



## **Sediment Transport Dynamics and Structures in Overland Flow**

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Grain movement in water and air on sloping land can take on different modes of transport. Controlled Laboratory studies of grains that are uniformly added at an upslope point on chutes and flumes have shown the development of characteristic grain movement structures in both gravity flow in air and overland flow of sediment in water. The observed structures consist of a pattern of regularly spaced waves the motion of which depends on the grain size, the concentration, and the surface slope. The nature of these waves and their mode of movement profoundly affect the transport capacity. In gravity flow three modes of transport were observed. At very low concentration there exists a (1) saltation mode which at increasing particle concentration exhibits local regions of densification. These regions graduate into (2) wave packets which move upslope and ultimately, at even higher concentrations, become (3) waves that move down-slope. In water or overland flow, also three modes of material transport were observed: (1) saltation, followed by (2) sediment packets or waves that migrate upslope by particle addition at the upslope part of the packet and particle removal at the down-slope part of the packet. The wave length of these packets is approximately 5 to 8 cm for the material used. This mode of transport is very similar to the second mode in gravity flow. The 3rd. mode is best describe as the formation of meanders with wavelength of as much as 75 cm. The presentation will show schematic and photographic evidence of these transport modes. The experimental observations are complemented with results from analytical considerations based on solutions of the continuity equations and the momentum equations. Also, data obtained with photonic probes will show particle velocity measurements and concentrations.