

INTERNATIONAL SYMPOSIUM ON

Climate Geoengineering

JUNE 10 - 11, 2019
RIO DE JANEIRO, BRAZIL



Symposium Motivation DIA 10 DE JUNHO / 10:00H



Why we are discussing this?

Paulo Artaxo é professor titular de física ambiental da Universidade de São Paulo (USP). Trabalhou na Universidade de Harvard (EUA), nas universidades de Lund e Estocolmo (ambas na Suécia), entre outras, assim como no Centro de Voos Espaciais Goddard da NASA (EUA). Seu foco é em mudanças climáticas e no papel dos aerossóis no clima e no ecossistema amazônico. Atua intensamente no Painel Intergovernamental sobre Mudanças Climáticas (IPCC, na sigla em inglês), sendo autor principal de diversos relatórios do grupo (AR4, AR5 e AR6 e o Relatório Especial em Mudanças do Clima e do Solo). Atua, ainda, no Programa das Nações Unidas para o Meio Ambiente (UNEP, na sigla em inglês) para o 6º Panorama Ambiental Global (GEO-6, na sigla em inglês). Artaxo é um dos cientistas brasileiros mais citados no mundo. É membro titular da Academia Brasileira de Ciências, da Academia Mundial de Ciências (TWAS) e da Associação Americana para o Avanço da Ciência (AAAS, na sigla em inglês). Recebeu o título de Doutor Honoris Causa da Universidade de Estocolmo (2009), na Suécia, e o Prêmio Almirante Álvaro Alberto, do Ministério de Ciência, Tecnologia e Inovação do Brasil (2016).

Geoengineering Overview DIA 10 DE JUNHO / 10:15H



Introduction to Solar Geoengineering

Alan Robock is a Distinguished Professor of climate science in the Department of Environmental Sciences at Rutgers University. He lived in Brazil for two years while his father worked for the United Nations there, attending kindergarten (Chapeuzinho Vermelho) in Rio and first grade in Fortaleza. He graduated from the University of Wisconsin, Madison, in 1970 with a B.A. in Meteorology, and from the Massachusetts Institute of Technology with an S.M. in 1974 and Ph.D. in 1977, both in Meteorology. Before graduate school, he served as a Peace Corps Volunteer in the Philippines. He was a professor at the University of Maryland, 1977-1997, and the State Climatologist of Maryland, 1991-1997, before coming to Rutgers. Prof. Robock has published more than 400 articles on his research in the area of climate change, including 250 peer-reviewed papers. His areas of expertise include geoengineering, climatic effects of nuclear war, effects of volcanic eruptions on climate, and soil moisture. He serves as Associate Editor of Reviews of Geophysics, the most highly-cited journal in the Earth Sciences. His honors include being a Fellow of the American Geophysical Union (AGU), the American Meteorological Society (AMS), and the American Association for the Advancement of Science, and a recipient of the AMS Jule Charney Award. Prof. Robock was a Lead Author

of the 2013 Working Group 1 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (awarded the Nobel Peace Prize in 2007). In 2017 the International Campaign to Abolish Nuclear Weapons was awarded the Nobel Peace Prize for “for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its groundbreaking efforts to achieve a treaty-based prohibition of such weapons” partly based on the work of Prof. Robock.

Dr. Robock testified at the first U.S. first Congressional hearing on geoengineering in 2009, and is the co-founder and co-leader of the Geoengineering Model Intercomparison Project, which has been conducting climate model simulations of the impacts of schemes to reflect sunlight to cool Earth since 2010. He served on AMS and AGU committees to write policy statements on geoengineering, now more commonly called climate intervention, and he was the co-chair of the inaugural Gordon Research Conference on Climate Engineering: Radiation Management Climate Engineering: Technology, Modeling, Efficacy, and Risks in 2017. He has published 57 papers on the topic of geoengineering.



