

Nationwide forest soil carbon survey in Japan and applications of soil information

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Abstract

Forest soils store more carbon than trees do and are expected to contribute to carbon neutrality¹⁾. Despite the importance of soils for carbon sequestration, soil carbon is more difficult to be assessed accurately than tree biomass carbon, and measured data are limited. For these reasons, we have been conducting a project with the Japan Forest Agency since 2006 to continuously survey three underground carbon pools, soil, litter and dead wood at approximately 2,500 sites across Japan every 5–10 years. Over the 18 years since the start of the project, researchers in the *Department of Forest Soils, FFPRI* have continuously worked to establish survey procedures, build the capacity of surveyors, manage the quality of data, and analyze the data. On the approximately 2,500 sites (1,000m² circular area each) where the aboveground biomass is already taken, we collect soil samples from four soil pits (0-30 cm) and four litter standing crops (50 x 50 cm)²⁾. We also measure dead woods located across the two lines in the circular area, and stumps and standing dead wood from the belt transect area, located 1m away from the lines.

The data obtained from the project were used as initial value of, and to verify the CENTURY-jfos model that calculates GHG sequestration on forest soils, or emissions from forest soils in Japan's annual national inventory report (NIR) for the United Nations Framework Convention on Climate Change (UNFCCC). In addition, using the dataset and the latest artificial intelligence (AI) technologies, we developed a nationwide soil carbon stock map, which has 10-meter spatial resolution³⁾. We opened the "Forest Soil Digital Map" system to public, which allows users to browse Japan's forest-soil carbon stock maps and related soil/topographic information on the web. These maps are widely used for forest management, disaster prevention planning, and other purposes.

References/ Publications

- 1) Houghton R.A. (2007) *Annu. Rev. Earth Planet. Sci.* 35:313-347
- 2) Ugawa S. et al. (2012) *Bulletin of FFPRI* 425: 207-221
- 3) Yamashita N. et al. (2022) *Geoderma* 406: 115534

Access to relevant information

Forest Soil Carbon Inventory <https://www.ffpri.affrc.go.jp/labs/fsinvent/> (Japanese Language)

Forest Soil Digital Map <https://www2.ffpri.go.jp/soilmap/> (Japanese Language)