

The FAU-SIAM student chapter invites you to a talk by

## Mary Silber, Ph.D.

University of Chicago



Thursday June 17th, 2021  
11:00am EST

Open to all and live on [Zoom](#) with the passcode Summer2021

### Pattern formation in the drylands: vegetation patterns captured by satellite images and by mathematical models

#### Abstract

A beautiful example of spontaneous pattern formation appears in the distribution of vegetation in some dry-land environments. Examples from Africa, Australia and the Americas reveal that vegetation, at a community scale, may spontaneously form into stripe-like bands, alternating with striking regularity with bands of bare soil, in response to aridity stress. A typical length scale for such patterns is 100 m; they are readily surveyed by modern satellites (and explored from your armchair in Google maps). These ecosystems represent some of Earth's most vulnerable under threats of desertification, and some ecologists have suggested that the patterns, so easily monitored by satellites, may have potential as early warning signs of ecosystem collapse. I will describe efforts based in simple mathematical models, inspired by decades of physics research on pattern formation, to understand the morphology of the patterns. I will also describe efforts at analyzing the patterns via the satellite images, which, in some cases, we can accurately align with the aerial survey photographs from the 1950s to investigate details of the pattern evolution.

#### About the speaker

Mary Silber is an applied mathematician at the University of Chicago, where she is a professor in the statistics dept. and also the director of the Committee on Computational and Applied Mathematics, which runs an interdisciplinary PhD program. Prior to joining the faculty at the University of Chicago in 2016, she was a professor in the Department of Engineering Sciences and Applied Mathematics at Northwestern University for more than two decades. She holds a PhD in physics from UC Berkeley. Her research is in dynamical systems and her area of expertise is pattern formation. She is presently most interested in ecology and climate science applications. She is a SIAM fellow and an APS fellow, and a founding member of the Math and Climate Research Network.

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