Soil Carbon Management for Climate Change Mitigation and Sustainable Development in Japan

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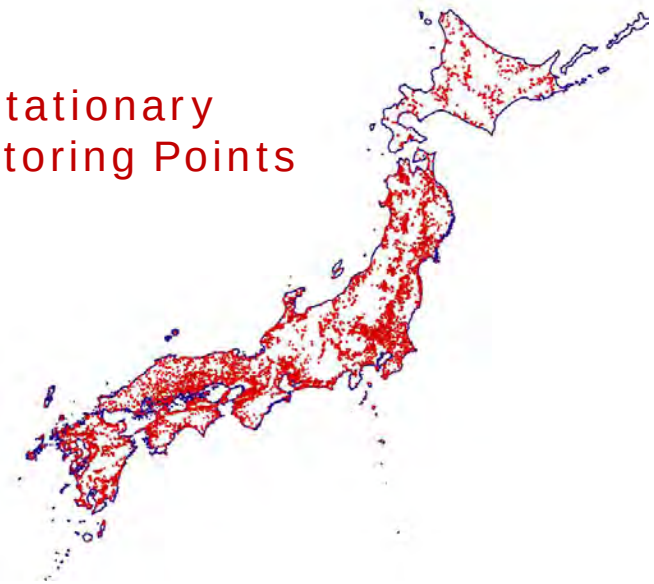
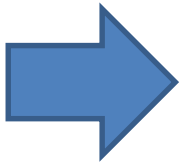
Monitoring, Mapping and Estimation

(1) Long-term monitoring of agricultural soil

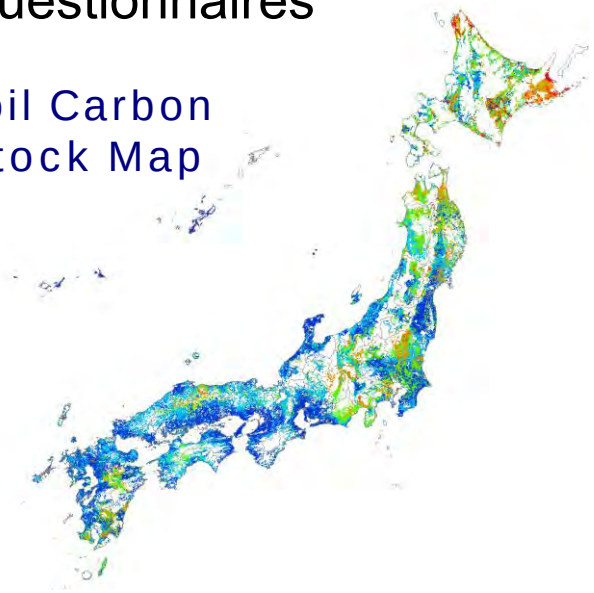
- A national program since 1979
- Sampling at about 4000 - 20,000 sites
- Physico-chemical properties
- Soil management record by questionnaires

Stationary Monitoring Points





Soil Carbon Stock Map



(2) Calculation models for soil organic C and GHG emission

- Change of soil carbon stock in cropland: Modified RothC Model
- Methane emissions from rice cultivation: DNDC-Rice Model
- Application of IPPC Tier 3 approach to Japanese National GHG Inventory Report from 2015

Future Projection of Agricultural Soil GHG Emissions

Scenario	C input	Paddy water management	N fertilizer	Mitigation potential vs. BAU (kt CO_2-eq./yr : minus: mitigation)				
				CO_2 (Soil C)	CH_4	N_2O	CO_2 (Fossil fuel)	Total emissions
Business as Usual	conventional	conventional	conventional	939	18,052	3,857	15,699	38,547
Mitigation1	+10%	conventional	conventional	-903	+1,637	+471		+1,205
Mitigation2	+10%	Extend MSD*	conventional	-903	-1,316	+471		-1,748
Mitigation3	+10%	Extend MSD*	-10%	-903	-1,316	+234		-1,985

*MSD: Mid-season drainage

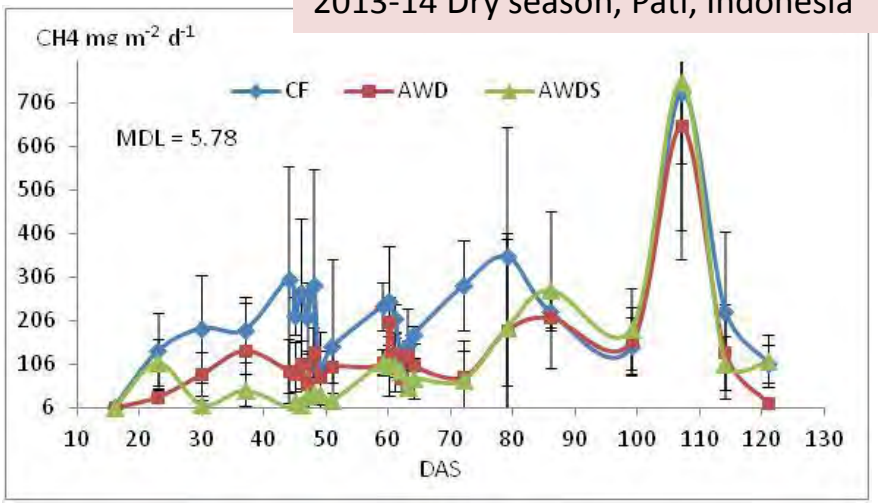
Average of 2014-2050 (per year)
Average of two climate change scenarios

- Results suggest that increasing soil C can decease CO_2 emissions.
- However, it will increase CH_4 emissions from rice cultivation and N_2O emissions from fertilizer application.
- Therefore, it is necessary to combine mitigation options for CH_4 and N_2O to those for soil CO_2 in Japanese agriculture.
- Similar stories are expected in other Asian countries where intensive rice cultivation and nitrogen fertilization are conducted.

MIRSA Project

(Greenhouse Gas Mitigation in Irrigated Rice Paddies in Southeast Asia)

2013-14 Dry season, Pati, Indonesia



- Research project funded by MAFF, Japan, from 2013 to 2018
- Aiming at assessing the feasibility of GHG mitigation through water saving techniques (AWD*) in irrigated rice fields
- Results show effectiveness of AWD to reduce CH_4+N_2O emissions