

# Alliance Summer School in Science and Policy 2014

 COLUMBIA | SIPA  
School of International and Public Affairs

THE EARTH INSTITUTE  
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## Climate Change Research: The Nexus of Natural and Social Sciences

Created in the fall 2002, the Alliance Program is a non-profit transatlantic joint venture between Columbia University and three prestigious French institutions: the École Polytechnique, Sciences Po, and Panthéon-Sorbonne University.

The Alliance Summer School began as a student-led initiative in 2012 in effort to promote interdisciplinary exchanges between doctoral students at Alliance institutions researching the nexus of science and policy. The Summer School brings together world-class professors, industry experts, policy makers and PhD students at a weeklong event.

In anticipation for the UNFCCC COP21 in Paris, our focus this year was on climate change research, at the nexus of natural and social sciences. They spanned cutting edge research, policy and private sector practice on mitigation measures, adaptation to climate change, measures of the impacts of climate change, long-term perspectives and modelling. The presentations and workshop sessions fostered potential research collaborations and promoted the exchange of ideas.

This year's summer school took place in Paris, France. It was hosted by Columbia University, in Reid Hall, a building that the University owns in the cultural and academic heart of Paris: the *Quartier Latin*.

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## Program

### Tuesday July 1

Organizing Team	Introduction
Claude Henry	Decision under Uncertain albeit Reliable Science
Antonin Pottier	Why are climate policies of the present decade so crucial for keeping the 2°C target credible?
Michel Maschi	How a big utility faces the energy challenges

### Wednesday July 2

Franck Lecocq	IPCC WGIII Report: Key Insights
Laurence Tubiana	Climate Change Negotiations and the Long Term Goal
Workshop	Out of Area: Fertilizing Novel & Interdisciplinary Ideas
Henri Waisman	International climate policy and national deep de-carbonization pathway
Welcome Reception	Laurence Tubiana

### Thursday July 3

Alain Adrianssens	Consequences of climate change on the railway system: the SNCF strategy
Chandra K.B. Krishnamurthy	The Economics of Climate Change: Major issues and challenges
Workshop	New Anchors of Climate Change Research
Herve Le Treut	Adaptation and mitigation: new challenges for climate sciences

### Friday July 4

Matthieu Glachant	The Impact of Energy Prices on Energy Efficiency: Evidence from the UK Refrigerator Market
Eric Strobl	The Challenges of Measuring the Economic Impact of Natural Disasters
Patrick Kinney	The role of public health in climate change adaptation and mitigation planning
Jean Jouzel	Deciphering the IPCC AR5 WGI

### Monday July 7

N. Todd and A-J. Valleron	The Impact of Climate of Mortality in Developed Countries: History and Perspectives
Céline Guivarch	Climate Change Mitigation Costs: What can we learn from a large number of scenarios?
Workshop	New Anchors of Climate Change Research: Breakout Groups
Workshop	Presentation Preparation

### Tuesday July 8

John Mutter	Scientists and the policy process: why do we get it wrong?
J-P. Ponsard	Climate change and business strategies in a world of unequal carbon prices
Workshop	Student Presentations
John Mutter	Closing Remarks
Nicolas Couderc	Climate change – What is at stake for the energy sector?
Closing Reception	Fondation EDF

## Speakers biographies and presentations

### **Claude Henry – Decision under Uncertain albeit Reliable Science**

*Claude Henry is a physicist turned economist. He is currently professor of sustainable development at Sciences Po Paris and at Columbia University. He is president of the Scientific Council of IDDRI. He is also a member of Academia Europea, and a Fellow of the Econometric Society.*

Claude Henry introduced the difficulties for scientists to cope with uncertainty in building models or developing theories. He showed how, at the interface of science and public policy, scientific uncertainty could be used as a tool to inhibit public action. Drawing from a variety of domains, Claude Henry discusses how climate change uncertainty could be dealt with in order to unleash necessary mitigation policies.

### **Antonin Pottier – Why are climate policies of the present decade so crucial for keeping the 2-Celsius degrees target credible?**

*Antonin Pottier is a research scientist at Cerna, at the School of Mines ParisTech, and teaches at EHESS and HEC. He recently graduated from CIRED.*

Following a brief presentation on the history of Integrated Assessment Models (IAM) and their common limitations, Antonin Pottier presents the framework and results of a [research project](#),



where he used an IAM with a threshold damage function to model a steep increase in damage when a 2°C target is overshoot. Many economic agents may become to find it optimal to overshoot the 2°C target and then face the resulting damage. This is the “Doomsday effect”. Pottier shows that this effect happens for any level of jump in damage and dramatically increase from the 2010-2020 decade on. Any further delay in reaching a clear international agreement closes the window of opportunity to meet the 2°C target, since policy makers may then become reluctant to implement ambitious climate policies as they believe it is too late to act and are struck by the “doomsday effect.”

