Geophysical Research Abstracts,
Vol. 11, EGU2009-12306, 2009
EGU General Assembly 2009

Towards the development of a combined Norovirus and sediment transport model for coastal waters

K. Barry and J.P.J. O'Kane

Department of Civil and Environmental Engineering, National University of Ireland, Cork (k.j.barry@webmail.ucc.ie, p.okane@ucc.ie)

Sewage effluent in coastal waters used for oyster culture poses a risk to human health. The primary pathogen in outbreaks of gastroenteritis following consumption of raw oysters is the Norovirus or "winter vomiting bug". The Norovirus is a highly infectious RNA virus of the Caliciviridae taxonomic family. It has a long survival time in coastal waters (T90 = 30 days in winter). Oysters selectively concentrate Norovirus in their digestive ducts. The virus cannot be removed by conventional depuration.

The primary goal of the research is to quantify the risk of Norovirus infection in coastal waters through physically-based high-resolution numerical modelling. Cork Harbour and Clew Bay in Ireland provide case studies for the research. The models simulate a number of complex physical, chemical and biological processes which influence the transport and decay of the virus as well as its bioaccumulation in oyster tissue. The current phase of the research is concerned with the adsorption of the virus to suspended sediment in the water column. Adsorbed viruses may be taken out of the water column when sedimentation occurs and, subsequently, be added to it with resuspension of the bed sediment.

Preliminary simulations of the Norovirus-sediment model indicate that suspended sediment can influence the transport of the virus in coastal waters when a high sediment-water partitioning coefficient is used and the model is run under calm environmental conditions. In this instance a certain fraction of the adsorbed viruses are taken out of the water column by sedimentation and end up locked in the bed sediment. Subsequently, under storm conditions, a large number of viruses in the bed are released into the water column by erosion of the bed and a risk of contamination occurs at a time different to when the viruses were initially released into the body of water.