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Avalanches of Singing Sand in the Laboratory SIMON DAGOIS-BOHY, Kamerlingh Onnes Laboratorium, Universiteit Leiden, SYLVAIN COURRECH DU PONT, STÉPHANE DOUADY, Laboratoire M.S.C., Univ. Paris Diderot — The song of dunes is a natural phenomenon that has arisen travellers' curiosity for a long time, from Marco Polo to R.A. Bagnold. Scientific observations in the XXth century have shown that the sound is emitted during a shear flow of these particular grains, the free surface of the flow having coherent vibrations like a loud speaker. The sound emission is also submitted to a threshold effect with many parameters like humidity, flow speed, surface of the grains. The sound has been reproduced in laboratory avalanche experiments close to the natural phenomenon on field, but set in a channel with a hard bottom and a few centimeters of sand flowing, which contradicts explanations of the sound that involve a sand dune under the avalanche flow. Flow rates measurements also show the presence of a plug region in the flow above the sheared band, with the same characteristic length as the coherence zones of the sound. Finally we show experimentally that the Froude number, once modified to take into account the height of this plug band, is the parameter that sets the amplitude of the sound, and produces a threshold that depends on the grain type.

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