Geophysical Research Abstracts
Vol. 15, EGU2013-2996, 2013
EGU General Assembly 2013

The effect of soil properties on the attachment of MS2 and ØX174 to natural soils

Florence Lee Chi Hiong, Stephen Pedley, and Katrina Charles

The Robens Centre for Public and Environmental Health (RCEPH), Civil and Environmental Engineering, University of Surrey, Guildford, United Kingdom (f.lee@surrey.ac.uk)

The attachment of viruses in the soil-water matrix is an important issue in environmental microbial risk assessment. The effects of different soil properties on the attachment of viruses have been studied using surrogate viruses known as bacteriophages. However, there have been few attempts to link those properties together to give an overall picture of the attachment dynamics. This study measured the attachment of bacteriophages MS2 and ØX174 to 27 natural, highly characterized soils. Statistical analysis was used to identify and rank the soil properties that facilitate virus attachment. Soil samples were mixed with artificial groundwater diluent and 1ml of bacteriophages for 3 hours. Attachment was measured by the reduction in phage titre in the supernatant (SS) relative to controls minus the soil (CS), and was presented as the ratio of SS/CS. The examined soil properties were pH, particle size distribution, moisture content, heterotrophic plate count, total nitrogen, total carbon, extractable acidity (H+) and cations (barium chloride method), and soil bulk X-ray diffraction. Spearman correlation was conducted between the SS/CS value and the tested soil properties. Where the SS/CS value was above 0.1, which showed minimum attachment of the bacteriophage to the soils, the attachment of MS2 was significantly enhanced ($p<0.05$) by Al ($r = - 0.790$) and Fe ($r = - 0.573$), whereas none of the tested elements could significantly enhance the attachment of ØX174. Where the SS/CS value was below 0.1, the attachment of MS2 was significantly inhibited ($p<0.05$) by H+ ($r = 0.764$), total nitrogen ($r = 0.580$) and total carbon ($r = 0.713$); whereas the attachment of ØX174 was significantly inhibited ($p<0.05$) only by H+ ($r = 0.701$).This preliminary result suggested that different bacteriophages may attach to the same soil with different efficiencies, affected by a different set of soil properties.