

Abstract Submitted
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Modeling the Earth: Climate on an Icosphere STEPHANIE FOUTS, Washington and Lee University, L. JONATHAN COOK, Roanoke College — The totally asymmetric simple exclusion process with Langmuir kinetics is a one-dimensional transport model used to study the motion of particles through a lattice. Its applications include systems in the fields of biology, climatology, mathematics, civil engineering, and physics. In our research, we examine the temporal dynamics through the power spectra, as well as the time-averaged particle distribution on the lattice via Monte Carlo simulations. We have applied our particle transport model to an icosahedron in an attempt to model Earth's changing climate. In our research, we examine the temporal dynamics of the particle distribution on the lattice, as they correspond to seasonal heat fluctuations in the polar and equatorial regions of the globe. Using Monte Carlo simulations, we alter the input parameters of the system to explore the resultant actions of the Earth-system model. Our findings include seasonal oscillations consistent with those seen in reality. We also built a mathematical framework for our model which, when solved numerically, matches the oscillations seen in our physical system.

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