### **Michel Maschi (EDF) – How a big utility faces the energy challenges**

*Former Executive vice-President of Unistar Nuclear Energy, wholly-owned EDF subsidiary in the United States, Michel Maschi is now Director of R&D’s global operations of EDF.*

Michel Maschi discusses the challenges that a big utility like EDF faces in a changing energy environment. Michel Maschi highlights the needs for EDF to stay connected with policy makers, while investing heavily in R&D in order to develop a wide variety of technologies that will be needed to face an increasingly varied demand. He presents the wide variety of investments that EDF is making in research in energy production and storage, including in partnerships with universities around the world.

### **Laurence Tubiana – Landing the climate regime in Paris 2015 COP21**

*Laurence Tubiana is founder of IDDRI, Professor and Director of the Sustainable Development Center at Sciences Po Paris, as well as Professor of International Affairs at Columbia University. She has served as co-chair of the Sustainable Development Solutions Network (SDSN)'s Leadership Council and co-chairs the SDSN working group on Deep Decarbonization Pathways. Since March 2014, she is the Special Representative for the 2015 Paris Climate Conference (COP-21).*

Laurence Tubiana presents the challenges and opportunities to reach an ambitious international agreement on Co2 emissions at the Paris Conference. She discusses the controversies around the 2°C target which is viewed to be either not ambitious enough or impossible to achieve. For Prof. Tubiana, it is urgent to shift from long-term targets to short term solutions. What is at stake in Paris is to create a favorable environment to align expectations of governments, companies, civil society and cities. Since it seems improbable to set a global common carbon price, it will be important to propose a variety of signals for all stakeholders to launch deep de-carbonization of the economy. The key challenge of our time is to create an environment that would shift investments to a low-carbon economy.



### **Franck Lecocq – Insights on IPCC's 5<sup>th</sup> AR WG III**

*Franck Lecocq is Director of CIRED. He is also a member of the French Economic Council for Sustainable Development. Franck Lecocq is a lead author of the IPCC 4th and 5th Assessment Reports (Working Group III).*

Franck Lecocq presents the process of the IPCC, and the content of the three reports: the summary for policy makers, the technical summary and the full report. He then presents conclusions of Chapter 4, "Sustainable Development and Equity", to which he contributed. This chapter focuses on mitigation measures. With no mitigation, global mean surface temperature might increase by 3.7°C to 4.8°C over the 21<sup>st</sup> century. Chapter 4 reviews existing literature on mitigation measures on both the supply side and the demand side. Substantial reductions in emissions would require large changes in investment patterns, as well as a collaboration of all stakeholders. The two major challenges are: de-GDP growth and GHG emissions, and rethinking the content of growth. Both require large changes in investment patterns.

### **Henri Waisman – International climate policy and national deep decarbonization pathways**

*Henri Waisman is an Economist and the coordinator of the Deep Decarbonization Pathways Project (DDPP) within the Climate Program at IDDRI. The Deep Decarbonization Pathways Project, launched under the auspices of the UN-Secretariat General, includes 31 institutions and research centers from 12 countries/regions playing a key role in the issue of climate change.*

After a discussion on the importance of keeping the 2°C target, Henri Waisman presents the Deep De-carbonization Projects (DDP) approach, and lays down the main points of their realizations. The DDPs are national bottom-up and long-term analysis: they lay down a set of sector disaggregated and explicit pathways to decarbonize the national economy and lean towards the 2°C target. A

“backcasting” (opposed to forecasting) approach builds a pathway from the end-point target to reconstruct the transition. For Prof. Waisman, the DDP are complementary to the global negotiations on climate. By going beyond the global vision, the DDPs intend to address the real specificities – economic, technical and social- of involved countries. The DDPs are meant to improve the credibility of low-emission pathways and favor their appropriation by national policymakers. They also favor learning and dialog across countries, and provide aspirational long-term objectives.

