Climate – the Answers are in the Soil

by Dr. Michaela Bach

Soil is not only the basis for the production of food, it also plays an important role in climate protection. Carbon reservoir in soil is discussed in the report on greenhouse gas sources and sinks in the United Nations Framework Convention on Climate Change (UNFCCC). At the moment, Germany has no extensive, up-to-date data on carbon reservoirs in agriculture soils. To plug this gap in the country's knowledge, the Institute of Agricultural Climate Research at the Johann Heinrich von Thünen Institute (vTI) in Braunschweig is undertaking a research project to develop a German agricultural soil inventory over the coming years. A systematic and representative determination of the current carbon reservoirs in soils used for agricultural purposes is intended to provide consistent base data for the German National Emission Inventory Report.

Over the next few years, georeferenced data will be collected at more than 3,000 locations using GPS/GNSS and samples will be taken and stored for evaluation in an extensive geodatabase as part of the 'Agricultural soil inventory' project. Researchers will be creating a unique systematic data set, which should provide the answers to numerous questions in future years: How large are the carbon reservoirs in the agricultural soil of Germany? What influence

will climate change have on soil carbon reservoirs? How do climate, land use, and management affect soil carbon reservoirs? What influence does soil and its specific characteristics have on the carbon stored within it?

This and other questions relevant to research will be investigated on the basis of this extensive fieldwork project. Precise georeferencing is necessary to be able to analyze and evaluate the large amount of data in a meaningful way in the future. "Our task in the field is to achieve a 2D accuracy of 30 cm (11.8 in). Only then can we use the data efficiently for subsequent modeling and be sure that we can always find the locations used in the 'Agricultural soil inventory' again if we need to," explains Lars Konen, Fieldwork Manager.

We established a grid for the fieldwork to ensure the samples were random. Samples were taken in a complex spatial process every 8 x 8 km (5 x 5 mi) on agricultural land and the information was collected. The fieldwork team determined the precise position using a Leica Viva Uno and a Leica Viva CS10 controller. Through the use of an external antenna on the pole and the connection to a data correction service provided by ascos, the sampling points are selected and surveyed all over Germany. Soil scientist Lars Konen: "For the mapping teams in the field, it is important we use a simple-to-operate, robust, and reliable system that can be operated intuitively by all team members after a short training and induction phase." For this reason, the project management team decided in favor of this system and a cooperation with Leica Geosystems: "High failure safety, Germany-wide support, and extensive network coverage through the reference data service were important criteria. Moreover, it was essential to us that the device be modular and could therefore be modified for use in future research projects undertaken by the Johann Heinrich von Thünen Institute," says Lars Konen.

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vTI also uses sensors to measure global radiation.

About the Thünen Institute

How does increasing international competition affect agriculture, forestry, and trends in agricultural prices? What consequences does climate change have for agricultural, forestry, and marine ecosystems? Which technical innovations will allow raw materials to be used more efficiently? These questions give an insight into the broad range of topics being investigated by the Johann Heinrich von Thünen Institute.

The aim of the research is to develop concepts for a sustainable, ecologically compatible, and competitive agricultural and food industry; forest and timber industry; and sea-fish and aquaculture industry to contribute to the solution to specific problems of agricultural regions. The Thünen Institute is a department research establishment of the German Federal Ministry of Food, Agriculture and Consumer Protection.

More information at:
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