CERAMAH TEKNIK TECHNICAL TALK

Application of high-resolution telemetered sensor technology to develop conceptual models of catchment hydrogeological processes

Professor Kevin M. Hiscock (University of East Anglia)
Date: 9 August 2018 (Thursday)
Venue: Department of Geology, University Malaya, Kuala Lumpur

Professor Dr. Kevin M. Hiscock is the Head of School of Environmental Sciences, University of East Anglia (UAE), United Kingdom. He completed his PhD at the University of Birmingham on the hydrochemistry of the Chalk aquifer in north Norfolk and have extended his research interests at UEA to include the application of stable isotope methods and dissolved gases in hydrogeological investigations. He has employed stable isotopes of water and noble gases to understand groundwater recharge and flow processes and has developed nitrogen isotope methods to demonstrate the sources and fate of nitrate in several aquifer systems, both in the UK and internationally. One of his special interest has been the evaluation of the production and consumption of nitrous oxide in groundwater and the contribution by aquifers of this greenhouse gas to the atmosphere. Prof. Hiscock is the author of the popular book entitled "Hydrogeology: Principles and Practice" and he has published over 130 peer-reviewed papers. He was in Kuala Lumpur as the External Assessor for B.Sc. in Geology and B.Sc. in Applied Geology programmes of University Malaya.

In his talk, Prof. Hiscock presented the results of long-term monitoring (2012-2018) of the arable headwater sub-catchment of Blackwater in Norfolk, eastern England using telemetered in-situ sensors. He examined the relationships between rainfall–runoff, catchment connectivity, antecedent moisture conditions and fertiliser application with nitrate-N and total phosphorus (TP) fluxes. He demonstrated that although the precipitation totals did not vary substantially between years, the timing of rainfall strongly influenced runoff generation and subsequent nitrate-N and TP fluxes. The greatest fluxes only occurred when shallow ground water was within 0.6 m of the ground surface and runoff coefficients were greater than 0.1. Throughout the period, dry antecedent conditions had a temporary effect in elevating TP loads. Proportional reductions in annual riverine nitrate-N and TP loadings were not observed at the sub-catchment outlet as loadings were largely influenced by annual runoff. Nitrate loadings were slightly higher during fertiliser application, but there was little relationship between P fertiliser application and riverine TP load. These data indicate that this intensive arable catchment may be in a state of biogeochemical stationarity, whereby legacy stores of nutrients buffer against changes in contemporary nutrient inputs.

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