A rainfall – runoff partitioning model for tropical catchments with vegetation elements

A. E. Ajayi (1), B.J. Abiodun (2), N.C. van de Giesen (3) and P.G. Oguntunde (3)

(1) Universidade Federal de Lavras – UFLA/DCF, Caixa Postal 3037 – 37200-000 Lavras, MG, Brasil ayodele.ajayi@yahoo.com (2) Department of Atmospheric Sciences, Iowa State University Ames, Iowa 50011-1010, USA. email: bjabiodun@yahoo.co.uk (3) Water Management Section, Department of Civil Engineering & Geosciences TU Delft Stevinweg 1, 2628 CN Delft, Netherlands email: n.c.vandegiesen@citg.tudelft.nl

Effective partitioning of rainfall into overland flow, infiltration, deep percolation and evaporation components has been a great challenge for hydrologist working on tropical catchments due to wide variability in surface features, soil properties and the characteristic high intensity but short duration events. In this study, an event based partitioning model based on the two-dimensional hydrodynamic model was developed. Spatial varying soil physical, surface features and temporally varying hydrological properties and rainfall intensity were adequately captured. Evaluation with results from field campaigns in the Volta Basin of West Africa during the 2002 rainfall season indicate good agreement, with r^2 values ranging from 0.89 to 0.96. The model successfully replicates field observation from Mbe watershed in Cote d'Ivore, and Owena watershed in Nigeria. The developed method will be useful in studying the dynamics of surface runoff and infiltration in many tropical catchments.