#### **Alain Adrianssens (SNCF) – Consequences of climate change on the railway system: the SNCF strategy (an example: the flood topic)**

*Since March 2012, Alain Adrianssens is Head of Environment and Sustainability Unit of SNCF, the main French Railways Company.*

Mr. Adrianssens presents the strategy of the SNCF to cope with both the long-term increase in temperature and prepare for extreme climate events. In July 2011, the French government organized a national climate change adaptation plan where all network companies had to prepare a



long-term plan to adapt to climate change. SNCF’s adaptation plan, “Climat D-Rail 2050”, consists of: 1) developing an accurate climate change risks cartography, 2) choosing prevention and crisis management plans, 3) developing alternative mobility solutions, 4) deciding climate governance and communication with stakeholders, making crisis exercises. Each component of the railway activity has to be taken into account: infrastructure, rolling stock, energy, and buildings.

#### **Chandra Kiran Krishnamurthy – Issues in Economics of Climate Change**

*Chandra Kiran Krishnamurthy is currently a post-doctoral researcher in environmental and resource economics at Umeå University, Sweden. He graduated from the PhD in Sustainable Development of Columbia University.*

Chandra Kiran Krishnamurthy presents a survey of the economic frameworks to understand and model climate change. He further presents the main common points, difficulties and criticism of Integrated Assessment Models (IAMs), in which a climate model is coupled to an economic model in order to project the rise in temperature. Chandra Kiran Krishnamurthy defines and presents in detail the controversies around each parameter of the economic models used in IAMs: the utility function, the role of temperature, the damage function, the discount rate etc. IAMs are extensively used in policy simulations. Yet, IAMs are criticized for they do not model adaptation to climate change, have a simple approach on uncertainty. Chandra Kiran Krishnamurthy ends up his presentation by discussing the necessity of IAMs to foster decisions on climate change mitigation.



### Hervé le Treut

*Hervé Le Treut is a natural scientist. He is the director of the Institut Pierre Simon Laplace, and a member of the French Academy of Sciences. Through most of his career he was a senior scientist at CNRS (Centre National de la Recherche Scientifique), and he is now a professor at University Pierre et Marie Curie, as well as at the École Polytechnique. He is coordinating lead author of the IPCC 5th Assessment Report (Working Group I)*

Hervé Le Treut gives an introductory lecture on atmospheric science, defining the atmosphere and its components, the climate evolution, the climate models and scenarios. Climate science builds on knowledge developed in the mid 19<sup>th</sup> century, but knew a big jump thanks to the advance of computer science and the increasingly precise inputs of satellites. Professor Le Treut highlights the difficulty of providing accurate estimates of local changes in temperature and precipitations. Yet, large scale effects are dominant and predictive models convey one certainty: there is an unequivocal warming, and adaptation has become the necessary complement of mitigation measures. Professor Le Treut concludes his presentation on the central role of science and scientists in advising for efficient climate change policies. Science is not an output on this topic: it has become a central input.

### Matthieu Glachant – The impact of energy prices on efficiency: Evidence from the UK refrigerator market

*Matthieu Glachant is head of Cerna and a professor of economics at MINES ParisTech. He is also the director of the newly-created Interdisciplinary Institute on Innovation (i3). He is currently visiting senior fellow at the LES.*

Professor Glachant focused his presentation on the energy efficiency gap and consumer behavior regarding revealed time preference. He presented results from a study of refrigerator purchases in the United Kingdom which showed that refrigerator producers react strongly to changes in electricity prices in terms of the products that they offered, which suggested that policies targeted at improving the competition between firms may decrease the energy efficiency gap more than the traditional policies of offering consumer incentives.



### Eric Strobl – The challenge of measuring the economic impact of natural disasters

*Eric Strobl holds a Ph.D. in economics from the University of Dublin, Trinity College. He is currently an Associate Professor of Economics at École Polytechnique Paris.*

Professor Strobl began his presentation with an overview of the state of research on disasters, touching on both the scientific and economic literatures associated with this broad area of study. He emphasized how little we understand about disasters, both due to the inherent difficulties in defining precisely what is meant by natural disaster and due to the lack of a long academic tradition of studying disasters. He proposed some solutions for overcoming the difficulties as well as suggesting further directions for new research, including studying the reaction and recovery responses of different countries to natural disasters.

