

AFOSR Workshop on Catastrophic Risks June 1st and June 2nd at SRI

www.ColumbiaRiskManagement.net

Participants

Professor Kenneth Arrow: Stanford University

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Kenneth J. Arrow, born in 1921, received his Ph.D. from Columbia University in 1951. He has taught at the University of Chicago, Stanford University, and Harvard University. He has worked on economic theory in various aspects, including social choice, general equilibrium, health economics, inventory theory, and the economics of risk-bearing and information. He received the Nobel Memorial Prize in Economic Science in 1972.

Professor Terence Agbeyegbe: Hunter College

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Professor Terence (Temisan) D. Agbeyegbe is a Professor of Economics at Hunter College and Graduate Center, City University of New York. He began his study of economics at University of Essex, where he received a B.A. in mathematical economics. After earning a M.S. in statistics from University College, London, he returned to pursue his study of economics at the London School of Economics and Political Science, where he received a M.S. degree. He began teaching at Rutgers University in 1983 after obtaining a Ph. D. in economics from University of Essex. He moved to Hunter College in 1989. Today, he regularly teaches both undergraduate and graduate courses in development economics, macroeconomics and econometrics. He has also taught courses at Columbia University, School of International and Public Affairs, Fordham Graduate School of Business, New York and the University of the West Indies, Cave Hill, Barbados. He was the Courtney Blackman Chair of Money, Banking and

Finance at UWI, Cave Hill, 2006-2007..

His research ranges across many fields within economics and includes work on continuous-time econometrics, natural resource price movements, commodity markets, monetary policy, finance and emerging markets. His current research interest is continuous-time econometrics is on stochastic delay differential equations. He is also working on term structure models in finance and exchange rate modeling issues.

In addition to his duties at Hunter, he is a research associate with The Caribbean Center for Monetary Studies, The University of The West Indies, St. Augustine, Trinidad and Tobago. Professor Agbeyegbe also serves on the board of several academic journals including the Journal of Asian Economics, where he has served as an Executive Editor. Since coming to Hunter, he has done extensive work in Barbados, India, Jamaica and Nigeria. Professor Agbeyegbe has held advisory and consulting positions with international agencies, such as the United Nations (UNDP, UNECA) and the International Monetary Fund (IMF).

He lives in Franklin Park, New Jersey with his wife Rae and two sons, Toju and Tone.

Professor Chris Barton: Wright State University

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Christopher C. Barton is Professor of Nonlinear Dynamics and Complex Systems at the Department of Earth and Environmental Sciences at Wright State University since 2004 and Associate Director of the Columbia University Consortium for Risk Management in a Changing Environment. He is a pioneer in the identification and quantification of nonlinear dynamics and complexity in earth, environmental, human, and economic systems. He uses the mathematical tools of fractals, chaos, and complexity to analyze, model,

and forecast future behavior of complex systems. Current research topics include the temporal dynamics of stream and river discharge, groundwater travel time, reversal times of the Earth's magnetic field, and shoreline dynamics. Dr. Barton received two master's degrees (1976, 1977), and a Ph.D. (1983) from Yale University. He was a post-doctoral fellow at U.C. Berkeley. He was a senior research scientist and project chief the U.S. Geological Survey (USGS) from 1984 until his retirement in 2004. He has twice been a USGS G.K. Gilbert Fellow at IBM with Benoit Mandelbrot, the "father of Fractals." He is the author of more than 60 published research papers and is the senior editor of two books. He is a contributing editor to the international journal, *Fractals* since 1994. Member and officer of *American Geophysical Union*, member of *AAAS* and *Geological Society of America*.

Dr. Stephanie Bruce: Air Force Office of Scientific Research (AFOSR) Arlington, VA
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Professor Richard Ericson: Eastern Carolina University
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Richard Ericson was born a U.S. citizen in Mexico in 1949, and has lived in the United States since 1951. He graduated from Georgetown University School of Foreign Service in 1971, received an MIA Degree from the Columbia University School of International Affairs in 1974, and a Ph.D. in economics from the University of California, Berkeley, in 1979.

