

HGM021-03

Room:301A

Time:May 25 14:45-15:00

Formation of dry sand avalanches in Tottori Sand Dunes, southwest Japan, in humid temperate climate

Yoshinori Kodama^{1*}, Ayaka Bitou²

¹Fac.Regional Sciences, Tottori Univ., ²Tajima Shinkin Bank

In the Tottori Sand Dunes, in southwest Japan, a phenomenon called *Sand Curtains* is sometimes observed; these sand curtains are basically dry sand avalanches that occur on calm pleasant days after a rainstorm. They are observed on the upper parts of the leeward slopes of transverse dunes. They are usually ca. 10 cm wide and 3 m to 6 m long. At such times, the color contrast between the dry sand avalanches and the wet slip-face slope is so clear that the tongue-shaped avalanches together resemble a curtain. After several days, with the increase in the dryness of the slip face slope, the dry sand avalanches become larger: up to 2 m wide and 20 m long. By this time, both sand avalanches and sand slopes have dried, and no sharp contrast is observed.

Flume experiments were conducted to investigate the dynamics of dry sand avalanches observed in sand dunes that appear in humid regions such as coastal areas. The flume, which was 40 cm wide, 10 cm deep and 200 cm long, was tilted to 32 degrees. A 4-cm-thick layer of sand with 0.2 mm-0.5 mm particle size was laid out in the flume, and moisture was added to the sand using a spray gun. On the top 40 cm of the flume, wet sand was added to make a steeper slope of 38 degrees. Then, a hand-made heater was placed over this part to dry the sand.

After several hours, with the drying of the sand by the heater, sand failure occurred on the steeper slope because the angle of slope exceeded the angle of repose. Subsequently, miniature dry sand avalanches were observed, which eventually escalated to collectively form a sand curtain. After one day, the slope sand moisture evaporated, the entire slope surface dried, and the size of each successive dry sand avalanche started increasing. We analyzed the grain size of samples from various microtopographies of the sand avalanches. The results showed that the coarser sand accumulated at the marginal and head parts of the sand avalanches, which is consistent with field observations. This suggests a reason for why sand avalanches stop moving on the constant gradient slopes: particle size segregation occurs in an avalanche body in motion; this increases the internal friction, as a result of which the avalanche stops moving.

Keywords: dry sand avalanche, avalanche formation experiment, Tottori Sand Dunes, sand curtain, angle of repose, particle size segregation