ABSTRACTS & SHORT BIOS

Global and regional C budget, uncertainties and challenges in the context of the boundless C Cycle

The current global carbon budget suggests that, on average, the terrestrial biosphere and the ocean absorb roughly half of fossil-fuel CO2 emissions. A land carbon sink requires that plant productivity exceeds plant and soil respiration, but this paradigm ignores the contribution of lateral carbon fluxes that move carbon away from where CO2 is withdrawn from the atmosphere. These lateral fluxes, resulting for instance from C transport by rivers or wood and crops harvest, allow to bypass biomass and soil carbon sequestration. After a brief review of the current uncertainties in global and regional carbon budgets, this presentation will address the possible quantitative significance of the lateral carbon fluxes. We will also discuss whether they should be treated as an integral part of the current perturbation of the C cycle or merely as background fluxes moving around old carbon deposits.

Dr. Philippe Ciais, Directeur de recherche at the Laboratoire des Sciences du Climat et de l'Environnement - CEA (France)

Philippe Ciais is a researcher at the LSCE (Climate and Environmental Sciences Laboratory). His research interests include the carbon cycle, global change and their interactions with society. Philippe Ciais authored more than 200 articles in A-ranking scientific journals, including some 20 in Nature and Science. Philippe Ciais is co-chairman of the Global Carbon Observations task in GEO and of the Global Carbon Project. He is acting as Convening Lead Author in the Working Group-1 of the 5th Assessment report of the IPCC. Philippe Ciais has coordinated several European research projects. Since 2006, he is responsible for the preparatory phase of ICOS, a European research infrastructure dedicated to monitoring the greenhouse budget of Europe and adjacent regions.

Natural sources and sinks of atmospheric methane: trends and variability

Atmospheric methane is a potent greenhouse gas. Reconstructions from polar ice cores show that methane concentration varied significantly in the past along with climate changes. Natural methane variability is thought to be caused by changes in emissions from global wetlands. The presentation will focus on reconstructed methane trends and variability, and highlight biogeochemical modelling approaches used for the understanding of the past and present global methane budget.

Dr. Renato Spahni, Researcher at the University of Bern (Switzerland)

Renato Spahni is a researcher at the Physics Institute & Oeschger Centre for Climate Change Research at the University of Bern (Switzerland). His research interests include the study of greenhouse gas concentrations in polar ice cores, the natural and anthropogenic emissions of methane and nitrous oxide to the atmosphere and the investigation of climate variability at glacial-interglacial and millennial timescales. His current research is focusing on biogeochemical modelling of methane emissions and the carbon cycle. He is the author of close to thirty peer-reviewed publications, including six in Nature and Science, and was contributing author of the chapter on paleoclimate in the IPCC's Fourth Assessment Report.

Modelling the global marine carbon cycle 'end-to-end'

The ocean is a large carbon reservoir. Small changes in oceanic C content can induce considerable variations in the atmospheric CO2 concentration. The ocean has the potential to take up large amounts of human produced CO2 but needs time for this.
Ocean models are a key tool for understanding and predicting natural and human induced changes of the carbon cycle. The presentation includes a part on the approaches/methods, some recent findings (past ocean, modern ocean), and future challenges.

Christoph Heinze, Professor at the University of Bergen (Norway)

Christoph Heinze is professor at the Geophysical Institute and the Bjerknes Centre for Climate Research of the University of Bergen (Norway) where he leads the research group 'Biogeochemical Cycles'. His field of expertise focuses on the coupling between the marine carbon cycle and climate change. C. Heinze has coordinated several large scale European projects on this theme and has participated in a number of others. He has published around forty peer-reviewed articles and was lead author of the chapter in the IPCC's fourth assessment report dedicated to the couplings between changes in the climate system and biogeochemistry. He is now involved as review editor for chapter 6 "Carbon and Other Biogeochemical Cycles" of the Fifth IPCC Assessment Report (Working Group I).

Will tropical forests dieback under climate change?
Clues from year-to-year variations in atmospheric carbon dioxide.

Plants and soil are currently performing an important service for humanity by absorbing about a quarter of the emissions of CO2 from fossil fuel burning and deforestation. However, models that couple the climate and carbon cycle suggest that the fraction absorbed by the land will decrease in the future, leaving more of our CO2 emissions in the atmosphere, which would act to accelerate global warming. Unfortunately, different climate-carbon cycle models give very different magnitudes for this effect, ranging from the relatively insignificant to a potentially catastrophic acceleration associated with the dieback of the Amazon rainforest. This talk will discuss the implications of our latest research, which has found a link between the likelihood of tropical forest dieback and the year-to-year variation in the atmospheric CO2 concentration.

Peter Cox, Professor at the University of Exeter (United Kingdom)

Peter Cox is professor of climate system dynamics at the University of Exeter (UK) and leader of the "Climate Change and Sustainable Futures" research group. His research interests concern the modeling of land biosphere-atmosphere interactions and the study of climate-carbon cycle feedbacks. He has contributed to close to a hundred peer-review publications, including more than ten in Nature and Science. He was lead author of the chapter in the IPCC's Fourth Assessment Report (2007) on the couplings between changes in the climate system and biogeochemistry and is now lead author of a chapter on the evaluation of Climate models in the Fifth Assessment Report. Prof. Cox is co-chair of the Analysis, Integration and Modeling of the Earth System (AIMES) programme of IGBP.