International Session (Oral) | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-GE Geological & Soil Environment

[A-GE03_30AM2]Subsurface Mass Transport and Environmental Assessment

Convener:*Yasushi Mori(Graduate School of Environmental and Life Science, Okayama University), Hirotaka Saito(Department of Ecoregion Science, Tokyo University of Agriculture and Technology), Ken Kawamoto(Graduate School of Science and Engineering, Saitama University), Shoichiro Hamamoto(Department of Biological and Environmental Engineering, The University of Tokyo), Ming Zhang(Institute for Geo-Resources and Environment, National Institute of Advanced Industrial Science and Technology), Chair:Yasushi Mori(Graduate School of Environmental and Life Science, Okayama University), Ming Zhang(Institute for Geo-Resources and Environment, National Institute of Advanced Industrial Science and Technology)

Wed. Apr 30, 2014 11:00 AM - 12:44 PM 213 (2F)

This session covers the topics on mass transport, waterand energy cycles in geoenvironment. Subjects related to laboratoryand field measurements, theoretical analysis, and numerical modelingwill be discussed. Presentations on geo-pollution, remediation,geological disposal of hazardous wastes, ground source heatutilization, mass transport in vadose zone, soil-water monitoring, andenvironmental assessment are encouraged.

12:20 PM - 12:35 PM

[AGE03-P03_PG]Characterization of water repellency parameters in soil water repellency characteristic curves for JP and NZ soils

3-min talk in an oral session

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Keywords:soil water repellency characteristic curve, water repellency parameters, soil organic carbon

Soil water repellency (SWR) is the phenomenon where soil does not wet when water is applied to its surface. Characterization of water repellency in natural soil is very important to understand the soil hydrological processes, surface flow and infiltration rates. Objectives of this study were (i) to characterize SWR using molarity of ethanol droplet (MED) test, sessile drop method (SDM) and water drop penetration time (WDPT) test, and (ii) to identify the relationships between the determined SWR parameters and soil organic carbon (SOC) contents. Soil samples were collected from different soil depths of representative Andosols and Cambisols in Japan (Nishigo, Hiruzen and Nikko; all sites under forest) and New Zealand (Ngahinapouri, Wahihora and Whatawhata; all sites under pasture). The soil-water contact angle was directly measured using SDM, and indirectly derived from MED and WDPT measurements. All the A horizons of the Japanese soils showed water repellency, and the New Zealand soils were also water repellent at all depths except the Ngahinapouri, B horizon. Then, soil water repellency characteristic curves (SWRCCs) were obtained for water repellent (WR) soils, i.e., soil-water contact angle / degree of WR as a function of the volumetric water content (θ). Three WR parameters were determined from the SWRCCs. They are (i) the integrated areas below a SWRCC, $S_{WR(\theta)}$, (ii) the soil

water content at maximum ($\theta_{WR\text{-}Max}$) and (iii) minimum ($\theta_{WR\text{-}Min}$) WR. Further, WR parameters were studied with soil organic carbon (SOC) contents. These relationships were agreed well with recently published work of Kawamoto *et al*. (2007) and Karunarathna *et al*. (2010). The SOC contents of New Zealand soils varied between 1.4% (WR) to 12.1% (WR), for the Japanese soils they ranged between 2.6% (Non-WR) and 26.3% (WR). Although the Japanese soils had high SOC contents in >10 cm depths, they were not WR (for Nikko >5 cm depth-Not WR). Therefore, further studies are needed to assess SWR as affected by SOC.