Hydrological impacts of solar radiation management in La Plata Basin

Inês Camilloni is Full Professor at the Department of Atmospheric and Oceanic Sciences at the School of Sciences of the University of Buenos Aires (UBA) and Independent Researcher of the Argentina National Research Council (CONICET), Argentina. She is currently Director of the master’s in environmental sciences (UBA). She has a PhD in Atmospheric Sciences from the University of Buenos Aires. Her research focuses on Climate Variability and Change in South America, acting on the following subjects: climate scenarios, climate change impacts, cities and climate change. She has authored several peer-reviewed scientific journal articles, book chapters and books. She has participated or coordinated many research projects related with these subjects. Currently she is the Principal Investigator of the project Hydrological impacts of solar radiation management in the La Plata Basin in South America funded by DECIMALS: She has been Lead Author of the IPCC AR5-WG1 and SR15 reports and currently she is Review Editor of the IPCC AR6-WG1.



Stratospheric solar geoengineering research: the need for laboratory and outdoor experiments

Frank Keutsch received his Diplom in chemistry from the Technische Universität München, Germany, under the supervision of Vladimir E. Bondybey in 1997. He received his Ph.D. in physical chemistry from the University of California at Berkeley in 2001. His graduate research was conducted under the direction of Richard J. Saykally and focused on vibration–rotation–tunneling spectroscopy and hydrogen-bond-breaking dynamics in water clusters. After working on stratospheric chemistry in the Department of Chemistry and Chemical Biology at Harvard University under the direction of James G. Anderson he started his independent academic career in 2005 at the University of Wisconsin-Madison. He then moved to his current position as Stonington Professor of Engineering and Atmospheric Science at Harvard University. His research combines laboratory and field experiments with instrument development to investigate fundamental mechanisms of anthropogenic influence on atmospheric composition within the context of impacts on climate, humans and the environment.



Multiscale Modeling of CO2 Flow and Storage in Pre-Salt Reservoirs: Perspectives and Challenges

Marcio Murad is researcher of the National Laboratory of Scientific Computing and has received his Doctorate Degree in Mechanical Engineering, from Pontifical Catholic University of Rio de Janeiro, on 1990.



Benefits and Risks of Solar Geoengineering

Alan Robock is a Distinguished Professor of climate science in the Department of Environmental Sciences at Rutgers University. He lived in Brazil for two years while his father worked for the United Nations there, attending kindergarten (Chapeuzinho Vermelho) in Rio and first grade in Fortaleza. He graduated from the University of Wisconsin, Madison, in 1970 with a B.A. in Meteorology, and from the Massachusetts Institute of Technology with an S.M. in 1974 and Ph.D. in 1977, both in Meteorology. Before graduate school, he served as a Peace Corps Volunteer in the Philippines. He was a professor at the University of Maryland, 1977-1997, and the State Climatologist of Maryland, 1991-1997, before coming to Rutgers. Prof. Robock has published more than 400 articles on his research in the area of climate change, including 250 peer-reviewed papers. His areas of expertise include geoengineering, climatic effects of nuclear war, effects of volcanic eruptions on climate, and soil moisture. He serves as Associate Editor of Reviews of Geophysics, the most highly-cited journal in the Earth Sciences. His honors include being a Fellow of the American Geophysical Union (AGU), the American Meteorological Society (AMS), and the American Association for the Advancement of Science, and a recipient of the AMS Jule Charney Award. Prof. Robock was a Lead Author of the 2013 Working Group 1 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (awarded the Nobel Peace Prize in 2007). In 2017 the International Campaign to Abolish Nuclear Weapons was awarded the Nobel Peace Prize for “for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its groundbreaking efforts to achieve a treaty-based prohibition of such weapons” partly based on the work of Prof. Robock.

