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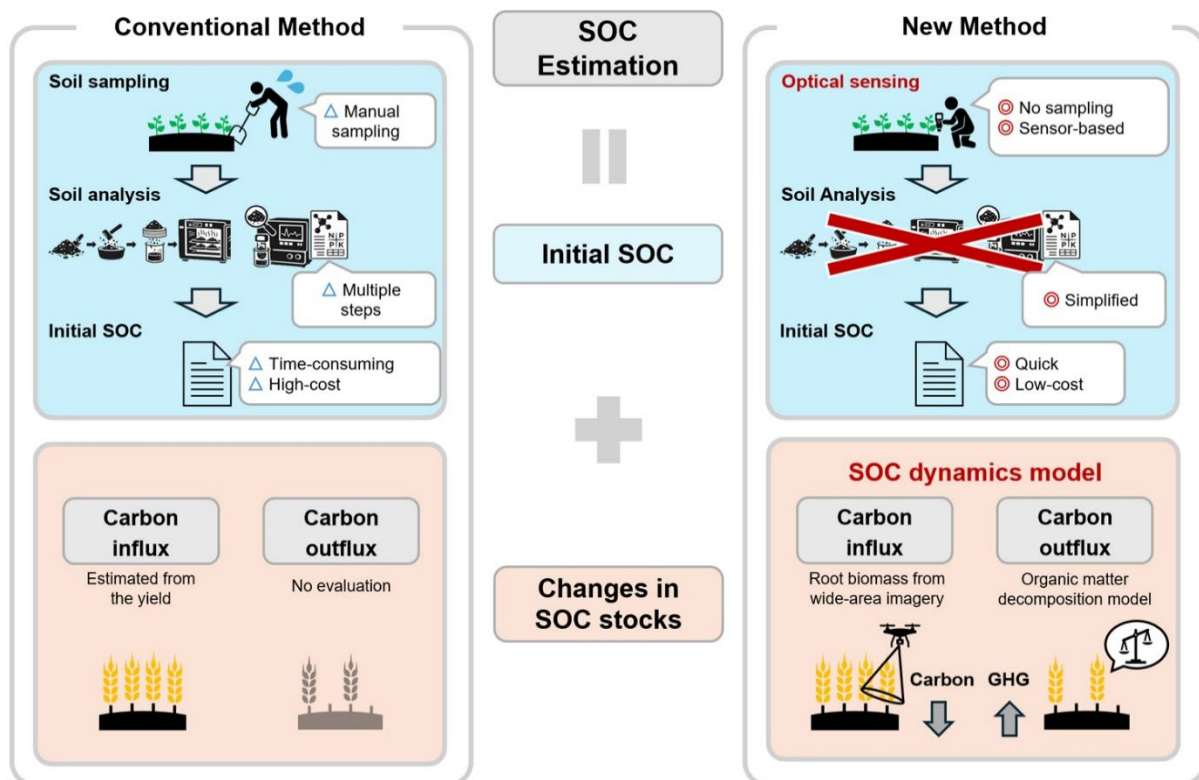
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## Mitsubishi Electric Technology Estimates Organic Carbon in Farmland Using Optical Measurements and Soil Organic Carbon Dynamics Models

*Accurate, labor-saving solution for improved productivity and reduced greenhouse gas emissions*



Comparison with conventional technology

**TOKYO, May 13, 2026** – [Mitsubishi Electric Corporation](https://www.mitsubishielectric.com) (TOKYO: 6503) announced today that it has developed a technology to accurately estimate the amount of soil organic carbon (SOC) in agricultural land by combining optical measurements with two SOC dynamic models: a root biomass model<sup>1</sup> and a microbially mediated organic matter decomposition model.<sup>2</sup> The new technology will enable the efficient, low-cost, large-scale monitoring of SOC by eliminating the need for soil sampling and laboratory chemical analyses. By

<sup>1</sup> A calculation method that predicts changes in SOC and nutrient levels by quantifying plant root biomass and growth dynamics.

<sup>2</sup> A model that predicts the rate of organic-matter decomposition by microbial activity and the associated carbon emissions.

supporting the evaluation of agriculture-derived carbon reductions within the GX-ETS,<sup>3</sup> which will be fully operational by the fiscal year ending March 2027, the technology will improve agricultural productivity and reduce greenhouse-gas emissions.

With the acceleration of Green Transformation (GX) policies and corporate and municipal emission-reduction plans along with the Japanese government's efforts to achieve its 2050 carbon-neutral goal, agricultural soil is increasingly recognized as a promising way to store carbon. Benefits include reduced greenhouse gas emissions, improved soil-water retention and increased soil fertility for improved crop production. However, SOC is strongly influenced by biological and chemical processes, specifically microbial decomposition and root growth, and since these processes are difficult to observe directly, extensive soil sampling and laboratory analysis have traditionally been required.

