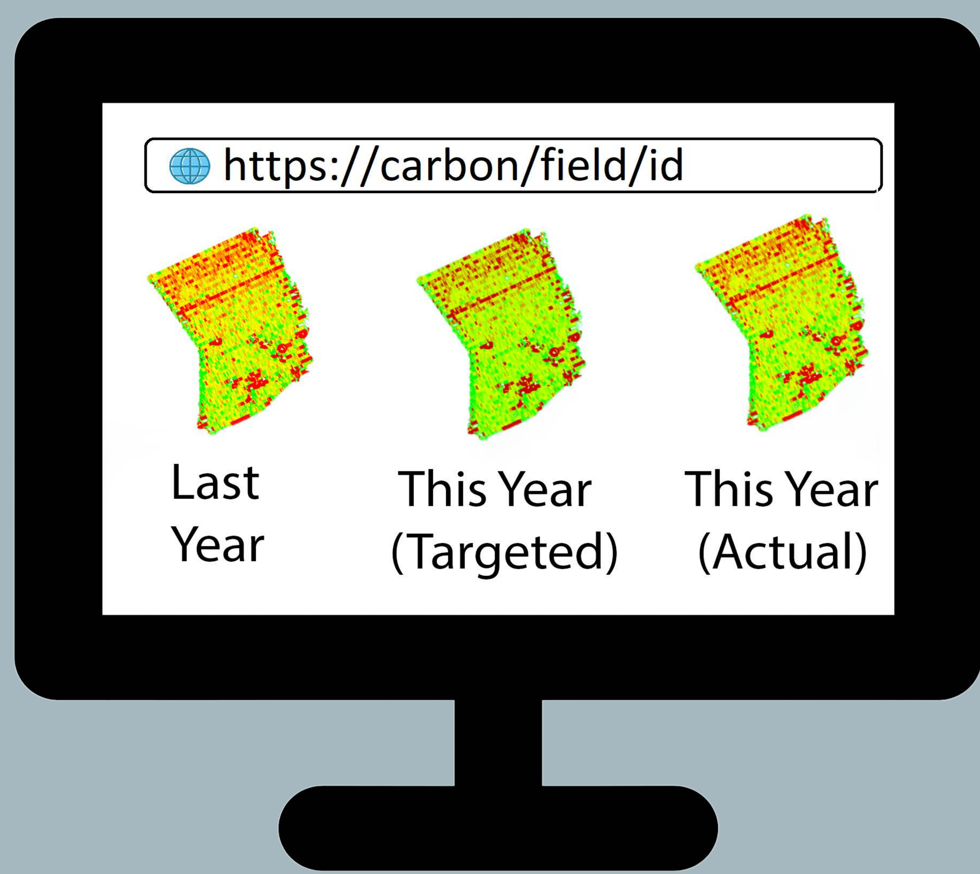
Research Context

- An accurate measurement of Soil Organic Carbon (SOC) is essential for farmers to qualify for incentives through participation in carbon trading schemes.
- Traditional methods of measuring SOC are both time-consuming and expensive.
- Current knowledge gaps:
  - Can we build a rapid and cost-effective data-driven method for SOC estimation?
  - Can we enhance the accuracy of the data-driven method by integrating Soil Science through 'Scientific Machine Learning'?