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Impacts on the Earth Ecosystems

Jean Pierre Ometto is Currently Senior Researcher at the Brazilian Institute of Space Research and Coordinator of the Earth System Science Center (CCST / INPE). Postgraduate Professor at CCST / INPE; Associate Professor at the PPG-Ecology of the Federal University of Juiz de Fora; and, Collaborating professor at NEPAM (UNICAMP). I started my scientific work with a focus on biogeochemistry, stable isotopes and interactions among the components of the biosphere, including "anthropic landscapes". Recently, my academic and research activities are centered on the diagnosis and prognosis of anthropogenic activities and climatic changes, in natural biogeochemical processes, land use and land cover, greenhouse gas emissions and sustainability indicators; with contributions to the Brazilian government on issues related to the quantification of carbon emissions of the LULUCF sector. Appointed IPCC contributor to WG-II (for AR5 cycle) and Task Force on GHG emissions inventories; for IPBES on Regional and Subregional Scope Evaluation; and for the Climate and Clean Air Coalition to Reduce Short-Term Climate Pollutants (CCAC) in Latin America; Brazilian representative of the Executive Board of the Inter-American Institute for Global Change Research (IAI); Regional Director of the International Nitrogen Initiative (INI); Member of the Coordination of the FAPESP Program of Research on Global Climate Change; Vice-Coordinator of the Brazilian Research Network on Global Climate Change (CLIMA Network).



Give me half a tanker of iron and I'll give you the next ice age (John Martin) - Reflexões sobre a resposta dos ecossistemas marinhos à projetos de geoengenharia

Frederico Pereira Brandini Defendeu o Mestrado em 1981 na atual Tokyo University of Marine Science and Technology (Japão), e o Doutorado em 1986 no Instituto Oceanográfico da USP. Foi bolsista da Fundação Humboldt durante o Pós-Doutorado no Alfred-Wegener Institute for Polar and Marine Research, Alemanha. Sua pesquisa foca nos processos biogeoquímicos em ecossistemas costeiros, na plataforma continental brasileira e na bacia oceânica adjacente. Participou de 12 cruzeiros oceanográficos no Oceano Atlântico Sul, entre o sul do Brasil e a Península Antártica, em colaboração com pesquisadores argentinos e alemães. Foi professor do Centro de Estudos do Mar da UFPR (Paraná) e Diretor da Unidade entre 1994 e 1998), de onde se aposentou em 2009 com o título de Professor Emérito outorgado pelo Conselho Universitário. Em 2009 assumiu a vaga de Professor Titular no Departamento de Oceanografia Biológica do Instituto Oceanográfico da USP (Diretor entre 2013 e 2017). Em 2014 trabalhou como Cientista Visitante no Department of Marine and Coastal Sciences da Universidade Rutgers, EUA, analisando bancos de dados biogeoquímicos no setor oeste da Península Antártica nos últimos 30 anos, região vulnerável à perda de gelo marinho por conta do aquecimento global. Em março e abril desse ano trabalhou como Research Scholar na School of Marine Science and Technology (UMassD, EUA). Já supervisionou 24 Dissertações de Mestrado e 12 Teses de Doutorado e várias Monografias de Graduação e de Iniciação Científica. Até o presente publicou 80 artigos em revistas especializadas nacionais e internacionais, 47 artigos de divulgação, 11 Capítulos em Livros, 2 livros internacionais editados e 2 livros publicados. Também colaborou no âmbito governamental entre 1994 e 1998 como (i) Membro do Comitê de Ciências do Mar do então MCT, (ii) Chairman do Programa Ocean Science and Living Resources do Brasil da Comissão Oceanográfica Intergovernamental (UNESCO, Paris), (iii) Representante Brasileiro no Scientific Committee on Oceanic Research e (iv) Membro do Comitê Assessor de Oceanografia do CNPq entre 1996 e 1998.



