Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05365, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05365
EGU General Assembly 2008

An analytical model of tidal marsh water table fluctuations

F.A. Montalto (1,2), J.Y. Parlange (1), T.S. Steenhuis (1)

(1) Cornell University, Department of Biological and Environmental Engineering, New York, USA, (2) Now at Drexel University, Department of Civil, Architectural, and Environmental Engineering, Pennsylvania, USA (fam26@drexel.edu / Fax: +001 215-895-1363)

This talk will present a previously published analytical model that can be used to predict water table fluctuations in a tidal marsh. The spatially and temporally variable position of the water table and of soil saturation is a key component of tidal marsh ecohydrology since these help to establish the oxidation state of the substrate, which, in turn, affects the wetland's

biogeochemical composition and the biological communities it is capable of supporting. The model presented here describes tidal marsh hydrology from creek bank to interior, considering transient drainage, net meteorological inputs, and tidal effects. Given a series of physical and time-dependent inputs, the analytical solution derived predicts the position of the water table at points along a transect perpendicular to a tidal creek. Validation of the model using water table time series data collected along three transects at a Hudson River, NY tidal marsh indicates good general agreement between observations and predictions, although the results may not be precise enough for some kinds of ecological applications. A sensitivity analysis on the model indicates that a range of pairs of transmissivity and specific yield values that increase with distance from the creek results in the same spatial and temporal fluctuations in the water table. This equifinality result is discussed as it relates to the predictive capacity of the model presented.