Beginning with his dissertation on the Soviet Industrial Supply System, Professor Ericson has done research and teaching in economic theory, the Soviet economy, and the Russian transition at Harvard University (1978-1983), Yale University (1982), Northwestern University (1981, 1983-1985), the New Economic School in Moscow (1996), Urals State University in Ekaterinburg (1999, 2000), the Kazakh National University in Almati (2002), Columbia University (1985-2003), and East Carolina University (2003-present). He has served as Associate Director (1991) and Director (1992-1995) of the Harriman Institute at Columbia University, and is currently Chair and Professor in the Harriot College Economics Department at East Carolina University, Chairman of the International Advisory Board of the EERC (Economic Education and Research Consortium) Network Program, and member of the Executive Committee and Board of Trustees of EERC, Inc. Professor Ericson has made frequent visits to the Soviet Union, Russia, Ukraine, and to the other successor states, for teaching and research on their economies, and for participation in economics training programs (NES and EERC). His publications include scholarly articles in conference volumes, and in academic journals such as *Econometrica*, *Journal of Economic Theory*, *Review of Economic Studies*, *Journal of Comparative Economics*, *Economic Systems*, and *Journal of Economic Perspectives*. He is on the Editorial Advisory Board of *Post-Soviet Affairs*, and *Post-Soviet Economics and Geography*. His current research is on the economics of transition from a command to a market economy, on the impact of the institutional and structural legacies of the Soviet economic system, on game-theoretic analyses of refugee negotiations, and on modeling decision-making in the face of uncertainty and extreme risk.

Dr. Jose Garrido: Concordia University, Canada
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Dr. José Garrido is a Full Professor and the Graduate Programs Director of the Department of Mathematics and Statistics at Concordia University, in Montreal, Canada.

Prof. Garrido received his PhD in 1987 from the Department of Statistics and Actuarial Sciences at the University of Waterloo, Canada. His research interests are in Risk Theory, Insurance Statistics, Credibility Theory, Risk Management, Actuarial and Financial Mathematics.

Prof. Garrido has written more than 40 articles in international refereed journals and conference proceedings. He is Associate Editor of several journals, including *Insurance: Mathematics and Economics*, as well as Editor of the *European Actuarial Journal*. Prof. Garrido is active in graduate education, having supervised 30 MSc, 11 PhD and 5 post-doctoral students.

Professor Peter Hammond: University of Warwick & Stanford University
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Peter J. Hammond was born in Marple, then in Cheshire. He began his university career in 1964, first studying mathematics (as an Open Scholar), then economics at Trinity Hall, Cambridge. Early in 1964 some of his interests were transferred from playing games to reading about game theory. Soon this developed into formally studying the application of game theory, and of mathematical and probabilistic tools more generally, not only to economics but to other social sciences, and even to philosophy.

He became an Emeritus Professor at Stanford in 2007, since when he has been a Professor of Economics at the University of Warwick. From 1976 to 1980 he was a managing editor of the *Review of Economic Studies*. He remains an Advisory Editor of *Social Choice and Welfare*. He has benefited from a Guggenheim Fellowship and an Alexander von Humboldt research award. He is the co-author of the textbooks *Essential Mathematics for Economic Analysis* and *Further Mathematics for Economic Analysis*, both published by Pearson Education.

Professor Jamie Kruse: Eastern Carolina University

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Dr. Jamie Kruse is recognized for her research in economics and decision making under uncertainty especially as it relates to natural hazards. She completed her doctoral work at University of Arizona under dissertation advisor, Vernon Smith (2002 Nobel Laureate). Dr. Kruse has published over fifty refereed journal articles in addition to proceedings, abstracts and reports. Her work has appeared in *Econometrica*, *RAND Journal of Economics*, *Southern Economic Journal*, *Journal of Economic Behavior and Organization*, *Economic Inquiry*, *Natural Hazards Review*, *Journal of Wind Engineering and Industrial Aerodynamics*, *Environmetrics*, *Weather and Forecasting*, *Journal of Risk and Insurance* and others. She has held faculty positions at the University of Colorado, Texas Tech University, East Carolina University and a visiting position at the Swiss Federal Institute of Technology. Her funded research has been supported by National Science Foundation, Department of Energy, National Institute of Standards and Technology, Federal Emergency Management Agency, Federal Deposit Insurance Corporation, Niagara Mohawk, State of Texas and the State of North Carolina. She has been PI or Co-I of research projects totaling almost \$20 million.