Mitsubishi Electric's new technology reproduces SOC dynamics by inputting aerial remote-sensing data and ground-based optical measurements into simulation models representing crop root growth and soil metabolic processes. In a demonstration in Toyotomi-cho, Hokkaido, Japan, the company confirmed that the technology can evaluate SOC across wide areas at low cost and substantially improves accuracy compared to conventional methods. The technology supports the preparation of various reports by providing data that can serve as objective evidence for third-party verification in monitoring, reporting and verification (MRV) required under the GX-ETS. Going forward, Mitsubishi Electric will conduct more demonstrations on different types of agricultural land in Japan and abroad, aiming to contribute to increased agricultural productivity, reduced greenhouse-gas emissions and a more carbon-neutral world.

### **Features of Technology**

#### ***1) Ground-based optical sensing reduces labor and costs for initial SOC evaluations***

- Mitsubishi Electric has developed rapid, low-cost methods for initial SOC<sup>4</sup> measurements, which use ground-based spectroscopic (optical) measurements<sup>5</sup> at designated points within agricultural fields, eliminating the need for soil sampling and laboratory analysis.

#### ***2) SOC dynamics models integrate root biomass and organic matter decomposition models to estimate changes in SOC stocks with superior precision***

- Mitsubishi Electric has developed a root biomass model that uses aerial data, such as vegetation indices and soil moisture, to estimate root volume. The model calculates how much carbon is stored in the roots through photosynthesis. Additionally, by mapping uneven root distribution, it can pinpoint growth variations across agricultural land to optimize crop management.
- Mitsubishi Electric constructed an organic-matter decomposition model integrated with soil environmental datasets (e.g., meteorological conditions, soil temperature, and moisture) to simulate the microbial decomposition of organic matter and subsequent CO<sub>2</sub> emissions.

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<sup>3</sup> A greenhouse gas emissions trading scheme in Japan, scheme in which companies set greenhouse gas emissions reduction targets and, through actual emission reductions as well as trading emission allowances and credits, aim to achieve both carbon neutrality and economic growth.

<sup>4</sup> The amount of carbon stored in the soil at the time a project or observation begins.

<sup>5</sup> A technology for estimating the physicochemical properties of soil from the reflected light intensity in the visible to near-infrared range.

- SOC dynamics models that integrate the root biomass model (influx) and the organic matter decomposition model (outflux) enable high-precision estimation of net changes in SOC stocks. Furthermore, Mitsubishi Electric improved the overall accuracy of the SOC dynamics models and enabled rapid, low-cost, large-area monitoring by using ground-based spectroscopic measurements to calibrate the predictions of aerial remote-sensing data analysis.

### 3) ***Reliable MRV process supports reporting and farm management***

- In view of the MRV requirements under the GX-ETS, which will be fully operational by the fiscal year ending in March 2027, this technology provides objective evidence for third-party verification and supports the preparation of various reports, including supply chain emissions reports.
- This technology quantifies the effects of agricultural land management practices, such as no-till farming and compost application, on organic matter decomposition and root formation. Consequently, it provides guidance for effective, decarbonized agriculture, accelerates implementation, and improves productivity.

### **Future Development**

Demonstrations have been ongoing in Toyotomi-cho, Hokkaido since September 2024, and measurements and evaluations are scheduled for completion by March 2027. Mitsubishi Electric is building on this technology to develop more accurate measurement techniques for the launch of SOC monitoring services. The company plans to apply this model to various soils and vegetation in Japan and overseas in the future to maximize the value of natural capital. By providing highly reliable carbon data, Mitsubishi Electric also aims to contribute to a more carbon-neutral world.

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### **About Mitsubishi Electric Corporation**

Guided by its [corporate philosophy](#), Mitsubishi Electric Corporation (TOKYO: 6503) places sustainability at the core of its operations and values stakeholder trust—encompassing society, customers, shareholders and employees. In pursuing profitability, capital efficiency and growth, Mitsubishi Electric works closely alongside customers to develop value-added solutions that address today’s complex challenges while enhancing the company’s sustainable corporate value.

Founded in 1921, Mitsubishi Electric has over a century of experience in delivering reliable, high-quality products and solutions. With over 200 group companies and approximately 150,000 employees worldwide, the company is a recognized global leader in manufacturing, marketing and selling electrical and electronic equipment and systems across a broad range of sectors, including public utility systems, energy systems, defense and space systems, factory automation systems, automotive equipment, building systems, air conditioning systems & home products, digital innovations, and semiconductor & devices.

Mitsubishi Electric recorded consolidated revenue of 5,894.7 billion yen (U.S.\$ 36.8 billion\*) in the fiscal year that ended on March 31, 2026. For more information, please visit [www.MitsubishiElectric.com](http://www.MitsubishiElectric.com)

\*JPY 160=USD 1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2026