



Extreme Value Analysis: From Likelihood to Bayesian Inference, Prediction, and New Frontiers

Keynote Speaker: Simone Padoan, TIES President's Invited Lecture

Abstract: This keynote provides a comprehensive overview of likelihood-based and Bayesian approaches to extreme value analysis, with a particular emphasis on applications in environmental and climate sciences. We first revisit the classical foundations of extreme value theory, including threshold exceedance and block maxima methods, and then move to more advanced modeling frameworks that account for temporal dependence and heteroskedasticity. We compare likelihood-based and Bayesian inferential approaches, highlighting their respective strengths, limitations, and complementarities in the analysis of extreme events. The talk moves with a forward-looking discussion on the statistical prediction of rare and unprecedented extremes, emphasizing the challenges posed by climate change and evolving environmental risk. We outline open problems and emerging directions in the statistical modeling of extremes, with important implications for risk assessment.

Short biography: Simone Padoan is Associate Professor of Statistics in the Department of Decision Sciences at Bocconi University and a Research Fellow at the Euro-Mediterranean Center on Climate Change (CMCC). He received his PhD in Statistical Science from the University of Padua under the supervision of Professor Stuart G. Coles and subsequently held a postdoctoral appointment at École Polytechnique Fédérale de Lausanne (EPFL), working with Professor Anthony C. Davison.

He is an elected member of the International Statistical Institute and serves as an External Expert for the European Geosciences Union's Climate Hazard and Risk Task Force. Since 2023, he has also participated in the Expert Meetings on Economic Losses from Weather- and Climate-Related Extremes, contributing to the dissemination of research on environmental and climate extremes within the ETC-CA group of CMCC, upon invitation by the European Environment Agency.

Professor Padoan serves as Associate Editor for several leading statistical journals, including the Journal of the Royal Statistical Society, Series B, Extremes, Statistics and Probability Letters, and the Journal of Statistical Planning and Inference. His research lies at the interface of theoretical and applied statistics, with a primary focus on Extreme Value Theory and its applications to environmental and climate risk, alongside time series analysis, spatial statistics, likelihood-based inference, Bayesian methods, and nonparametric statistics.

He has authored numerous peer-reviewed articles, developed several widely used R packages, and is a frequent invited speaker at major international conferences and university institutions worldwide.