During 2010 she held the position of Chief Economist at NOAA. Dr. Kruse's responsibilities within NOAA included member on the NOAA Research Council and chair of the Research Council Social Science Committee. She was co-chair of the ad hoc committee for Scientific Integrity. At the interagency level, she served as a member of the OSTP Subcommittee on Social, Behavioral and Economic Sciences, OSTP Subcommittee on Ocean Science and Technology and was co-chair of the Ocean Social Science Interagency Working Group. On April 20 an explosion of the drilling rig known as the Deepwater Horizon triggered a response from NOAA that involved all line offices. Dr. Kruse was lead in the social science thematic area for the NOAA Deepwater Horizon Science Team and served on the National Incident Command Economic Solutions Team.

Professor Alan Kirman: University de Marseille, France

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Alan Kirman is Professor Emeritus of Economics at Aix Marseille Université and at the Ecole des Hautes Etudes en Sciences Sociales and is a member of the Institut Universitaire de France. His PhD is from Princeton and he has been professor of economics at Johns Hopkins University, the Université Libre de Bruxelles, Warwick University and the European University Institute in Florence. He was elected a fellow of the Econometric Society and of the European Economic Association and was awarded the Humboldt Prize in Germany. He is a Member of the Institute for Advanced Study in Princeton. He has been a frequent visitor to the Santa Fe Institute. He has supervised more than 40 PhD theses.

His research has recently focused on the relationship between individual and collective economic behaviour and the role of direct interactions between economic agents in determining aggregate outcomes. His work is particularly focused on how economic systems can suddenly develop crises without any exogenous shock. He has also worked on general equilibrium theory, international trade, game theory, information, social choice, networks and economic justice. He has published 150 articles in international scientific journals. He is the author and editor of twelve books and his most recent one was published in July 2010 by Routledge and is entitled *Complex Economics: Individual and Collective Rationality*.

Professor Urs Luterbacher: Graduate Institute of International Relations, Geneva, Switzerland
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Urs Luterbacher is a Professor emeritus of Political Science at the Graduate Institute of International and Development Studies in Geneva Switzerland where he is now a Director of Research. He took his Licence and PhD degrees from the University of Geneva after doing graduate work at the University of Michigan. Prof. Luterbacher has done work on dynamic models of arms races, the general theory of conflict and cooperation, political systems modeling and more recently on the analysis of conflict and cooperation related to environmental questions. Prof Luterbacher has been visiting professor at the University of Michigan and the University of Nebraska. He is the author of books and articles on Arms race modeling, Conflict and cooperation and International cooperation about global environmental change. His latest work on International relations and global climate change was published by MIT press. He is currently working on another edition of that book and on environmentally and emotionally induced conflicts.

Mr. Sebastien Massoni: University of Paris 1 Panthéon Sorbonne
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Sébastien Massoni is a PhD candidate at the University of Paris 1 Panthéon Sorbonne and the Paris School of Economics. He has a B.A. in microeconomics. His thesis is done under the supervision of Jean-Christophe Vergnaud and is concentrated on the formation and the elicitation of subjective beliefs. He tries to import different methods of cognitive sciences (psychophysics task, signal detection model) in experimental economics and decision theory. He also have some publications on applied public economics (education, health, career-path).

Professor Olivier Chanel: Groupement de Recherche en Économie Quantitative d'Aix-Marseille
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Dr. Olivier Chanel was born in 1967. He is a CNRS (National French Research Council) senior researcher at GREQAM, a member of the Aix-Marseille School of Economics and the Institute in Public Economics. His research focuses on microeconometrics applied to cultural goods, environment, health, industrial organization and stated preferences methods. He has authored of 32 articles in referred journals and 6 contributions to books, one as co-editor, acted as an expert (WHO, EU, INSERM) and participated in 12 government-funded projects.

