Abstract. The $d$-dimensional abelian sandpile model is a lattice model introduced in 1987 by Bak, Tang and Wiesenfeld as an example of what they called ‘self-organized criticality’. Although this deceptively simple model has been studied quite intensively both in the physics and mathematics literature, some very basic questions about it are still open, like its properties under two different kinds of dynamics: ‘addition’ (of grains of sand), and the shift-action.

By extending an algebraic construction originally introduced by A. Vershik for Markov partitions of hyperbolic automorphisms of the 2-torus one can show that the sandpile model is closely related to a certain $\mathbb{Z}^d$-action by automorphisms of a compact abelian group, the ‘harmonic model’.

The purpose of this lecture (which is based on joint work with Evgeny Verbitskiy) is a discussion of this construction and of the conclusions that can be drawn from the connection between these systems.