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Kenneth M. Golden* (golden@math.utah.edu), University of Utah, Department of Mathematics, 155 S 1400 E, RM 233, Salt Lake City, UT 84112-0090. *Transition in the Fractal Geometry of Arctic Melt Ponds.*

During the Arctic melt season, the sea ice surface undergoes a remarkable transformation from vast expanses of snow covered ice to complex mosaics of ice and melt ponds. Sea ice reflectance or albedo, a key parameter in climate modeling, is largely determined by the complex evolution of melt pond configurations. In fact, ice–albedo feedback has played a major role in the recent declines of the summer Arctic sea ice pack. However, understanding melt pond evolution remains a significant challenge to improving climate projections. Here we will discuss recent findings on the evolution of melt pond geometry. In particular, we have found that as the ponds grow and coalesce, their fractal dimension undergoes a transition from 1 to about 2, around a critical length scale of 100 square meters in area. As the ponds evolve they take complex, self-similar shapes with boundaries resembling space-filling curves. We will also discuss how mathematical models of composite materials and statistical physics, such as percolation and Ising models, are being developed to describe this evolution. (Received September 15, 2013)