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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land-use behaviour in the study area reflects a tendency of subsistence farming. In terms of farm-households' livelihood strategy, especially the structure of the farm income, there was a growing contribution of rice and groundnuts. Accordingly, SKY-LUDAS has revealed a gradual shift among land-use types from traditional cereals farming to the cultivation of groundnuts and rice. As a result, this study has a merit of contributing to answer the critical question on whether certain adaptation decisions are stimulated by climate change. Therefore, farmers in the study area have adapted their land-use to climate change based on their income source and gradual change in the cultivated land-use in the purpose of being less dependent on the vulnerable farming systems.

P-3330-51

A Bayesian Trend analysis of annual maximum stream flows of the Oti River Basin (West Africa)

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Non-stationary analysis of hydrological extremes is crucial for characterizing hydrologic phenomena, planning and management of hydraulic and water resources systems. Moreover, Bayesian analysis appears to be a consistent framework for deriving complex statistical models and implementing uncertainties into induction problems. For this study which is conducted in the Oti River Basin, West Africa (75,859 km²), a set of discharge data from two gauging stations in Benin (upstream at Porga) and Ghana (downstream at Saboba) were obtained from the national hydrological services. These records were quality checked and preprocessed in order to derive long term annual maximum stream flows (AMSF) time series between 1952 and 2008. The Generalized Extreme Value (GEV) distribution was fitted to AMSF under stationary and non-stationary conditions. The non-stationary condition tested here is the variation of AMSF over time. To this end a time covariate was introduced in the location parameter of GEV distribution using a Bayesian approach. The results showed better non-stationary fitting for the upstream site (Porga) which exhibits significant decreasing trend in AMSF. The reservoir between the two gauging stations strongly controls the flows at the downstream gauging station which in turn affected the detection of no significant trend in AMSF while annual maximum rainfall are changing over the basin. The estimated return levels under non-stationary conditions showed a decreasing trend over time. This study provides good baseline information for climate change and flood frequency research within the basin. However, further investigations are required to understand the impact of the reservoir on the downstream discharge in general, but also on extremes and the occurrence of floods.

P-3330-52

Impact of deforestation on surface water and energy feedbacks in sudanian region of West Africa

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In West Africa, surface atmosphere exchanges have been found to impact both regional and local features of the Monsoon. At local scale the spatial patterns of evaporative fraction can drive the trajectories of mesoscale convective systems. Within Sudanian climate, ~80% of the precipitation returns to atmosphere through evapotranspiration. However, this amount and its seasonal dynamic may vary with the vegetation cover. Consequently, one might expect that any land use or climate changes could lead to the modification of the surface water and energy feedbacks, and, thus both the atmospheric and the regional water cycle. Finally, the sudanian region of West Africa is submitted to a 3% demographical increase per year, which induces a drastic expansion of crops areas. This study aims at quantifying the changes in evapotranspiration and sensible heat flux regimes caused by such a land use change under sudanian climate.

The AMMA-CATCH observatory documents evapotranspiration flux in West Africa since 2007. A pluri-annual energy budget term of a clear forest and a cropland area are analysed. It is shown that sudanian forest evapo-transpirated always more than crop areas because of agricultural practice, which cleaned to bare the crops areas with bush fires and water availability for trees. Thus, during the dry season, the cultivated areas remain bare. At the same time, more than 1mm per day of evapotranspiration rate is measured above the forest area despite the lack of precipitations. Deep rooting systems allow the clear forest to get access to water from deep soil layers for transpiration throughout the dry season. During the rainy season, low but significant differences in evaporative fraction are also observed. These differences will lead to a large deficit of the water vapour that returns to the atmosphere, and, thus, will change significantly the continental water cycle when forests will be replaced by crops. In the future, agroforestry that combines local crops (yam, manioc, millet, etc.) and sparse trees could mitigate surface feedbacks. Finally, the selected trees could provide extra agricultural products taking benefit from deep water availability, but also strengthen social equilibrium between men and women.

P-3330-53

Impact of Climate, Agriculture and Vegetation in the Sahel in the recent past : the CAVIARS Projet

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The semi-arid regions of the Earth are particularly vulnerable to wind erosion. The Sahelian region experienced contrasted climatic conditions during the last decades, with severe drought in the 70's and 80's and a relative re-greening in the recent years. Over the same period, changes in land use have occurred with an increase of the cultivated surfaces leading to a decrease of fallows and rangelands. As a result, a significant proportion of the land is bare or sparsely vegetated, and thus is not efficiently protected from the erosive action of wind. In this region, wind erosion tends to decrease the productive capacity of the soils whose fertility is already very low. In addition, the impact of wind erosion is expected to increase significantly in the near future (1) in relation with the expected changes in climate (in particular the modifications of precipitation and surface wind) and (2) in response to the increasing land use due to population increase and the related food needs.

The aims of the CAVIARS project (Climate, Agriculture and Vegetation: Impacts on Aeolian ERosion in the Sahel) are to develop an integrated modeling tool to describe the evolution of wind erosion in the Sahel in connection with climatic and land use changes, to validate this tool in the current period by making the best possible use of the numerous data sets acquired in recent years over West Africa, and to test its ability to reproduce specific events (such as the drought in the Sahel) of the recent past (about the last 50 years). This project is based on a modeling approach of this recent past (hindcasts) that is justified by the need to ensure the robustness of the simulations with different forcings prior to any simulation of future scenarios.

The proposed strategy is (1) to develop or optimize reliable modeling tools for quantifying the various terms (land use, changes in aridity...) responsible for changes in the intensity of wind erosion (2) to synthesize quality-checked observations, that can be used as direct or indirect indicators of wind erosion (precipitation time series, changes in vegetation cover, atmospheric dust load,...) (3) to implement a validation strategy based on the quantification of wind erosion both locally, measured on grazed and cultivated plots, and at the regional and continental scales.