

Bali ancient rice terraces: A Hamiltonian approach

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The beautiful mosaics characterising several rice-growing regions in Bali-Indonesia are a consequence of the synchronised dynamics ruled by the Subak irrigation system in that tropical island. The self-organising process characterised by such a spectacular spatial patterning is an effect led by two main mechanisms behind Subak farmers' decisions. Pest stress is the local mechanism promoting order, namely, using the same schedule within neighbouring patches. On the other hand, an antiferromagnetic interaction is set by a global mechanism, fixing a limit in the total number of cells in the same state. In this work, we propose a Hamiltonian formulation for the Subak irrigation System. Our Subak Hamiltonian presents several phase transitions, having one of them a critical nature. We compare such a critical behaviour with the criticality found out on the real centuries-old Balinese rice terraces.