### **Patrick Kinney – The role of public health in climate change adaptation and mitigation planning**

*Patrick Kinney is Professor of Environmental Health Sciences at Columbia University. He is also the Director of Columbia's Climate and Health Program, at the Mailman School of Public Health.*

While many presentations focused on adaptations to climate change, professor Kinney's presentation looked specifically at the co-benefits of such adaptations, particularly those associated with public health. He concludes that climate change mitigation strategies may have large health benefits due to decreases in harmful local pollutants. He also showed how rising temperatures associated with climate change can have major impacts on public health in cities such as New York.



### **Jean Jouzel – Deciphering the IPCC AR5 WGI**

*Jean Jouzel obtained his diploma in Physical Chemistry from École Normale Supérieure de Chimie Industrielle, Lyon, in 1968. He is now Director of Research at the Atomic Energy and Alternative Energies Commission (CEA). He has been awarded numerous prizes, including the Milanković Medal of the European Geophysical Society in 1997 and the Revelle Medal of the American Geophysical Union in 2003. He has served as Vice Chair of the IPCC since 2002.*

Jean Jouzel presented the work of the IPCC Assessment Report 5, Working Group I, for which he served as a bureau member. He covered the evidence that global average temperatures have been increasing, as well as the changes in precipitation that have been observed over the past century. He also looked at the projections from the IPCC for temperature, sea level, ocean pH, and ice melt in response to the different carbon emissions scenarios used by the IPCC. He also noted the importance of uncertainties relating to cloud responses from increased warming, and how these translate into uncertainties about the future of the global climate.

### **Nicolas Todd & Alain-Jacques Valleron – The impact of climate change on mortality in developed countries: history and perspectives**

*Nicolas Todd graduated from the Ecole des Mines ParisTech and holds a master's degree in early modern history from Paris-Sorbonne University. He now begins a PhD on the transgenerational epigenetic consequences of the First World War.*

#### **Alain-Jacques Valleron**

*Alain-Jacques Valleron is Emeritus Professor at University Pierre et Marie Curie in Paris as well as a member of the French Academy of Sciences. He graduated from Ecole Polytechnique and holds a PhD in Sciences from University Paris 7. He has been elected to be a member of the French Academy of Sciences.*

Nicolas Todd discussed the history of climate impacts on human health and societies. They covered climate-induced natural selection, the impact of temperature on infectious disease, and more recent evidence on the relationship between temperature and mortality. They presented a model of climate adaptation for the past half century in France, which suggests geographical and temporal evidence of adaptation.

### **Céline Guivarch – Climate change mitigation: what can we learn from a large number of scenarios?**

*Céline Guivarch is a research scientist at CIREN, and teaches at Ponts ParisTech and ENSTA ParisTech. She has participated to numerous research projects including European Project ADVANCE and Climate Strategies. She obtained her PhD at CIREN after graduating from Ecole Polytechnique and Ponts ParisTech.*

Céline Guivarch's presentation focused on the costs of climate change mitigation and how they should be modeled. She discussed the importance of having many models and policy scenarios in order to reach an accurate and complete picture of the possibilities for the future. She emphasized the importance of policy design, noting that how mitigation policies are executed and their implications for other tax policies can be important factors in how costly mitigation would be. She also pointed out the possibility that technologies could act on these different policy choices in different ways, so that the progress of technology will affect the policy-makers decisions.



### **John Mutter – Scientists and the policy process: why do we get it wrong?**

*Jointly appointed as a professor in the Department of Earth and Environmental Sciences and the Department of International and Public Affairs at Columbia University, John Mutter served as deputy director of the Earth Institute for five years until 2007 and is a member of the Earth Institute Faculty. He is the Director of Graduate Studies for the PhD in Sustainable Development at Columbia University.*

Professor Mutter looked at how scientists interact with policy decisions, and noted the shortcomings of science as a means of informing policy. He targeted specifically the rhetoric of fear that is frequently used to try to achieve action on climate change and the reasons why this has not been successful. He also touched on some of the inherent difficulties in practicing and communicating science, questioning the sufficiency of the peer review process as well as the view that science is objective and autonomous from its practical societal consequences.

### **Jean-Pierre Ponssard – Climate change and Business Strategies in a World of Unequal Carbon Prices**

*Jean-Pierre Ponssard is emeritus research director at CNRS and associate research fellow at CIRANO professor of economics at Ecole Polytechnique and the head of the Laboratoire d'économétrie. He currently leads the "Business Sustainability" Research Project at Europlace Institute of Finance (EIF). In 2010 he received the excellence award from CNRS.*

Jean-Pierre Ponssard's presentation focused on leakage in carbon markets, the idea that incentivizing reduced carbon emissions may lead to reallocation of carbon emissions rather than reductions. He covered some proposed solutions, such as ex-ante and ex-post free allocations, as well as the idea of border trade adjustments. He examined closely the case of Spain within the EU Emissions Trading System as well as enumerating potential research topics aimed at improving the EU ETS.



