Flume experiments on the dependence of the deformation of barchans on angular variations of bidirectional flows

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Dune morphology relates to available sand volume on the bedrocks and variation of the flow direction. It is generally believed that barchan dunes, which are typically crescentic-shaped dunes, develops in the area where the bedrock is barely covered with sand and the wind or the water flow is unidirectional. According to several field observations, barchan dunes exposed to bidirectional flows are characteristically deformed. We previously conducted water flume experiments under bidirectional flows with 180 degree of the variation in the flow direction, and found four types of deformation that depend on absolute velocity of the forward flow and the strength of the reverse flow relative to the forward flow. This result explains some observation facts on Mars and Earth. However, processes of some other strange dunes are not still understood well. To get better understanding of the deformed barchans, study on the barchan deformation caused by bidirectional flows running at an angle other than 180 degree is needed. Here, we show the result of flume experiments about the dependence of the deformation of barchans on the angle of the flow variation.