

Mobilization and Leaching of Colloidal Particles in Repacked Okinawa Red-Yellow Soil Columns

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The soil and groundwater contaminations of harmful chemicals facilitated by soil colloids, which diameter is typically less than 1 micrometer, have been identified as one of the emerging soil physicochemical processes in the soil-water system.

However, mobilization and leaching of natural soil colloids has not yet fully understood since colloids transport has been usually examined in ideal porous media such as sand and glass beads columns in the previous researches.

In this study, we first measured charge characteristics and colloid stability of water dispersible colloids (WDC) extracted from Okinawa red-yellow soil, which is known as a cause of ocean pollution. Next, we investigated characteristics of natural colloid (NC) leaching (including mobilization and transport) from repacked soil columns. As well as NC, simultaneous transport of applied WDC was also examined.

The soil columns (i.d. 5 cm, length 10 cm) were initially saturated with artificial rainwater (0.085 mM NaCl + 0.015 mM CaCl₂ solution; ARW) from the bottom, and were kept for 24 hours. Then, the ARW or WDC were applied from the column top at different constant flow rates using a peristaltic pump. Colloid concentration, colloid particle size distribution, pH, and EC in effluent solutions were measured after passing 1 micrometer filter. In addition, to reveal the differences in mobilization and transport properties of NC and WDC, HYDRUS-1D code was used for estimating transport/deposition parameters.