

# Understanding soil reserves the future of our planet



## Lab. Soil Science

Professor: Funakawa, S., Assistant Prof.: Shinjo, H., Watanabe, T.

“Global climate change”, “desertification”, “deforestation” and “acid rain”, which are some of the well-known environmental problems, are all related tightly with soil as the basis of the environment. By elucidating the behavior of the soil, we are studying how we should perform our duties on the earth.

## For sustainable land use in the tropics and the arid land

Overexploitation of the soils for increasing food production is a serious concern in the developing countries. We are conducting field surveys and analyzing the mechanisms of soil degradation processes, such as erosion and salinization, in Sub-Sahara Africa and Central and Southeast Asia to develop the agricultural technology that can realize both environmental conservation and sufficient food supply.



Fertile surface soils can be easily lost by our mismanagement.  
Left: Wind erosion in Niger, West Africa  
Right : Water erosion in Kazakhstan, Central Asia

## Functions of organic matter in soils



Field measurement on soil organic matter dynamics (left) and laboratory incubation experiment (right) are combined.

Soil organic matter derived from the dead tissues plays a crucial role in the hold-and-release of plant nutrients and also in carbon sequestration. We are combining the worldwide *in-situ* measurement of soil organic matter dynamics with the detailed laboratory experiments to evaluate the functions of soil organic matter.

## Functions of minerals in soils

Soil minerals derived from rocks and volcanic ash also have vital functions for the hold-and-release of plant nutrients. We are examining the conditions for the mineral formation, nutrient release mechanism from minerals and the behavior of minerals in pollutant adsorption.



Soil samples are being collected around the world. Photos show soil profiles. From left; Ukraine, Tanzania, Northern Kyoto, Eastern Hokkaido.

## Keywords

*Desertification, Global climate change, Carbon and nutrient cycling, Sustainable land use, Soil erosion, Soil organic matter, Sub-Saharan Africa, Humid tropics, Arid land*

## Recent Publications

**Effect of land management on CO<sub>2</sub> flux and soil C stock in two Tanzanian croplands with contrasting soil texture** Sugihara S, Funakawa S, Kikasara M, and Kosaki T (2012) *Soil Biology and Biochemistry*, 46, 1–9

**Effect of land management on soil microbial N supply to crop N uptake in a dry tropical cropland in Tanzania** Sugihara S, Funakawa S, Kilasara M, and Kosaki T (2012) *Agriculture, Ecosystems and Environment*, 146, 209–219

**Fluxes of dissolved organic carbon and nitrogen throughout Andisol, Spodosol and Inceptisol profiles under forest in Japan** Fujii K, Funakawa S, Shinjo H, Hayakawa C, Mori K, and Kosaki T (2011) *Soil Science and Plant Nutrition*, 57, 855–866

**Biodegradation kinetics of monosaccharides and their contribution to basal respiration in tropical forest soils** Hayakawa C, Fujii K, Funakawa S, and Kosaki T. (2011) *Soil Science and Plant Nutrition*, 57, 663–673

**“Fallow Band System,” a land management practice for controlling desertification and improving crop production in the Sahel, West Africa. 1. Effectiveness in desertification control and soil fertility improvement** Ikazaki K, Shinjo H, Tanaka U, Tobita S, Funakawa S, and Kosaki T (2011) *Soil Science and Plant Nutrition*, 57, 573–586

**Field-scale aeolian sediment transport in the Sahel, West Africa** Ikazaki K, Shinjo H, Tanaka U, Tobita S, Funakawa S, and Kosaki T (2011) *Soil Science Society of America Journal*, 75, 1885–1897

**Aeolian Materials Sampler for measuring surface flux of soil nitrogen and carbon during wind erosion events in the Sahel, West Africa** Ikazaki K, Shinjo H, Tanaka U, Tobita S, Funakawa, S, and Kosaki T (2011) *Trans. ASABE (American Society of Agricultural and Biological Engineers)*, 54, 983–990

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