

# LSGI Distinguished Lecture Series “Geo-complexity: Emergent Behaviors, Spatial-temporal Correlations, and Information Flow”

## Overview

It was our pleasure to invite Prof. Jianbo GAO, Beijing Normal University, to deliver a seminar of the LSGI Distinguished Lecture Series on 15 May 2019.



## Biography

Jianbo Gao received his Ph.D. in Electrical Engineering from UCLA in 2000, taught at the Electrical and Computer Engineering Department at the University of Florida (Gainesville), and collaborated with the Air Force Research Lab at Dayton Ohio, as a research Professor at Wright State University. From 2013 to 2018, he was a Distinguished Professor and founding director of Institute of Complexity Science and Big Data Technology at Guangxi University. He has moved to Beijing Normal University in 2018.

He specializes in sophisticated physical and mathematical techniques to solve data-driven real-world problems in electrical engineering, bioengineering, finance, and the geo- and environmental sciences. He is a leading expert on multiscale analysis and nonlinear time series analysis. His book, "Multiscale Analysis of Complex Time Series: Integration of Chaos and Random Fractal Theory, and Beyond", is the first of its kind, and is highly praised in the field. His recent book, "Quantitative Analysis of Belt and Road Initiative Big Data – Task, Challenges, and Solutions", is the first book quantitatively analyzing infrastructure construction, international trade, and massive media data pertinent to the Belt and Road Initiative.

## Geo-complexity: Emergent Behaviors, Spatial-temporal Correlations, and Information Flow

Emergent behaviors of complex systems have fascinated mankind for aeons. To adequately characterize the ensuing patterns and dynamics, in recent decades, a number of important theories and approaches have been developed, including chaos theory, random fractal theory, and multiscale analyses. This talk will focus on the role of spatial-temporal correlations and information flow play in characterizing geo-complexity. As illustrative examples, geomorphology, river flow dynamics, worldwide political conflicts, and target detection within sea clutter radar returns will be discussed. A versatile adaptive filter, which can accurately determine trend, reduce noise, perform fractal and multifractal analysis, and process images, will also be presented.