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.

OUR UNDER
COMMON CLIMATE
FUTURE CHANGE

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, asses and monitor solutions to tackle climate change together with other major global challenges, including sustainable development goals.

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Use of the CORDEX simulations to with ORCHIDEE crop to assess the impact of +2/4 K climate change on crop yields in Subsaharan Africa

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The population of Subsaharan Africa is projected to increase during the 21st century. This population increase needs to be matched with an increase in the amount of food available.

The IPCC AR5 used the CMIP5 models to assess future climate impacts on a regional and global scales. Alongside the development of AR5 recent publications have changed approach to a «not if, but when» approach to passing certain climate thresholds. The +2/4/6 K global temperature changes are examples of these thresholds. The Representative Concentration Pathways (RCPs) used in AR5 were simulated using different inputs and models and therefore reach temperature thresholds at different times. Here we present the projected change in crop yields in Subsaharan Africa for global average temperature changes of +2/4 K.

In tropical regions the ability of Global Climate Models (GCMs) to reproduce realistic weather patterns is known to be poor, this is largely due to the low resolution of climate models being unable to simulate the weather conditions accurately. To counteract the low resolution issues, the Coordinated Regional Climate Downscaling Experiment (CORDEX) used several Regional Climate Models (RCMs) to focus on specific geographical regions, including Africa, South East Asia and Europe. The higher resolution RCMs are better at simulating accurate weather and can be bias corrected to remove any large inconsistencies. Models which represent the range of the CORDEX simulations have been used to drive the ORCHIDEE-Crop model. The ORCHIDEE-Crop model is the crop specific version of the ORCHIDEE land surface model. The crop specific version has been tuned to produce accurate yields with various crops including maize, wheat and rice.

In this work we investigate how maize yields will change in Subsaharan Africa at +2/4 K using data from the CORDEX experiments. The changes in yields and the responses to different stresses will be used to assess how the future climate will affect the populations in Subsaharan Africa.

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Observed long-term land cover vs climate impacts on the West African hydrological cycle: lessons for the future ?

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West Africa has experienced a long lasting, severe drought as from 1970, which seems to be attenuating since 2000. It has induced major changes in living conditions and resources over the region. In the same period, marked changes of land use and land cover have been observed: land clearing for agriculture, driven by high demographic growth rates, and ecosystem evolutions driven by the rainfall deficit. Depending on the region, the combined effects of these climate and environmental changes have induced contrasted impacts on the hydrological cycle. In the Sahel, runoff and river discharges have increased despite the rainfall reduction ("less rain, more water", the so-called «Sahelian paradox »). Soil crusting and erosion have increased the runoff capacity of the watersheds so that it outperformed the rainfall deficit. Conversely, in the more humid Guinean and Sudanian regions to the South, the opposite (and expected) "less rain, less water" behavior is observed, but the signature of land cover changes can hardly be detected in the hydrological records.

These observations over the past 50 years suggest that the hydrological response to climate change can not be analyzed irrespective of other concurrent changes, and primarily ecosystem dynamics and land cover changes.

There is no consensus on future rainfall trend over West Africa in IPCC projections, although a higher occurrence of extreme events (rainstorms, dry spells) is expected. An increase in the need for arable land and water resources is expected as well, driven by economic development and demographic growth. Based on past long-term observations on the AMMA-CATCH observatory, we explore in this work various future combinations of climate vs environmental drivers, and we infer the expected resulting trends on water resources, along the west African eco-climatic gradient.

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Regional climate modelling of the West African Monsoon regime and its use for impacts and adaptation studies in Sahelian countries

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In the context of climate change, increasingly applications are asked to better adjust adaptation and mitigation policies at regional and local levels. Regional Climate Models (RCMs) appear as useful tools to downscale meteorological and climate information and make it more meaningful to fulfill end-user needs. In the framework of the International Research Initiative on Adaptation to Climate Change (IRIACC) - Faire face aux Changements Ensemble (FACE), a joint effort has been carried out to investigate different aspects and repercussions of climate change on health and agriculture over the Sahelian region in view of various RCM projections. The presentation will focus on the ability of RCMs to improve the climate information at different time and space scales, with respect to large-scale boundary conditions, in particular their performance regarding the intraseasonal variability of the monsoon regime. Precipitation onset, which significantly affects the agricultural activities, meteorological-scale rainy systems as well as daily precipitation indices (related to occurrence, intensity, and duration of daily events) are compared with the recent past observations showing a better agreement compared to global reanalyses and global climate models simulations. However, to be really helpful and oriented to specific applications, some aspects of RCMs, namely their physical parameterizations and/or simulated processes at the scale of meteorological systems, need improvements.

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Defining genotypic adaptation targets via crop-climate modelling

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Recent literature indicates that, in the absence of adaptation, on average, climate change would reduce agricultural yields globally by 2-10 % per degree of warming. Crop breeding will likely play a critical role in