Seminar Announcement: Modeling Biodegradation Capacity of Nonvolatile Contaminants in the Capillary Fringe

Modeling Biodegradation Capacity of Nonvolatile Contaminants in the Capillary Fringe

Contaminated plume is created by the pollutants within an aquifer and dispersion of contaminants cause spreading of pollution over a wide area. When the contaminated plume intersect with groundwater wells, it makes water supply unsafe for human, wildlife and endanger wellbeing of ecosystem. For this reason, treatment of it becomes very important. Pollutants can be observed in the plumes are classified as volatile and nonvolatile organic contaminants. Volatile pollutants like hydrocarbons is well studied since they cause vapor transmission. Examples of nonvolatile contaminants can be given as Aniline (AN), Diphenylamine (DPA) 2,4,6-trinitrotoluene (TNT), 2,4-dichlorophenoxy acetic acid (2, 4-D) and atrazine. Most them are considered to be pesticides and their application on the soil can be considered as the major source of pollution through leaching process. Yet, there is also nonvolatile chemicals which do not come with leachate but they stay in the groundwater and these chemicals are also very important. They cannot cause such vapor intrusion, but they can move with groundwater and can be transported the upper parts of the soil.

In this study, biodegradation capacity of nonvolatile pollutants will be modeled by focusing on Aniline (AN) and Diphenylamine (DPA) which are industrially significant chemicals come mainly from dyes. Most of the studies in the vadose zone which is known as the unsaturated zone between land surface and top of the water table, were made with volatile contaminants. Although there are many studies on volatile compounds in the vadose zone, there are not many recent studies on the biodegradation of nonvolatile compounds but studies previously done showed that these pollutants can be degraded in the capillary fringe. The modeling of nonvolatile compounds in capillary fringes is not apparent. There is lack of modeling studies examining the vertical transport of pollutants to the upper parts of the soil since previous studies focused on the leachate process. This project is developed to fill this gap. The biodegradation capacities previously obtained will be modeled with MATLAB. The outputs of this study are expected to be a guide for similar chemicals and provide information for future studies that focus on the cost-benefit analysis regarding the natural attenuation should be enhanced or not.

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Zoom Link:
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