OUR COMMON FUTURE UNDER CLIMATE CHANGE

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.

Christopher Field, *Chair, CFCC15 Scientific Committee*
Jean Jouzel, *Chair, CFCC15 High Level Board*
Hervé Le Treut, *Chair, CFCC15 Organizational Committee*

Committees

Scientific committee

- Chris FIELD *(IPCC, USA) - Chair*
- Philippe CIAIS *(LSCE, France)*
- Wolfgang CRAMER *(IMBE, France)*
- Purnamita DASGUPTA *(IEG, India)*
- Ruth DEFRIES *(Colombia University, USA)*
- Navroz DUBASH *(CPR, India)*
- Ottmar EDENHOFER *(PIK, Germany / IPCC, USA)*
- Michael GRUBB *(University College London, UK)*
- Jean-Charles HOURCADE *(CNRS- France)*
- Sheila JASANOFF *(Harvard Kenny School of Government, USA)*
- Kejun JIANG *(Nanyang Technological Univerisity, China)*
- Vladimir KATTSO *(MGO, Russia)*
- Hervé LE TREUT, France *(CNRS-UPMC/France)*
- Emilio LEBRE LA ROVERE *(National University, Brazil)*
- Valérie MASSON-DELMOTTE *(LSCE/IPSL, France)*
- Cheik MBOW *(ICRAF, Kenya)*
- Isabelle NIANG-DIOP *(IRD, Senegal)*
- Carlos NOBRE *(SEPED/MCTI, Brazil)*
- Karen O'BRIEN *(Universty of Oslo, Norway)*
- Joe JACQUELINE PEREIRA *(University Kebangsaan, Malaysia)*
- Shilong PIAO *(Peking University, China)*
- Hans OTTO PÖRTNER *(Alfred Wegener Institute, Germany)*
- Monika RHEIN *(University of Bremen, Germany)*
- Johan ROCKSTRÖM *(Stockhom University, Sweden)*
- Hans Joachim SCHELLNHUBER *(PIK, Germany)*
- Robert SCHOLES *(University of Witwatersrand, South Africa)*
- Pete SMITH (University of Aberdeen, UK)
- Youba SOKONA *(The South Centre, Switzerland)*
- Jean-François SOUSSANA *(INRA, France)*
- Mark STAFFORD-SMITH *(Future Earth, Australia)*
- Thomas STOCKER *(University of Bern, Switzerland)*
- Laurence TUBIANA *(IDDRI, France)*
- Diana ÜRGE-VORSATZ *(Central European University, Hungary)*
- Penny URQUHART *(Independent analyst, South Africa)*
- Carolina VERA *(University of Buenos Aires, Argentina)*
- Alistair WOODWARD *(University of Aukland, New Zealand)*

Organizing committee

Chair:

- Hervé Le Treut *(CNRS-UPMC)*

Members:

- Wolfgang Cramer *(CNRS/Future Earth)*
- Pascale Delecluse *(CNRS)*
- Robert Kandel *(CNRS/Ecole polytechnique)*
- Frank Lecocq *(AgroParis Tech/CIRED)*
- Lucilla Spini *(ICSU)*
- Jean–François Soussana *(INRA)*
- Marie–Ange Theobald *(UNESCO)*
- Stéphanie Thiébault *(CNRS)*
- Sébastien Treyer *(IDDRI)*

Conference Secretariat:

- Claire Weill, Head *(INRA)*
- Géraldine Chouteau *(Météo-France)*
- Aglaé Jézéquel *(INRA)*
- Gaëlle Jotham *(INRA)*
- Ingrid Le Ru *(IDDRI)*
- Benoît Martimort–Asso *(IRD)*
- Nadia Mersali *(IDDRI)*
- Catherine Michaut *(CNRS-UVSQ/IPSL)*
- Aline Nehmé *(INRA)*
- Jeremy Zuber *(INRA)*
- Aimie Eliot *(INRA)*
- Eve Le Dem *(INRA)*

Communication Advisory Board:

- Richard Black, *Energy and Climate Intelligence Unit*
- Hunter Cutting, *Climate Nexus*
- Owen Gaffney, *Future Earth/Stockholm Resilience Centre*
- Kalee Kreider, *United Nations Foundation*
- Michelle Kovacevic, *Communications consultant*
- Jonathan Lynn, *IPCC*
- Kim Nicholas, *Lund University*
- Tim Nuthall, *European Climate Foundation*
- Nicholas Nuttall, *UNFCC*
- Roz Pidcock, *Carbon Brief*
- Charlotte Smith, *Communications INC*
- Sue Williams, *UNESCO*
- Denise Young, *ICSU*
- Jeremy Zuber *(INRA)*

between the need to perform agricultural intensification, which increases emissions, and at the same time reduce emissions through the reduction of deforestation and land cover change. While the share of total anthropogenic emissions from land use, land use change and forestry (including deforestation) has been diminishing, emissions from agriculture have continued to grow steadily (Tubiello et al. 2015). Furthermore, new research has found that land management impact on surface temperature are substantial and have been overlooked up to now, stressing the need to integrate land management to improve assessment of human impacts on the climate (Luyssaert et al. 2014). This contribution has the objective to give some insights into possible synergies, trade-offs and feedback loops related to land-based mitigation measures. It builds on different research achievements of the Global Land Project, part of the Future Earth program, which hosts the largest community of active researchers and practitioners in land system science. Insights from two GLP endorsed projects related to REDD+, REDD-PAC in Brazil and the Congo Basin and I-REDD+ in Southeast Asia allow to identify methodological challenges in implementing land-based mitigation measures and assessing their impacts on biodiversity, food security and forest carbon stocks. These challenges include 1) the definition of reference emission levels in highly dynamic land use and management change contexts, 2) the estimation and integration of carbon stocks and sinks in degraded forests, abandoned lands and mosaic landscapes, 3) the need for broader and more complex criteria for forest definition, 4) matching spatially explicit data to assess possible synergies and trade-offs between desired functions of land, like for example carbon sequestration and biodiversity conservation, and 5) the assessment of just benefit distribution and risk of elite capture of incentives related to land-based mitigation. On the base of these challenges, we discuss the potential of new concepts for analyzing and measuring land-use intensity to assess the possible impacts and feedback loops related to land-based mitigation measures.

O-2218-03

Agroecological practices adopted by Malagasy farmers to reduce farms carbon footprint in the Central (Itasy) and East Coast (Analanjirofo) of Madagascar

N. Rakotovao (1) ; J. Razakaratrimo (1) ; TM. Razafimbelo (2) ; S. Rakotosamimanana (3) ; M. Jahiel (4) ; A. Albrecht (5) ; S. Deffontaines (3)

(1) University of Antananarivo, Laboratoire des RadioIsotopes, Antananarivo, Madagascar; (2) University of Antananarivo, Laboratoire des RadioIsotopes, Antananarivo, Madagascar; (3) Agrisud International, Antananarivo, Madagascar; (4) Centre Technique Horticole de Tamatave, Tamatave, Madagascar; (5) Institut de Recherche pour le Développement, Umr eco&sols, Montpellier, France

