International Scientific Conference

ABSTRACT BOOK

7-10 July 2015 • Paris, France
This Abstract book is based on a compilation of all abstracts selected for oral and poster presentations, as of 15 May 2015.

Due to the inability of some authors to attend, some of those works will therefore not be presented during the conference.
Welcome to the Conference

Welcome to Paris, welcome to ‘Our Common Future under Climate Change’!

On behalf of the High Level Board, the Organizing Committee and the Scientific Committee, it is our pleasure to welcome you to Paris to the largest forum for the scientific community to come together ahead of COP21, hosted by France in December 2015 (“Paris Climat 2015”).

Building on the results of the IPCC 5th Assessment Report (AR5), this four–day conference will address key issues concerning climate change in the broader context of global change. It will offer an opportunity to discuss solutions for both mitigation and adaptation issues. The Conference also aims to contribute to a science–society dialogue, notably thanks to specific sessions with stakeholders during the event and through nearly 80 accredited side events taking place all around the world from June 1st to July 15th.

When putting together this event over the past months, we were greatly encouraged by the huge interest from the global scientific community, with more than 400 parallel sessions and 2200 abstracts submitted, eventually leading to the organization of 140 parallel sessions.

Strong support was also received from many public French, European and international institutions and organizations, allowing us to invite many keynote speakers and fund the participation of more than 120 young researchers from developing countries. Let us warmly thank all those who made this possible.

The International Scientific Committee deserves warm thanks for designing plenary and large parallel sessions as well as supervising the call for contributions and the call for sessions, as well as the merging process of more than 400 parallel sessions into 140 parallel sessions. The Organizing Committee did its best to ensure that the overall organization for the conference was relevant to the objectives and scope. The High Level Board raised the funds, engaged the scientific community to contribute and accredited side events. The Conference Secretariat worked hard to make this event happening. The Communication Advisory Board was instrumental in launching and framing our communication activities on different media. We are very grateful to all.

We very much hope that you will enjoy your stay in Paris and benefit from exciting scientific interactions, contributing to the future scientific agenda. We also hope that the conference will facilitate, encourage and develop connections between scientists and stakeholders, allowing to draw new avenues in the research agenda engaging the scientific community to elaborate, assess and monitor solutions to tackle climate change together with other major global challenges, including sustainable development goals.

Christopher Field, Chair, CFCC15 Scientific Committee
Jean Jouzel, Chair, CFCC15 High Level Board
Hervé Le Treut, Chair, CFCC15 Organizational Committee
The accumulative carbon emissions of China and India from year 2016 to 2100 can be reduced by 69.27GtC and 57.78GtC separately, whereas the carbon emission reductions of the developed countries are smaller under carbon tax policies because of their lower abatement potentials caused by higher initial low-carbon technologies, lower economic growth rates, etc. In the simulations of four international carbon tax distribution schemes, the equality principle which is based on the population benefits China most, while the carbon emission per capita principle and the payment ability principle benefit countries with large populations and low economic developments e.g. middle & low developing countries. The study shows that the knowledge capital for improving process technology progress will increase the carbon abatements, especially in developing countries. While the investing rate of knowledge capital from carbon tax return reaches up to 50%, the accumulative carbon emissions of China and India from 2016 to 2100 will be reduced by 69.27GtC and 57.78GtC separately. However, the developing countries have relatively lower emission reductions because of their higher initial capital knowledge levels, lower carbon tax returns, etc.

