

Abstract:

Complex systems are ubiquitous in nature and society, and studying them is an inherently multidisciplinary endeavor. In recent decades applied mathematician, physicists, and computer scientists have developed various techniques for modeling and analysis of such systems. I will introduce a few such techniques from the theory of complex networks, nonlinear dynamical systems, and applied statistics. To demonstrate the effectiveness of these techniques, I will present an analysis of rainfall datasets from South Asia and East Asia. The analysis provides many insights into the atmospheric processes that generate extreme events over these regions. Furthermore, I will show a recent application of these techniques to high-latitude total electron content data.