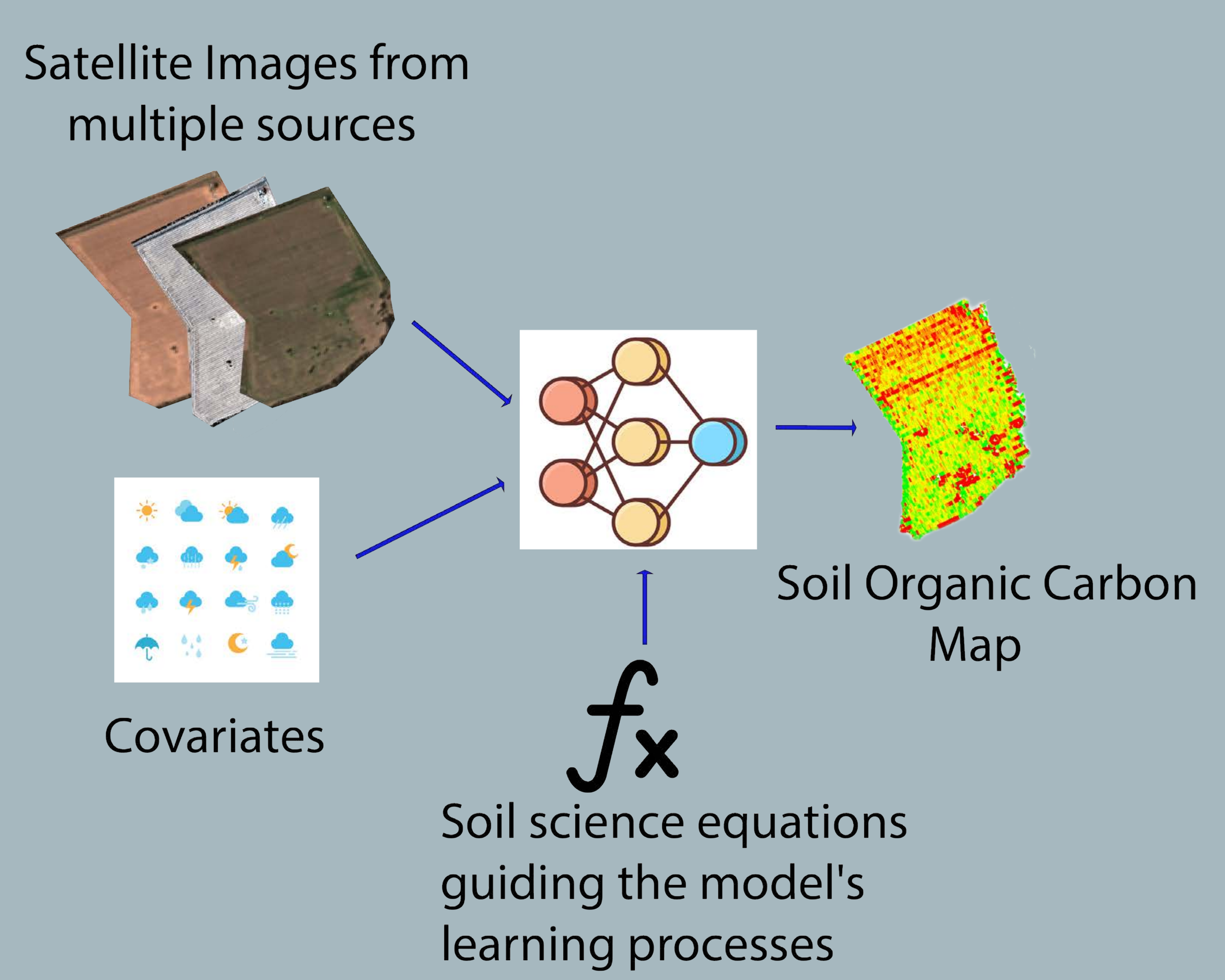
Objective & Significance

- Creating a rapid and cost-effective data-driven method for SOC mapping.
- The research will result in a centralised carbon monitoring system, thus eliminating the need for farmers' time and expenses.



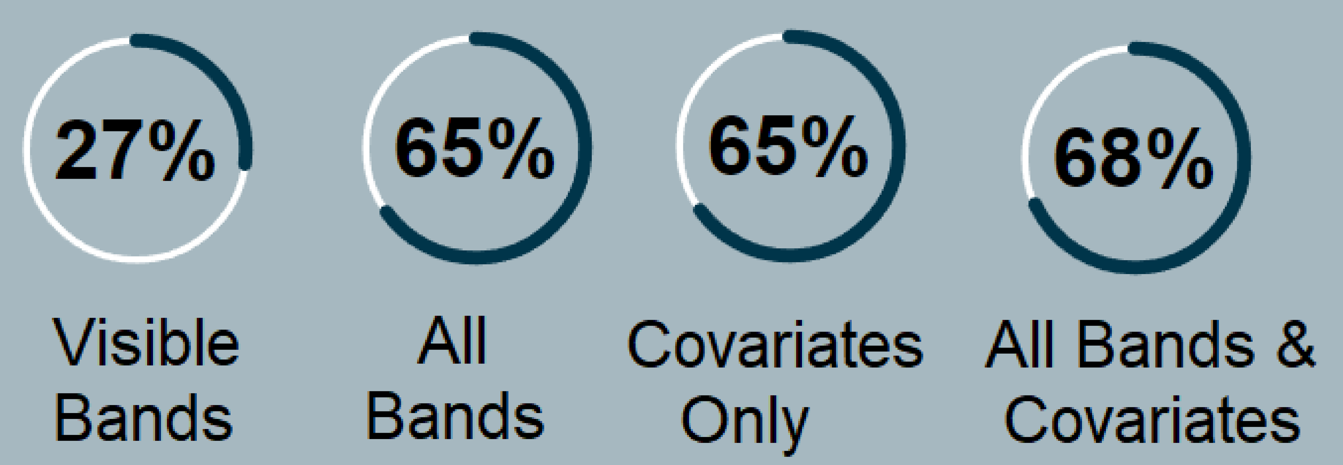
Methodology

- Input data: Multiple satellite images.
- Covariates: elevation, moisture, temperature.
- Model: Multi-layered neural network.



Results

- 27% - 68% prediction accuracy.



- Observation-1: 3% increased accuracy by incorporating satellite imagery.
- Observation-2: Visible spectrum-based sensors (i.e. smartphones) have a strong potential for rapid testing.

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