Model-Data Fusion for Carbon Cycle Studies

International seminar

18 February 2014, Lund University, Lund, Sweden

The past decade has seen a proliferation and expansion in the availability of observational datasets and proxies relevant for characterising temporal and spatial variations in the carbon cycle from regional to global scales. Process-based models of the carbon cycle have also evolved and representations of the carbon cycling and associated feedbacks are now included as standard components in climate (Earth system) models. Despite this, future climate studies with Earth system and offline carbon cycle models reveal that much uncertainty remains as to the trajectories and geographic patterns of change in carbon stocks and fluxes in a future, high-CO$_2$ world. Approaches for inferring carbon balance that bring together process-based models, observational data such as ecosystem fluxes and remote-sensing products, and advanced statistical techniques offer promise for informing and constraining ecosystem and Earth system models, and reducing uncertainty as to future changes. These approaches rely on elaborated e-science infrastructures, in particular high performance computing systems and efficient data handling.

This seminar will gather leading experts in model-data fusion approaches for studies of the carbon cycle in the atmosphere, oceans and on land as the basis for a broad discussion of the above topic. The seminar is hosted by the Foundation for Strategic Environmental Research research programme Mistra-SWECIA and the Lund University Strategic Research Areas Biodiversity and Ecosystem Services in a Changing Climate (BECC) and Modelling the Regional and Global Earth System (MERGE) as well as the strategic collaborative research programme in e-science eSSENCE.

Draft programme

10.00 Opening and welcome (Ben Smith, Lund University)
10.10 Atmospheric CO$_2$ inversions (Christian Roedenbeck, Max-Planck Institute for Biogeochemistry, Jena, Germany)
10.35 Marine CO$_2$ modelling and inversions (Christoph Heinze, Bjerkenes Centre for Climate Research, Bergen, Norway)
11.00 Regional greenhouse gas inversions (Ute Karstens, Max-Planck Institute for Biogeochemistry, Jena, Germany)
11.25 Regional greenhouse gas inversions (Rona Thompson, NILU to be confirmed)
11.50  
Lunch

13.00  
Towards consolidation and diversification of data driven global carbon cycle products (Nuno Carvalhais, Max-Planck Institute for Biogeochemistry, Jena, Germany)

13.25  
Title TBA (David Dingwell, Uppsala University, Sweden)

13.50  
Remotely sensed vegetation water content and its potential for model data fusion (Jennifer Grant, Lund University)

14.15  
Spatio-temporal statistical methods for inverse modelling of CO₂ fluxes (Johan Lindström, Lund University)

14.40  
Coffee break

15.00  
Discussion (Mediator: Marko Scholze, Lund University)

15.50  
Closing reflections (Markku Rummukainen, Lund University)

16.00  
End of seminar

Venue: Pangea, 2nd Floor, Geocentrum II, Sölvegatan 12, Lund, Sweden

Registration by 14/2 to Anna Kristiansson (anna.kristiansson@cec.lu.se). Lunch and afternoon tea are complementary for all registered participants.