Stratigraphic Signals of Autogenic Processes in a Bimodal Alluvial Fan: Laboratory Experiments

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The autogenic process is an intrinsic process of the depositional system, which occurs naturally without changes in external forcing. The autogenic process also changes in response to the external forcing of basin and leaves a unique signature in the stratigraphic record. Understanding the relationship between autogenic process and associated sedimentary record is critical to correctly interpret basin-filling history using the sedimentary record. Lithofacies boundaries such as a gravel-sand transition migrate based on the external forcing (e.g. climate, sea level and tectonic movement). Autogenic process causes short-term fluctuation of lithofacies boundaries and records stratigraphic signals in the deposit. This study uses physical laboratory experiments of alluvial fan evolution to investigate the short-term migration of gravel-sand transition as an autogenic signature. The flume for the experiments has dimensions of 4 m wide, 5 m long, and 1.5 m tall. The experiments will have different ratios of sediment to water discharges (Qs/Qw). The sediment supply from a point source at the upstream end, consisting of a well-sorted bimodal sediment mixture, forms an alluvial fan under the constant base-level condition. We will measure short-term fluctuation of downstream location of the gravel-sand transition shown in the sliced deposit. Different trends in response to the discharge ratios are expected. We hypothesize that high Qs/Qw results in high frequency and low amplitude short-term fluctuations in the gravel-sand transition record while low Qs/Qw results in low frequency and high amplitude fluctuations. Baumanis and Kim (2018) shows similar changes of autogenic stratigraphic signatures in response to the rate of base level rise and this presentation will introduce the results. Our study will provide a new perspective to interpret paleoenvironment using the autogenic signatures recorded in alluvial-fan deposit.