G226-P001 **Room: Poster Session Hall** **Time: May 17**

Flume experiments of multiple inversely-graded units under sediment gravity flow

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Multiple inversely-graded units are occasionally found at the basal part of the gravity flow deposits such as massive sandy turbidite layer and pyroclastic flow deposits. Although the inverse grading had been explained in terms of dispersive pressure caused by extensive shearing between sediment bed and overlying suspension flow (traction carpet model by Lowe, 1982), it seems quite difficult that (1) the thickness of the units often exceeds 10 cm, and (2) each unit is bounded by a extremely smooth erosional surface, and (3) occasionally, large number of units are stacked. On the other hand, multiple inversely-graded units formed by upstream migration of antidunes show similar characteristics as those in gravity flows deposits. A series of flume experiments was performed to demonstrate that the supercritical sediment gravity-flow can yield these inversely-graded units.

In order to set up supercritical state, high-velocity and thinner gravity-flow is needed. It can be realized by (1) high density fluid, or (2) large scale flow, and/or (3) steep-slope flow. Because both high-density and large scale flows are not practical, steep slope version was tried. Mixed size sediments are put at the rate of 17g/s/cm into the flume with 1.4 m long and 27 degrees slope. The gravity flow with velocity of 20 cm/s and 4.5 cm thick was mainteined for about ten minutes by continuous sediment supply. As the rsult, a smooth, low angle bedform was formed and migrated upslope with increasing amplitude. Sand grains coarser than medium-grained sand passed through the bed without deposition, however, they deposited on the backset slope of the bedform, resulting a set of inversely-graded unit thinner than the height of the crest of several centimeters. After the first crest reached to the upslope end, another crest was formed on the lower slope which also migrated upstream. As a resut of upslope migration of several crests, multiple inversely-graded units were formed.

The flow-parallel peeled section of the units shows (1) the basal part is composed of well-sorted very-fine to fine grained sands overlain by (2) inversely graded within a few centimeters thick interval from the basal part to the upper medium-grained massive sands without any discontinuity. Inversely-graded unit is translatent without backset lamination. A distinctive a(p)a(i) imbrication was observed in the basal part, and high-angle imbrication was also shown in the most part of the unit.

Close-up high-speed video observation clarified that the grains felt down from the overlying gravity flow show active saltation and rolling motion with forward rotation until it settled on the bed surface. As the coarser grains keep their motion under strong and smooth shear flow, only the finer grains could remain on a flat bottom until the first backset slope approached, comprising basal fine sand layer. On the backset slope, coarser grains can deposit due to decreased shear velocity and thickened flow induced by a weak hydraulic jump. Decreased shear also causes rapid deposition, development of the backset slope, and hence the upflow migration of the crest. The backset angle is about 10 degrees, which exaggerate the apparent imbrication angle in reference to the bedding plane. The flow reestablished on the lee-side of the crest erode some bed material, although the erosive shear stress is not so effective. The second crest did not appear until the first crest reached at the upstream end of the 1.4 m long flume, suggesting longer wavelength of the bedform. Backward progradation of the backset slope left no visible internal lamina but subhorizontal inversely-graded translatent unit bounded by a smooth erosional surfaces.