

## Model experiment on the development of isolated dunes using a circular flume

Keisuke Taniguchi<sup>1\*</sup>, Noritaka Endo<sup>2</sup>

<sup>1</sup>Graduate School of Environmental Studies, Nagoya University, <sup>2</sup>Graduate School of Natural Science & Technology, Kanazawa University

A model experiment using a circular water flume was conducted to elucidate the formative process of isolated dunes from the condition where there was no available particle on the bottom surface. Such condition often occurs in various environments, e.g., the margin of large dune field, the seafloor affected by tidal flows, and the snow surface having a snowstorm, although the whole process have never been observed yet.

The experimental procedure was as follows. In advance, a given amount of very fine sand was put in the channel, and then a strong water flow was exerted to suspend all sand from the bottom. After that, the flow velocity was reduced to the given velocity, and an experimental run started. During the run, 20 g of the sands were supplied in the flume every 6 minutes. The development of topography was recorded by digital cameras from the top and side of the flume, and the distribution of the flow velocity was measured by the PIV method.

The isolated dunes developed on the solid surface (flume bottom) from sand ribbons through sand patches and protodunes. Sand ribbons, the first feature that appeared in this experiment, were stream-like and low-relief features parallel to the flow direction. The ribbon covered almost the entire bottom of the flume. After that, sand patches were formed on the sand ribbons, and then the patches elongated transverse direction. Protodunes developed from the transverse sand patches. Finally, mature dunes that have a clear slipface appeared.

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