P-3322-06

A bottom-up approach to improve local-scale understanding and decision making in responding to climate change

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Integrated assessment models of global change require improvements to better quantify climate change impacts and to represent the effects of adaptation decisions at local scales. This is especially relevant for understanding the consequences of local decision making on land use change processes, which varies significantly across cases. Assessment of realistic adaptation options to climate change at local scales also requires recognition of the role of governance and behavioural aspects in any modelling and analysis rather than making over-simplified assumptions such as relying solely on profit maximization. Methodologically, there is also a challenge of studying these processes through the continuum between collecting (often qualitative) data on local stakeholders’ decisions and tracing the cumulative impacts of those decisions in simulation models (often quite formal and mathematical). This paper presents an approach of model-based ways to contribute to incorporating essential human elements in decision making processes for modelling of complex socio-ecological systems, and hence improve understanding and communication about decision making in complex socio-ecological systems. The presentation then specifically tackles the challenge of bridging the qualitative and quantitative by presenting a stochastic–deterministic framework for analysing and organizing stakeholders (qualitative) into formal simulation models (quantitative). The methodology integrates cognitive mapping and agent based modelling. It cascades through a step of qualitative and numerical methods comprising: (1) Interviews to elicit mental models; (2) Cognitive maps to represent and analyse individual and group mental models; (3) Time-sequence diagrams to conceptually structure the decision making process; (4) Building an all-embracing conceptual model of decision making, and (5) A computational, in this case agent-based, model. We apply the proposed methodology (hybrid ICT) in a case study in South Australia, which faces the potential of aggravated water scarcity under a changing climate. In particular, we focus on local decision-making in vineyard holding areas and evaluate the vulnerability to SWOT (strengths–weakness–opportunities–threats) levels with respect to their understanding of risk of water shortage and chosen adaptation strategies. Finally, we use the strengths–weakness–opportunities–threats (SWOT) analysis to reflect on the methodology. Results show that the methodology leverages the use of cognitive mapping to capture the richness of decision making and mental models, and provides a combination of divergent and convergent analysis methods, deepening the understanding of decision making during the construction of an Agent Based Model.

P-3322-07

Assessing future energy and climate pathways in an uncertain World: stochastic and parametric framework in TIMES models

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Uncertainty introduces a new dimension in the decision making environment that simply cannot be captured by scenario analysis. Hedging strategy is not necessarily a combination of deterministic solutions; new options may emerge dominant with explicit treatment of uncertainty. For example, perfect foresight of no emission abatement may favor coal, and that of severe emission abatement may favor renewable sources, for near term power sector investments. However, under a stochastic cumulative emission bound, gas may become the most appealing solution for decision–makers, as it is relatively short-lived, cheap and not as polluting as coal. We see several examples of this dynamic in the runs that we propose to present.

Further, it is not easy for decision makers to assign probabilities to long-term future scenarios. While risks levels imposed in a future changing climate. Analyzing a wide range of probabilities of key uncertainties would provide more useful insights to policy makers.

To demonstrate, stochastic programming with the TIAM–World model is used for a parametric analysis of hedging strategies, varying the probabilities associated with each of two correlated technology outlooks. The stochastic–parametric analysis constitutes an original supplement to the computation of hedging strategies by identifying technologies that are robust under a broad range of probabilities. The two technology outlooks. Natural gas appears to be one of the most appealing robust options in an uncertain technological context, especially in China, given its relatively low emissions and the low capital cost of associated technologies. Natural gas and some other options are in fact considered as «super-hedging» actions, penetrating more in the hedging solution than in any of the deterministic scenarios. Nuclear power and CCS use are more robust: they depend much more on either the level of the climate target or the probabilities of the technology outlooks. The analysis also shows that technological uncertainty has a greater impact under milder climate targets than under more severe ones.

The combination of stochastic programming and parametric analysis proves to be powerful for policy formulation as it delivers useful insights with minimal assumptions from the policy maker.

P-3322-08

2030 Climate Targets in Sweden: An Integrated BU and TD Approach

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The aim of this paper is to identify the role of biomass in meeting stringent Swedish climate targets in the year 2030. This is achieved by improving the existing soft–linking between TIMES, an energy system model, and EMEC (national CGE model), with special emphasis on the representation of biomass in the two models. While the generation of electricity and heat is close to carbon-free, the Swedish industry sector and transportation has remained carbon-intensive. Biomass can play an important