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Towards an understanding of the Maximum Entropy Production principle in climate toy models

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The so called Principle of Maximum Entropy Production (MEP) states that a non-equilibrium stationary system selects the state which maximizes the entropy production taking into account some constrains. Though many attempts to demonstrate this principle did not lead to convincing results, the MEP principle has been succesfully used in climate science e.g. to obtain well suited approximations of global temperature distributions. However a rigorous definition of the MEP principle is still needed. We tackle this problem by using climate toy models for which dynamical analogues of the thermodynamical quantities can be defined. We show how, in some 1D stochastic models e.g. the asymmetric simple exclusion process (ASEP) model and the zero-range process model, the Maximum Entropy Production Principle (MEP) and the Maximum Kolmogorov-Sinai Entropy Principle (MKSEP) are equivalent, under certain conditions, even far from equilibrium. These results point to an existing link between these two empirical principles suggesting some basis for the improvement of the MEP principle formulation.