Professor Louis Narens: University of California, Irvine
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Louis Narens is a Professor in the Department of Cognitive Sciences, Department of Logic and Philosophy of Science, and Institute of Mathematical Behavioral Sciences at UC Irvine. His research areas are foundations of measurement, theoretical and experimental psychophysics, metamemory, decision theory, and foundations of probability. His work in the behavioral sciences is somewhat unusual in that it incorporates ideas from mathematical and philosophical logic into psychological theory and experimentation.

Professor Bala Rajaratnam: Stanford University

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Bala Rajaratnam is a mathematical scientist from Stanford University. He received his MS/PhD from Cornell University under the supervision of Michael Nussbaum in the Department of Mathematics and Martin Wells in the Department of Statistical Science. His postdoctoral research have been undertaken at SAMSI/Duke University, Stanford and Cambridge University. He is currently a faculty in the Department of Statistics at Stanford University. He also has a joint appointment in the Department of Environmental Earth System Science, and an affiliated faculty appointment at the Woods Institute for the Environment at Stanford University. His research interests span the various subfields of mathematical sciences, including mathematical statistics, probability, algebra, analysis, graph theory and optimization. His research also spans various applications including earth/geosciences, genomics, economics and quantitative finance.

Bala Rajaratnam received the DARPA young faculty award, DARPA's distinguished career award, in Mathematics in 2011. He was also awarded the mathematical geosciences award by the National Science Foundation, and was ranked first in the nation for the collaborative mathematical geosciences awards. He was an invited contributor to the writing of the recent national white paper on mathematical geosciences. He has also been the recipient of several other awards and recognitions. He has been a keynote and invited speaker at various workshops/conferences/seminars

Mr. Armon Rezai: Vienna University of Economics and IIASA, Austria

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Armon Rezai is an assistant professor in environmental economics at the Vienna University of Economics and Business (WU) and a guest researcher at the International Institute for Applied Systems Analysis (IIASA). He earned a doctorate in economics from The New School for Social Research and his work focuses on macroeconomic topics, such as growth and distribution, and their application to ecological problems like climate change. Before joining his current department, he worked as research assistant at the United Nations University's World Institute for Development Economics Research in Helsinki and the Schwartz Center for Economic Policy Analysis in New York. He has also worked as a short-term consultant for the World Bank and has been a Fulbright fellow and visiting fellow at the University of California at Berkeley and Oxford University.

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Professor Maria Victoria Rivas: Facultad de Informática Universidad Complutense de Madrid, Spain

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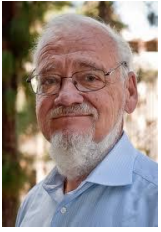


Maria Victoria Rivas holds the position of Associate Professor of Financial Mathematics at the Complutense University of Madrid (Felipe II College, Campus Aranjuez.). Her research was focused on: EU Solvency II, copula theory, catastrophic risks, alternative risk transfer products as cat bonds, industry loss warranties, alternative reinsurance and captives insurance companies.

She has been collaborating with SAS Business Intelligence in the implementation of Solvency II in the Spanish insurance and reinsurance companies from 2007 to 2009. Moreover, She has been visiting scholar at Berkeley University (Center for Catastrophic Risk Management, Harvard University (The Center European Studies) and Columbia University (Statistics Department). She serves as an external risk management consultant to insurance firms in Spain and Peru.

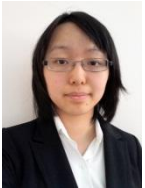
She holds a Ph.D. in Actuarial Science from Complutense University of Madrid and M.A in Insurance Management I.C.E.A. (with special honors) and Bachelor degree in Business Administration from Complutense University of Madrid.

Professor Brian Skyrms: University of California, Irvine & Stanford University
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Brian Skyrms is a Distinguished Professor of Logic and Philosophy of Science at University of California at Irvine and a professor of Philosophy at Stanford University. His most recent book is titled *Signals: Evolution, Learning and Information*, from Oxford University Press.

