Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Excess pore water pressure due to ground surface erosion STEFAN LLEWELLYN SMITH, Department of Mechanical and Aerospace Engineering, UCSD, STEVEN GAGNIERE, UCSD — Erosional unloading is the process whereby surface rocks and soil are removed by external processes, resulting in changes to water pressure within the underlying aquifer. We consider a mathematical model of changes in excess pore water pressure as a result of erosional unloading. Neuzil and Pollock (1983) studied this process in the case where the water table initially coincides with the surface. In contrast, we analyze an ideal aquifer which is initially separated from the ground surface by an unsaturated zone. The model is solved using Laplace Transform methods in conjunction with a boost operator derived by King (1985). The boost operator is used to boost the solution (in the Laplace domain) to a frame of reference moving at constant velocity with respect to the original frame. We use our solution to analyze the evolution of the pressure during erosion of the aquifer itself for small and large erosion rates. We also examine the flux at the upper boundary as a function of time and present a quasi-steady approximation valid for very small erosion rates in the appendix.

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Date submitted: 30 Jul 2015 Electronic form version 1.4