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## Introduction to Soil Carbon Mapping

Soil is an essential for carbon storage, and AI models can help map its presence.

Scotland's soil properties, including carbon content, vary widely from place to place and with depth from the top of the soil. Understanding where the soil carbon is allows land managers, policymakers and regulatory bodies to make better decisions about how to best protect soil, which is one of our most important natural assets.

At the James Hutton Institute, we have developed an AI-based approach to mapping soil carbon. This approach makes use of legacy soil survey data, linking it to a range of spatial datasets describing factors that influence soil properties. The AI modelling can produce estimates of soil carbon concentration at any depth within the soil profile, but it is also important for us to understand how accurate this model is.

The effectiveness of the model is influenced by the number of samples, where they were taken and how deep within the soil profile. This means that uncertainty is not always the same, with some soil carbon estimates being very confident and some being less so.

In the TAIM project, we have carried out soil sampling in the topsoil across several study areas, using this data to give us a better idea of how confident our AI model is from place to place. This will help us identify where to carry out more sampling in future, to reduce high levels of uncertainty where they occur.





Figure 1: Soil carbon stock map of Scotland