Climate modelling uncertainties: implication for geoengineering studies

Pedro Leite da Silva Dias received his Bachelor degree in Applied Mathematics (Univ. of São Paulo/USP in 1974), MSc and PhD in Atmospheric Sciences by the Colorado State University in 1977 and 1979, respectively. Professor at the Institute Geophysics and Atmospheric Sciences - IAG/USP since 1975. Current position as Director of the Institute of Astronomy, Geophysics and Atmospheric Sciences of the University of São Paulo. Former Director of the National Laboratory for Scientific Computing of the Ministry of Science and Technology. (2007-2015) Member of the Brazilian Academy of Sciences. Won the Scientific Honor Recognition by the Ministry of Science and Technology in 2002 and recognized by the American Meteorological Society for his contribution to the South American Meteorology. Visiting Researcher at NCAR and NCEP in the USA in several occasions. Senior researcher of the National Institute for Space Research (INPE) and head of the Center of Weather Forecasting and Climate Research (CPTEC) between 1988 and 1990. President of the Brazilian Meteorological Society between 1992 and 1994 and Science Director of the Society from 2006 to 2008. Coordination of the Environmental Area of the Institute of Advanced Studies of USP from 1996 to 2007 and the Regional Weather and Climate Studies Laboratory (MASTER) at USP. Published about 135 papers and book chapters, mostly in international journals and about 240 complete papers in national and international scientific events. Advisor of more than 65 MSc and PhD students. Participated in a large number of international committees of the World Meteorological Organization and international and national science panels. . Areas of expertise: tropical/extratropical interactions with emphasis on the role of tropical heat sources, numerical weather and climate modeling, operational weather prediction, climate variability and change and environmental issues.

Governance DIA 11 DE JUNHO / 9:30H



SRMGI: building the capacity of developing countries to evaluate SRM

Andy Parker has worked on solar radiation management geoengineering (SRM) for over a decade, first as a Senior Policy Adviser at the Royal Society, then as a Research Fellow at the Harvard Kennedy School and the IASS Potsdam. He is currently the Director of the SRM Governance Initiative (SRMGI), for which he has been the main architect since it was launched in 2010. SRMGI is an international, NGO-driven project that seeks to build the capacity of developing countries to evaluate SRM. Andy developed SRMGI's programme of engagement workshops in the Global South before designing and implementing the DECIMALS Fund: the world's first international SRM research fund and the first helping researchers in developing countries model how SRM could affect their regions.

Andy has published academic papers on topics including SRM research governance, the risks of termination shock, and counter-geoengineering, and has had commentary pieces published in the Washington Post, Nature Geoscience and Nature. He was a member of the UN Convention on Biological Diversity's expert working group on geoengineering and is currently an honorary Senior Research Fellow at the University of Bristol.



Kai-Uwe B. Schmidt builds on more than 20 years of international and senior level working experience including at the executive office of the secretary-general of the United Nations, at the secretariat to the United Nations Framework Convention on Climate Change, at the World Bank, and as independent senior advisory work. As a senior member of the secretary-general's Climate Change Support Team, Schmidt contributed to the coordination of the global climate change summit in 2009 and was part of the secretary-general's team in Copenhagen. Leading towards, in and after the Paris climate change agreement in 2015, he led the team's work on setting the foundations for the Global Climate Action agenda which mobilizes thousands of companies, hundreds of cities, and sub-national authorities in collaboration with governments, the UN, IGOs, and NGOs

Schmidt's experience has covered public policy design, regulatory design, and implementation of global emissions trading and offset instruments. He has coordinated high-level events, navigating the interface of international negotiations with private sector, intergovernmental, and non-governmental organizations focusing on private sector engagement in climate change and development action at international, national, sub-national, city, and company/NGO levels. He holds a Master of Finance and Economics of the University of Geneva, Switzerland.



Geopolitics and Governance of Climate Geoengineering

Eduardo Viola received his doctorate degree at Science Politics from Universidade de São Paulo (1982). He is currently full professor at Universidade de Brasília. Has experience in Political Science, focusing on International Politics, acting on the following subjects: globalizacão, governabilidade global, ambientalismo, brasil and desenvolvimento sustentável.

As normas internacionais de regulamentação das mudanças climáticas



Claudia Perrone-Moisés é Professora Associada (Livre-docente) do Departamento de Direito Internacional e Comparado da Faculdade de Direito da USP.



