

# RANDOM MATRICES AND THE MELTING POLAR ICE CAPS

**Kenneth M. Golden**

Department of Mathematics, University of Utah, USA  
golden@math.utah.edu

The precipitous loss of Arctic sea ice has far outpaced expert predictions. In this lecture we will delve into the mathematical underpinnings of this mystery, and discuss how we are using the mathematics of multiscale composites and statistical physics to study key sea ice properties. In particular, we will explore how random matrices arise in these problems, and show how the onset of connectedness in composite microstructures gives rise to striking transitional behavior in the long and short range correlations of the eigenvalues of the associated random matrices. This work is helping to improve projections of the fate of Earth's ice packs, and the response of polar ecosystems. We will conclude with a short video from a 2012 Antarctic expedition where sea ice properties were measured.

*Joint work with N. Benjamin Murphy (Department of Mathematics, UC Irvine, USA).*