For decades, Malagasy farmers have to deal with the low performance of the agricultural system and cope with the threat of food insecurity. This low productivity is caused by various factors including lack of means of production and degradation of natural resources such as loss of soil fertility. In addition, the effects of climate variability constrained farmers to shift constantly cropping calendars. Therefore, agroecology was proposed to farmers on one hand to cope with food insecurity by increasing agricultural production and diversifying crops in order to get more sources of incomes and on another hand to restore the production environment such as watersheds, soil and water availability and to contribute to climate change adaptation. First, this work aimed to estimate the carbon footprint of farms in two regions located in the Central and the East Coast of Madagascar. Secondly, the contribution and influence of the agroecological practices adopted by farmers to carbon footprintsat farm scale was assessed. The annual flux of the three main greenhouse gases encountered in the agricultural sector including the carbon dioxide (CO_2), the methane (CH_4) and the nitrous oxide (N_2O) expressed in CO_2 equivalent is considered as the carbon footprint of each farm. Twenty smallholder farms selected from farm typologies per region were studied: twelve for the Central Highlands and eight at the East Coast. Farms located in the central region were characterized by intensification of annual cropping systems using agroecological practices such as intensified rice system which alternates flooding and drying of rice fields, composting organic residues and planting fruit trees in association with annual cropping systems. Agricultural activities of farms located in the East Coast were based on clove plantation associated with annual crops either in simple specie agroforestry or mixed tree species agroforestry and the traditional twice-a-year rice cropping system. Farm resource flow maps were developed in order to represent all of the structures and characteristics of each farm. GHG-source and -sink compartments' inventory was carried out and emission factors adapted to each zone were selected form the literature. A local/specific farm carbon footprint calculator was developed.The results showed that farm carbon footprint average amounted to 3.04 Mg CO2eq ha-1y-1and 7.69 Mg CO2eqha-1y-1 in the central and in the east coast respectively. Farms in the East Coast showed high carbon footprint because of the traditional twice-a-year rice cropping. In the Central Highlands, the intensified rice cropping system reduced the farm carbon footprint by reducing methane emission, composting organic residues reduces also farm carbon footprint up to 30% by improving carbon storage in soils. In the East Coast, agroforestry allowed a farm carbon footprint reduction between 15 to 51% due to carbon storage in woody biomass. These results showed another aspect of the beneficial impacts of agroecological practices when adopted by smallholder farmers in Madagascar, at farm scale, to climate change mitigation.

2218-POSTER PRESENTATIONS

P-2218-01

The contribution of agroforestry systems to climate change mitigation - Assessment of C storage in soils in a Mediterranean context

C. Chenu (1) ; R. Cardinael (2) ; T. Chevallier (3) ; A. Germon (3) ; C. Jourdan (4) ; C. Dupraz (5) ; B. Barthes (3) ; M. Bernoux (3)

(1) Agroparistech, Umr ecosys, Grignon, France; (2) IRD and AgroParisTech, Umr eco&sols, Montpellier, France; (3) Institut de Recherche pour le Développement, Umr eco&sols, Montpellier, France; (4) CIRAD, Umr eco&sols, Montpellier, France; (5) INRA, Umr system, Montpellier, France

Agroforestry is a land use type where crops and trees are grown together in the same place and at the same time. Agroforestry systems have the advantage of providing multiple products (e.g. wood, fruits) or services (e.g. biodiversity enhancement, erosion control) whilst maintaining agricultural production. If they are known to store carbon into the biomass of the trees, they could also increase soil organic carbon (SOC) stocks. However their impact has rarely been studied under temperate or Mediterranean conditions and has mostly concerned superficial soil layers. Our objectives were (i) to quantify and spatialize SOC stocks in an agroforestry system and in an adjacent agricultural plot, (ii) to assess what SOC fractions are responsible for possible additional carbon storage, and (iii) to quantify all organic inputs entering the soil. The trial was established in 1995 in southern France. Hybrid walnut trees are intercropped with durum wheat. SOC stocks were measured on 200 soil cores down to 2 m soil depth, and particle-size fractionation was performed on 64 soil samples. Carbon stocks of trees and of the herbaceous vegetation in the tree rows were also quantified. A trench was dug to 4 m soil depth to quantify tree fine root distribution and biomass. Minirhizotrons were installed at different depths to study tree fine root turnover. Annual additional SOC storage rates were estimated at 259 ± 59 kg C ha-1 yr-1 (0-30 cm) and at 350 ± 88 kg C ha-1 yr-1 (0-100 cm). Additional storage was mainly due to particulate organic matter fractions (> 50 µm) and 10 to 15% was associated to clay particles. When the aboveground biomass of the trees was taken into account, total organic carbon storage rate reached 1.11 ± 0.16 Mg C ha-1 yr-1. High tree root densities were observed at depth, but root turnover decreased with depth. Agroforestry systems provide higher amounts of carbon at depth than other agricultural practices, such as no-till farming, and could therefore provide a more stable C storage in the long-term.

This study was funded by ADEME within the Agripsol project as part of the Reacctif program.