A Experiencia em Geoengenharia Climática do IVIG/COPPE/UFRJ

Marcos Freitas is graduate at Geographe from Universidade do Estado do Rio de Janeiro (1983), master's at Nuclear Engineering from Universidade Federal do Rio de Janeiro (1988) and ph.d. at Economie de l'Environnement from École des Hautes Études en Sciences Sociales (1994). Has experience in Energy and Environmental Planning, acting on the following subjects: energy, water resources, climate change, and amazônia, infrastructure and environment.



Governance of international treaties on environment and sustainable development

Manuel Rodríguez-Becerra is Industrial Engineer, Universidad de Los Andes, Bogotá, and a B.Litt. in Management Studies, Oxford University, UK. Currently, Emeritus Professor, Sustainable Development Goals Center for Latin America and the Caribbean (CODS) and School of Management, Universidad de Los Andes. From 1990 to 1993, General Director of the National Institute of Natural Resources and the Environment, INDERENA: coordination and development of Law 99 of 1993 which gave way to the National Environmental System; 1994, first Environment Minister of Colombia.

Co-chair, Intergovernmental Panel of Forests of the United Nations (1995-97); chair, United Nations Forum on Forests (2004-2005) and member of the World Commission on Forests and Sustainable Development (1994-1998). Cofounder and board president: (1) National Environmental Forum (1998-present); (2) National Parks Alliance (2017- present). Cofounder: CODS (2018).

Governance and Science´s Future at the Latin America DIA 11 DE JUNHO / 15:20H



Fragmented International Governance and the Role of Regional Organizations

Marcos Regis da Silva holds the position of Executive Director with the Inter-American Institute for Global Change Research (IAI). In this capacity, he is responsible for the strategic direction of the IAI, implementation of its strategic plan and scientific agenda and leadership regarding the role of the IAI in the current environmental governance discussions. Prior to joining the IAI, he held the position of Chief, Knowledge Management and Outreach Services at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In this role, he provided CITES Parties with advice in the implementation of new electronic trade procedures and technologies to ensure that international trade in CITES-listed species was legal, sustainable and traceable. He was previously with the Convention on Biological Diversity (CBD) as Program Officer, Clearing-House Mechanism where he worked with CBD Parties to facilitate and promote technical and scientific cooperation. Before joining the United Nations, Marcos was a Programme Officer with the NAFTA Commission on Environmental Cooperation (CEC) where he worked to establish the North American Biodiversity Information Network, perhaps the first global interoperable network of biodiversity data. He holds a PhD from McGill University where he was an Adjunct Professor for many years.



Geoengineering: the need for governance - an international perspective

Kai-Uwe B. Schmidt builds on more than 20 years of international and senior level working experience including at the executive office of the secretary-general of the United Nations, at the secretariat to the United Nations Framework Convention on Climate Change, at the World Bank, and as independent senior advisory work. As a senior member of the secretary-general's Climate Change Support Team, Schmidt contributed to the coordination of the global climate change summit in 2009 and was part of the secretary-general's team in Copenhagen. Leading towards, in and after the Paris climate change agreement in 2015, he led the team's work on setting the foundations for the Global Climate Action agenda which mobilizes thousands of companies, hundreds of cities, and sub-national authorities in collaboration with governments, the UN, IGOs, and NGOs

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How CCS can help to tackle the Climate Change challenge

Alexandre Breda joined Shell Brazil in December 2013; he holds a B.Sc. degree in Mechanical Engineering from Unicamp (University of Campinas) with a Master in Energy from USP (University of Sao Paulo). He has also a Black Belt (Six Sigma Academy-Arizona) and followed courses in Business Strategy and Management (Unicamp) and Legal Contracts for Infrastructure (FGV-Law).

Prior joining Shell, he worked for Comgas, Cummins Power Generation and BG Group; he has a solid experience in new business development, gas supply chain, climate change and greenhouse gases, project management, contract negotiation, renewables integration with natural gas and end-use of gas, mainly cogeneration and air conditioning. At Shell, he is responsible for the CO₂ Abatement R&D Projects in Brazil, aiming the growth of CCUS and Methane Emissions technology solutions, working with leading universities and suppliers through open innovation.
