Subaqueous Landslides in Clay-Rich Systems

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Abstract

We simulated subaqueous landsliding within sedimented beds of clay-rich material. We deposited beds inside a flume and gradually increased the bed angle until failures developed. In a preliminary experiment, localized debris flows developed at bed angles of ~25° in a thin (2 cm thick) bed of kaolinite clay (60% by weight) and silica silt (40% by weight). Failure surfaces were confined to the upper 0.5cm. In one flow we observed outrunner blocks that accelerated away from the main flow and created linear grooves along the upper bed surface. In future experiments we aim to understand: 1) how landslide rates and styles vary as a function of material properties (clay mineralogy, grain size, and presence of thin interbeds of sand); and 2) the process of retrogression by measuring pore pressure in several locations behind retrograding headscarps. This work will illuminate the processes that drive subaqueous landsliding on continental slopes.