Ms. Zhounan Xie: Columbia University
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Zhounan is a rising junior in Columbia College from Michigan. She is pursuing a bachelors in mathematics-statistics with an economics background. She hopes to pursue a career in economics research, especially in the fields of behavioral and mathematical economics. Her hobbies include drawing and watching movies; she illustrates for the Columbia arts magazine and newspaper, the *Eye and Spectator* resp. Last summer she worked as an accounting and managerial assistant at Bernstein and Associates, Architects. Currently she is working for Professor Chichilnisky

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Peter Eisenberger has studied and worked in the applied sciences field for more than four decades. He started his career at Bell Laboratories in 1968 where from 1974-1981 he was a department head and his research interests involved using X-ray produced by Synchrotron radiation to study the structural properties of complex solids and surfaces. In 1981, Eisenberger joined Exxon Research and Engineering Company as Director of their Physical Sciences laboratory, where he remained until 1989.

In 1989, Dr. Eisenberger was appointed Professor of Physics and Director of the Princeton Materials Institute at Princeton University that he founded. From 1996-1999, he was appointed Vice Provost of the Earth Institute and Director of Lamont-Doherty Earth Observatory at Columbia University and today is a Professor of Earth and Environmental Sciences at Columbia, currently on sabbatical leave. Eisenberger also was a director at Cross Border Exchange from 2000-2003.

Throughout his work career, Eisenberger has remained active in various academic roles and scientific associations. He was a consulting professor at Stanford University's Applied Physics Department from 1981-1987, chair of the Advanced Photon Steering Committee and a participant in National Academy of Sciences (NAS) and Department of Energy (DOE) studies. Eisenberger is a fellow of both the American Physical Society and the American Association of the Advancement of Science. He was one of the authors of the National Action Plan for Materials Science and Engineering and was a member of the Commission of the Future of the National Science Foundation (NSF). He was chair of the Advisory Committee in the

Mathematical and Physical Sciences Division of the NSF. Additional affiliations include Chairman of the Board of the Invention Factory Science Center, Member of the Board of Trustees for New Jersey's Inventors Hall of Fame, Director of Associated Institutions for Materials Science, and organizer of several NSF/DOE Conferences. He was appointed by the Governor of New Jersey to the New Jersey Commission on Science and Technology and is a member of the GEO2000 Task Force of the NSF.

Peter Eisenberger attended Princeton University from 1959-1963, where he received a B.A. in Physics with honors. He received a Woodrow Wilson Fellowship for his first year at Harvard University and a Harvard Fellowship for his second year. He graduated in 1967 from Harvard University with Ph.D. in Applied Physics and remained at Harvard for one year as a Post Doctoral Fellow, where he did research in both biophysics and on the polaron problem.

Professor Graciela Chichilnisky: Columbia University

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Graciela Chichilnisky is a Professor of Economics and Mathematical Statistics at Columbia University, Director of Columbia Consortium for Risk Management (CCRM), a former Senator and UNESCO Chair in Mathematics and Economics at Columbia University, and Principal Investigator for the AFOSR grant number: 5222-72. Dr. Chichilnisky is also the Founder and Managing Director of Global Thermostat LLC and is a world renowned economist and mathematician. The Washington Post has called her an "A-List Star," and she appeared in the 2009 Time Magazine on "Heroes of the Environment." Dr. Chichilnisky acted as a US Lead Author of the Intergovernmental Panel on Climate Change, which received the 2007 Nobel Prize. She is a special adviser to several UN organizations and heads of state and US Congress, and is the author of the carbon market of the UN Kyoto Protocol that became international law in 2005. She also created the concept of Basic Needs voted by 153 nations at the 1993 UN Earth Summit to be the cornerstone of Sustainable Development, and in 1996 created the formal theory of Sustainable Development that is used worldwide. Dr. Chichilnisky has a Masters and a PhD in Mathematics from MIT and UC Berkeley, and a second PhD in Economics from UC Berkeley.

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