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In the submarine canyon and the vicinity, continuous step-like morphology is often observed. Many of them are inferred to be formed by turbidity currents. In this study we investigate the sedimentary structures and grain size distribution of cyclic steps formed by surge-type turbidity currents in an experimental flume. Two kinds of plastic particles, whose grain-size distributions differ from each other, were used in this study to observe grain size distribution and sedimentary structures of the cyclic steps, with an eye to application to sediment waves in the modern sea floor and in the rock record.

The experiment was conducted at the Hydrosystems Laboratory of University of Illinois, Urbana-Champaign (UIUC). In the experiment, a flume, which is 14.5 m long, 0.5 m deep and 0.1m wide was suspended in a larger tank, tilted at 2.5 degrees. Salt water (density: 1.17 g/cm^3) and two kinds of plastic particles (specific gravity: 1.5, D_{50}: 68 μm, 206 μm) were mixed at a weight ratio of 20:1:1 in the head tank, and then introduced into the flume as a slurry. In Case A, slurry filling the entire volume of the head tank, 58.7 L (5.87 L/cm), was supplied for single surge, which took 40 seconds to flow out. We repeated 40 such surges. In Case B, slurry filling half the volume of the head tank, 27.4 L (2.74 L/cm), was supplied for each surge, which took 10 seconds to flow out; we repeated 80 surges. The total amount of supplied sediment was about the same in both cases. The flow rate per unit time gradually decreased during a single surge.

At the end of each series, 4 steps were formed in the two series. Those steps moved upstream during the series of pulse runs. The mean values of wave steepness of the resulting steps were 0.06 and 0.05. The sedimentary structures observed in the cyclic steps of these experiments were mainly laminae gently dipping toward the upstream side. These laminae were truncated at the downstream side of the step. Moreover, the grain size analysis of the cyclic steps showed that D_{50} of the surface sediments tended to decrease toward the downstream, with the tendency being more prominent as the total discharge of the surge increased. It was also found that the D_{50} on the downstream side is smaller than on the upstream side of each step. This distribution is inferred to be caused by a hydraulic jump at the upstream side of each step.

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