## Participants and Workshops outcomes

The Paris Summer School brought together twenty-four students from various disciplines: about a third of students majored in economics, a third in Natural Sciences and another third in Policy and Humanities. This allowed for fruitful discussions bridging between fields and expertise.

The students were: (by alphabetical order):

Pierre André (PhD in Philosophy, La Sorbonne), Alice Ballat (PhD in Political Science, Sciences Po), Mehdi Benatiya Andaloussi (PhD in Sustainable Development, Columbia University), Mélody Braun (Climate Change Advisor at WorldFish), Yann Chavaillaz (PhD in Climate Science, LSCE), Quan Chen (PhD in Climate Science, LSCE), Celian Colon (PhD in Applied Mathematics, Ecole Polytechnique), Karl De Pryck (PhD in Political Sociology, Sciences Po), Henri De Ruiter (PhD in Environmental Sciences, Public Health and Nutrition), Fausto Di Quarto (Ph.D. in Urban Studies/ Sociology, Universita Milano-Bicocca), Eugénie Dugoua (PhD in Sustainable Development, Columbia University), Juliette Faure (Masters in Energy and Environment, Columbia University and Sciences Po), Timothy Foreman (PhD in Sustainable Development, Columbia University), Achim Hagen (Ph.D. in Economics, Carl von Ossietzky University Oldenburg), Monica Lafon Riojas (Masters in Environmental Policy, Science Po), Corentin Lemaire (Masters in Economics, CIRED), Jules Schers (PhD in Energy Economics, CIRED), Olivier Membrive (Ph.D in Climate Science, LMD, Ecole Polytechnique), Amélie Rajaud (PhD in Climate Science, LSCE), Jiaoyang Ruan (Ph.D. in Climate Science, LSCE), Ana Varela Varela (PhD in Sustainable Development, Columbia University), Jason Wong (PhD in Sustainable Development, Columbia University), Tianbo Zhang (PhD in Sustainable Development, Columbia University), Zina Skandrani (Ph.D. in Ecology, Museum National d'Histoire Naturelle).

Throughout the summer school, students worked in small groups to prepare presentations on topics that they selected from the speakers presentations and work. Five groups formed around:



- Rematerializing Economic models<sup>1</sup>
- Perception, Realism, and the 2°C Target
- Transdisciplinarity in the Case of Climate Change
- Adapting to Climate Change in Cities
- COP21 needs CAP21: Consumption-based Approach to Policy

<sup>1</sup> From Antonin Pottier's PhD thesis: *L'économie dans l'impasse climatique : développement matériel, théorie immatérielle et utopie auto-stabilisatrice*

## Organizers

### The Organization Team

The organizers are first year students in Columbia's PhD program in Sustainable Development:

Mehdi Benatiya Andaloussi  
Timothy Foreman  
Ana Varela Varela  
Jason Wong  
Tianbo Zhang



### PhD in Sustainable Development

The purpose of the Ph.D. in Sustainable Development is to create a generation of scholars and professionals equipped to deal with some of the most crucial problems in the world today. By combining elements of a traditional graduate education in social science, particularly economics, with a significant component of training in the natural sciences, the program's graduates will be uniquely situated to undertake serious research with the goal of sustainable development. The program includes a set of rigorous core requirements, but also provides students with the flexibility to pursue in-depth research in a broad variety of critical policy issue areas.

Since 2004, our Ph.D. program remains one of the most competitive doctoral programs at Columbia, admitting only 3-6% of applicants each year. With its unique emphasis on rigorous scholarship and research at the boundary between social and natural sciences, the Ph.D. in Sustainable Development has become the most sought after advanced degree of its kind in the world. All of our graduates have accepted academic positions as tenure-track professors or post-doctoral fellows, or high-level positions in the private sector.

## Partner Institutions



### Funding partners

*Alliance – Columbia University, SIPA – Ecole Polytechnique – Sciences Po Paris – IDDRI – EDF*



### Represented institutions

*Mines ParisTech – CIRED – Institut Pierre Simon Laplace – CNRS – CEA – INSERM – Umea University – SNCF – Sustainable Development Doctoral Society*

