

Abstract Submitted  
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**A granular-continuum model of channelization in sedimentary layers by sub-surface flow**<sup>1</sup> VIKRANT YADAV, ARSHAD KUDROLLI, Clark University — We discuss experiments where channels form in a quasi-two dimensional bed of consolidated granular particles by fluid flow. A continuum three phase model was developed recently [A. Mahadevan, A.V. Orpe, A. Kudrolli, and L. Mahadevan, EPL, 2012] which shows that channels can develop from small differences in packing in an otherwise homogeneous medium which leads to increased porosity and nonlinear feedback. To build on this model, an erodible porous medium composed of millimeter scale grains and Bentonite clay was prepared in a Hele-Shaw cell. The cohesive strength between the grains is directly proportional to the amount of clay binder. When water is pumped through this porous medium, the binder dissolves and loose beads are advected out of the erodible medium, and an initially uniform flow of water through the porous medium gets localized into channels over time. We will discuss the measured integrated rates of erosion as well as the statistical development of heterogeneity and comparison with the three-phase model as a function of binding strength and consolidation of the medium.

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