AGE04-P20　　　　　　　　:　　　　　　　　　　　:5　20　18:15-19:30

Modified TR model for soil water repellency characteristics curves for volcanic ash soils in Japan and New Zealand

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Water repellency (WR) of soil can induce significant hydrological problems such as reduced water infiltration, enhanced surface runoff and erosion and the forming of preferential flow patterns in soils. Although WR has been reported in many countries including Japan and New Zealand, WR characteristics and its dependence of soil water content and soil organic carbon content (SOC) for volcanic ash soils are net fully understood. In this study, soil water repellency characteristics curves (SWRCCs; degree of WR as a function of soil water content or soil water potential) for volcanic ash soils with different SOC taken from several locations in Japan and New Zealand were determined by using various WR tests. WR parameters in the SWRCCs were correlated to either SOC per unit weight (kg kg-1) or SOC per unit specific surface area (kg m-2). Besides, a predictive model for SWCCs, Two-Regional Water Repellency (TRWR) model (Karunarathne et al., Vadose Zone J., 2010), was modified based on the newly obtained correlations between model parameters and SOC per unit specific surface area. The modified TRWR model performed better than the original model and well predicted the measured SWRCCs for volcanic ash soils.

Keywords: water repellency, volcanic ash soil, Two region model